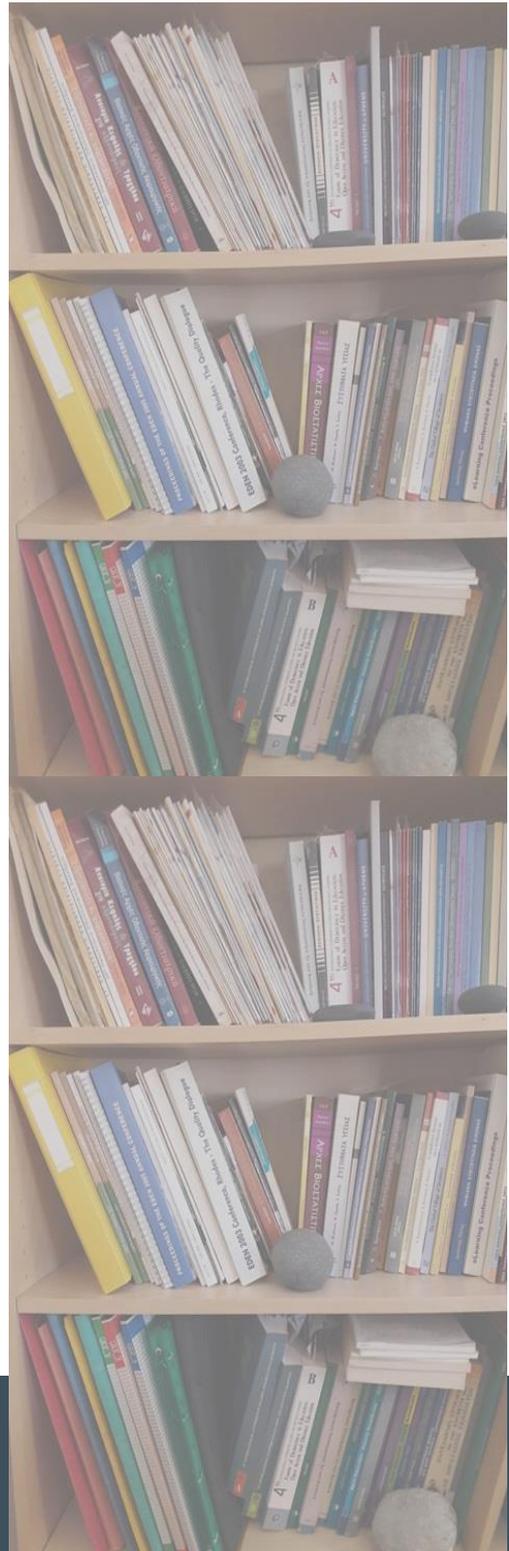


A Review of the Literature on Continuing Professional Development (CPD)

Commissioned by the General Dental Council (GDC) to inform their policy proposals for CPD development

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GLOSSARY

We present in this glossary definitions of core terms, mainly based on references used in this review. By providing a glossary, our intention is to enhance the understanding of this report rather than to establish one final 'definition' for each concept.

Active learning	A method of learning in which learners are actively involved in the learning process (opposite to passive learning). It is learner-centered and requires the active participation of learners, who must engage in higher-order thinking tasks such as analysis, synthesis and evaluation, by doing things and reflecting on them.
Academic detailing (Educational outreach visits)	Structured visits by trained professionals to healthcare practices for the purpose of delivering tailored education and training to healthcare providers. It is also referred to as educational outreach visits, educational detailing, or university-based detailing. Typically it is delivered face-to-face, but web-based technologies are sometimes employed.
Andragogy	Concerning the methods and practice of education with adult learners, in contrast to those intended for children (pedagogy).
Appraisal	A process between an 'appraiser' and an 'appraisee', focused on the appraisee's performance and achievements and involving critical reflection, identification of learning needs and planning for professional development.
Related: medical appraisal	A process of facilitated self-review supported by information gathered from the full scope of a doctor's work
Association for Dental Education in Europe (ADEE)	A European not-for-profit educational organisation, which brings together a broad-based membership across Europe comprised of dental schools, specialist societies and national associations concerned with dental education. ADEE is committed to the advancement of the highest level of oral healthcare for all people in Europe and beyond.
Audit (clinical)	A process of review of the clinical performance/clinical records of healthcare providers against best-practice standards, over a specified period of time, used to improve accountability and patient care, either in the context of governance or as a component of continuous quality improvement efforts.
Blended learning	A combination of face-to-face instruction with computer mediated learning activities, at a variety of percentages, where the educational content, assessment and interactions exist within both portions. Also referred to as hybrid learning, technology-mediated instruction, web-enhanced instruction, and mixed-mode instruction.

Coach/coaching/ peer coaching	A person with domain expertise, who supports the 'coachee'-learner in achieving specific professional goals by facilitating self-directed learning and providing training and guidance. Coaching is a one-to-one relationship, focused on the enhancement of learning and development, through increasing self-awareness and personal responsibility in a supportive and encouraging climate. Peer coaching is an interactive type of coaching, in which peers at a similar level of knowledge, engage in an equal relationship that involves observation of the task, feedback to improve performance and support in the implementation of changes.
Similar: Mentor/mentoring	Traditionally, a person who teaches or gives help and advice to a less experienced person, the 'mentee'. Traditional mentoring is a hierarchical relationship in which the more experienced person provides guidance over a sustained period of time to a less experienced 'mentee', tailored to the expertise of the mentor and the needs of the 'mentee'. Modern mentoring is a cooperative, mutually beneficial process, whereby the mentor participates in the mentee's professional development, by providing learning, advice, guidance and encouraging.
Cochrane collaboration	An international not-for-profit organisation whose mission is to promote evidence-informed health decision-making by producing high-quality, relevant, accessible systematic reviews and other synthesized research evidence.
Constructivism	Constructivism (in education) is a theory about how people learn. It argues that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. From the constructivist point of view, individuals build learning, in contrast to the traditional emphasis on experts handing information down to passive learners. Constructivists believe that adults do not learn by merely receiving information but by active engagement in the learning experience.
Continuing Dental Education (CDE)	An element of Continuing Professional Development (CPD) involving the development of specific clinical and technical skills within the field of health, relating to dentists. Activities can be categorised as formal/informal and mandatory/voluntary.
Continuing Medical Education (CME)	An element of Continuing Professional Development (CPD) involving the development of specific clinical and technical skills within the field of medicine, primarily relating to physicians.
Continuing Professional Development (CPD)	The systematic maintenance, improvement and continuous acquisition and/or reinforcement of the lifelong knowledge, skills and competences of health professionals. It is pivotal to meeting patient, health service delivery and individual professional learning needs. The term may include procedural, scientific, regulatory and ethical developments, as well as research, management, administration and patient-relationship skills.
Continuing Professional Development (CPD) for dental professionals	Learning, training or other developmental activities, which can reasonably be expected to maintain and develop a person's practice as a dentist or dental care professional, and is relevant to the person's field of practice.
DentCPD	The acronym for the European-funded project " <i>Harmonisation and standardization of European Dental Schools' programs of continuing professional development for graduate dentists</i> ". The project was initiated and supported by ADEE, led by Cardiff University and lasted from 2010-2012, producing influential and sustainable results in the field of dental CPD, both at European and international levels.

E-learning/online learning	A comprehensive concept that refers to learning facilitated and supported through the use of information and communication technologies. The broad concept of e-learning includes a range of educational methodologies, from entirely online learning to technology-assisted learning and blended learning.
EndNote	A reference management software package used to manage bibliographies, citations and references. We imported references retrieved from all databases (Ovid, Web of Science etc) into Endnote, except from the Cochrane database, and the Law databases which we kept separately.
Evidence-based practice (EBP)	The conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It integrates three principles: (1) the best available research evidence on the specific clinical problem, (2) clinical expertise of the health professional, and (3) patient's values, preferences and expectations. It started in the field of medicine (evidence-based medicine).
Experiential learning	A theory which refers to the concept of reflecting on one's experiences and learning from them. It involves active learning, hands-on learning, situated learning, as opposed to passive, didactic teaching. David Kolb, in 1984, developed the experiential learning model, including a 4-phase cyclical process: concrete experience, reflective observation, abstract conceptualization and active experimentation.
Feedback	In clinical settings, feedback refers to the specific information about the comparison between a professional's observed performance and a standard, given with the intent to improve the professional's performance.
Fitness to practice	Fitness to practice implies that health professionals continue to practice in accordance with regulators' standards, including requirements relating to the maintenance of professional skills and knowledge. It encompasses an assessment of both conduct and competence.
Focus Group	A form of qualitative research, where the researcher poses questions (related to the issue being studied) which are discussed with a group of people, providing the researcher with in-depth knowledge concerning attitudes, perceptions, beliefs and opinions of individuals regarding the topic. During this process, the researcher either takes notes or records the discussion.
Grades of quality (grades of evidence)	A system for grading the quality of evidence reported in research studies. Systematic reviews and randomized controls trials are rated as offering high quality evidence, whereas case reports and opinion papers are usually rated as low quality evidence. Limitations in the design and implementation of the study, inconsistency or imprecision of results, high probability of bias are among the factors lowering the quality of the study.
Grey literature	Refers to materials and research produced by organisations outside of the traditional academic publishing and distribution channels. Common grey literature includes unpublished reports (annual, research, technical, project, etc.), working papers, government documents, white papers and evaluations.
Interprofessional education (interdisciplinary education)	Refers to an educational situation, where members of two or more professions are engaged in learning with, from and about each other. It aims to improve relationships, increase trust and deepen understanding of other professionals' roles and responsibilities and assist in the development of communication and interpersonal skills.

Lifelong learning	All general education, vocational education and training, non-formal education and informal learning undertaken throughout life, resulting in an improvement in knowledge, skills and competences. Such learning might occur within a personal, civic, social and/or employment-related context.
Literature review	A comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. The review should enumerate, describe, summarise and critically evaluate the previous research on a topic, with the aim of identifying strengths, gaps, controversies or areas for further research and not merely provide summaries or descriptive lists.
Mandatory CPD	CPD that is mandatory for a professional, on the grounds of predefined requirements set by a competent authority (e.g. regulator or professional body), sometimes related to re-licensure or revalidation. Mandatory CPD may require activities to fulfill, e.g., minimum requirements pertaining to the number of study days or credits to be gained in a set time period, requirements for providing evidence of the CPD activity or other requirements. It may encompass both formal and informal CPD activities.
Multiple Choice Questions (MCQ)	A form of assessment in which respondents are asked to select the best possible answer (or answers) out of the choices from a list.
Multi source feedback (360° feedback)	A questionnaire-based method of assessing an individual in which multiple respondents (assessors), representing discrete professional groups, provide confidential feedback on key performance behaviours. In healthcare professions, the assessors may include doctors, dentists, patients, co-workers, allied health professionals, nurses, pharmacists, clerical and managerial staff.
Nephrology	Derived from the Greek words “nephros”= kidney, combined with the suffix –“logy”=the study of). Nephrology is a specialty of medicine that concerns itself with the kidneys: the study of normal kidney function and kidney disease, the preservation of kidney health, and the treatment of kidney disease, from diet and medication to renal replacement therapy.
Objective Structured Clinical Examination (OSCE)	A form of performance-based examination, used to assess clinical competencies in a range of skills, mainly in clinical sciences. It is a hands-on, real-life approach to learning and assessment, with standardized content and grading, which is designed to be repeatable and reliable. It includes a number of ‘stations’, each one presenting a clinical problem, through which the assessed individual rotates, while being observed and evaluated.
Oncogenetics	Derived from the Greek words “oncos”=tumor and “genetics”= birth. It is a medical discipline studying the genetic origin of cancers. It includes the identification of patients with an inherited predisposition to cancer, performing of oncogenetic tests for patients at risk, drawing family trees and other related tools and processes.
Online surveys	<i>Online surveys</i> (formerly BOS) is an easy to use, online survey tool for creating online surveys (development, deployment and analysis of the survey), designed for academic research, education and public sector organisations.
Peer review	A critical examination and evaluation of the performance of individual health professionals by members of the same profession or a team. It may be formal or informal.
Similar: Peer audit	A process of review of the clinical performance/clinical records of healthcare providers against best-practice standards, over a specified period of time, performed by peers.

Personal Development Plan (PDP)	A structured process of creating an action plan based on an individual's learning, performance and achievements, to set out the goals, strategies and outcomes of learning and training. The plan should clearly define time frames, activities and outcomes to meet the defined goals.
Problem-based learning (PBL)	An educational method (derived from andragogy) in which students are presented with real-life problems that stimulate them to discuss, reflect, negotiate and evaluate. Student responsibility and self-directed learning are emphasized and teamwork skills are also nurtured. Teaching strategies include critical thinking questions, scenarios, case studies and small group work.
Protected time	Time allocated to health professionals working in hospital/community settings for educational activities. During protected time, the health professionals are not available for their normal clinical duties and their clinical responsibilities are covered by their peers or senior colleagues.
Portfolio	A professional tool for collecting evidence of both the processes and product of learning. It encourages practitioners to engage in critical reflection on their accomplishments and current practices, gain insight into their strengths, weaknesses and learning needs, and perform prospective analysis to guide their future development.
E-portfolio	A purposeful collection of digital items (ideas, evidence, reflections, feedback, etc.) which presents a selected audience with evidence of a person's learning and ability.
Quality Improvement	A systematic approach using specific techniques and continuous actions designed to lead to measurable improvement in healthcare services and patient care.
Reflection	A metacognitive process that creates understanding of specific issues in practice through critically contextualizing, observing and analysing, to generate new knowledge and insights which can enhance practice.
Related: Reflective practice	An active and deliberate process of critically examining one's practice in which the individual is challenged to engage in self-assessment, leading to new understanding and development of new knowledge.
Re-licensure	The renewal of a professional license or certificate within a specified period of time generally linked to assessment of a health professionals' continuing fitness to practice.
Revalidation	The process through which registered health professionals demonstrate periodically that their knowledge is up-to-date and their continuing fitness-to-practice. It can be a tool for showing that CPD activities undertaken are appropriate for supporting and enhancing professional practice. It may be a prerequisite for re-licensure and re-registration, and can be linked to a professional's appraisal.
Systematic review	A way of reviewing data and results from research about a particular question, in a standardised, systematic manner. It aims to provide an objective and transparent overview of all evidence surrounding a specific question.

Other abbreviations

CDHBC	College of Dental Hygienists of British Columbia, Canada
COPDEND (UK)	Committee of Postgraduate Deans and Dental Directors (UK)
CPSA	College of Physicians and Surgeons of Alberta, Canada
EngC	Engineering Council
GCC	General Chiropractic Council
GDC	General Dental Council
GOC	General Optical Council
GPhC	General Pharmaceutical Council
HCPC	Health and Care Professions Council
IMechE	Institute of Mechanical Engineers
RPHS	Royal Pharmaceutical Society
NMC	Nursing and Midwifery Council
OTs	Occupational Therapists
RCOT	Royal College of Occupational Therapists
SRA	Solicitors' Regulatory Authority
WCPPE	Wales Centre for Pharmacy Postgraduate Education

EXECUTIVE SUMMARY

The General Dental Council (GDC) recently introduced new requirements for continuing professional development (CPD) for dental professionals under their new “Enhanced CPD” scheme and their direction of travel in relation to CPD policy is evidenced in “*Shifting the Balance: a better, fairer system of dental regulation*” (GDC, 2017). In support of their aspirations, the GDC commissioned this broad review of the literature on CPD. The research team’s extensive remit was to consider literature on CPD in relation to dentists, dental care professionals (DCPs), the dental team as a whole, other healthcare professionals and non-healthcare professionals, across the UK and internationally. Evidence is summarised in relation to the GDC’s questions to be addressed by the literature review:

Q1. What evidence is there for the following CPD activities:

- a. Interactive activities – active learning (e.g. hands-on)
- b. Peer learning
- c. Mentoring and coaching
- d. Reflection and reflective activities

Q2. What are the areas of best practice in relation to those CPD activities (a-d above)?

Q3. Is there variation across different work settings, and is there evidence of activities working more or less effectively across these settings?

Settings may include: independent/private practices, NHS practices, corporate dental practices, hospital settings, community dentistry settings.

Q4. Is there evidence of CPD choices being driven by insight and/or intelligence:

- At an individual level – for example, as a result of an audit, a quality improvement activity, appraisal (including personal development planning), patient feedback, 360-degree feedback etc.
- At an organisational level (regulators/employers/public bodies/professional bodies/expert bodies/government) – for example, as a result of this, making recommendations or mandating certain CPD activities

Q5. What qualitative-based models exist for CPD (i.e. other than quantitative measures such as points or hours-based) and which aspects of these might be considered appropriate in developing a model for dental professionals in the UK?

Research Methodology

The processes of a systematic literature review were followed. This included the development of keywords, searching databases, selection and retrieval of relevant references and data extraction. In total, data were extracted from 184 publications. In addition, an online survey was constructed and circulated widely to relevant ‘Research Area Experts’ in an effort to identify additional publications, grey literature and website links. All work was undertaken in five months from June to October 2018.

Key Findings

Question 1: evidence of CPD activities

Interactive activities

There is a variety of ‘interactive’ activities: not only hands-on supervised practice but also simulations and virtual simulations, workshops with role play, standardized patients, OSCE-type activity, facilitated small groups, patient case studies and others. A strong case is made for the importance of basing activity on adult learning principles, recognising that adults are self-directed, bring prior experience, are goal-focused and need learning to be relevant to real life/work. Experiential learning and active learning theories (in contrast to passive learning) underpin the development of interactive activities. Key points include:

- Interactive activities (for example hands-on) are a major influence on the professional's choice to undertake specific CPD courses.
- In terms of appeal and effectiveness, the relevance of the interactive activity to clinical practice, through the inclusion of real-life problems or real patients, is of primary importance.
- The reported benefits of interactive activity include enhanced confidence and strengthened clinical skills. In addition, communication skills and team-working skills are reinforced in interactive small-group activities.
- Group learning during interactive activities (e.g. simulation) strengthens clinical skills and promotes participant interaction and networking.
- Some evidence suggests that multiple learning methods and repeated interactive activities are more beneficial than isolated one-off educational activities. However, it is hard to measure outcomes on patients and/or practice. Data on outcomes are usually presented in terms of self-reported or intended changes.

e-learning

E-learning encompasses pure online learning, as well as blended learning (combination of online and face-to-face courses) and various activities with the e- prefix (e-mentoring, e-simulation, etc). There is a huge variety of e-learning delivery methods, formats and combinations of teaching models, all designed to optimise the learning process and which have been evaluated with mixed results. Authors emphasise the development of e-learning courses based on sound educational principles, i.e. adult learning principles and andragogy. Within this context, self-directed learning, self-discipline and self-assessment capabilities are prerequisites for efficient e-learning. Key aspects of e-learning include:

- The e-content should have specific attributes: be interactive, relevant and visually attractive, include self-assessment exercises and provide feedback. Relevance of content, inter-activity and feedback are also important aspects. The instructional design of the e-course aims to enhance learners' engagement with the content and promote interaction. To minimise technological problems, technology must be kept simple and inter-operable within different software.
- The importance of the inclusion of a range of experts in the development stage is stressed: academics, IT specialists, educationalists and content experts (e.g. clinical specialists).
- Positive outcomes for learners have been shown from the evaluation of blended learning. Examples show the appropriateness of this approach for interprofessional learning, specifically in community-based and hospital settings.
- Within the e-learning concept, e-mentoring and e-simulation have been implemented and evaluated, showing benefits and challenges. The benefits of e-mentoring include remote access to geographically dispersed mentors and freedom over frequency and timing of contact. The disadvantages include lack of direct observational opportunities and problems with technology. Features of effective e-simulation include: authentic situations, opportunities for interaction, reflection and feedback. E-simulation offers advantages in the development of non-technical skills, such as communication or behavioural competencies. Innovations include the use of text messaging, mobile learning and apps.
- Of particular interest is the blended learning CPD programme in periodontology, the 'Master Online Periodontology and Implant Therapy' offered by the University of Freiburg's Dental School; its first seven years of implementation were evaluated with positive results.

Peer learning

Peer learning takes a number of forms including peer review, peer support, peer feedback, peer observation, peer audit, peer discussion groups, peer interaction, peer mentoring and coaching and use of peer facilitators. Peer learning facilitates sharing of best practice and promotes high standards of practice which can be especially valuable for lone practitioners. Working together and interacting was reported to be beneficial and more likely to lead to positive changes in practice. In addition, peer learning supports reflective practice and identification of learning needs. Peer review groups can enhance interprofessional and inter-practice communication, learning and engagement, and promote mutual understanding.

Mentoring and coaching

Mentoring can take a number of forms including peer-mentoring and online mentoring. It generally takes place over a sustained time period. The modern concept of mentoring presumes that the mentor facilitates the mentee in the process of self-assessment and planning of learning activities, through interaction and feedback. Thus, mentoring promotes learning by facilitating the sharing of experience and expertise. A large portion of the literature on mentoring refers to medical practice and, in particular, to workplace-based mentoring. Important features include:

- For a beneficial mentoring experience, it is important to define roles and responsibilities of mentors and coaches and agree process and goals in advance.
- Critical thinking and reflection are inherent within mentoring; the mentoring process helps mentees to reflect on their practice and identify learning gaps, aims and career goals.
- Consideration needs to be given to the skills of the mentor or coach; one study showed that -mentoring by peers did not lead to sustained improvement.
- Mentoring may be combined with other learning approaches (e.g. peer learning, simulation, case-based discussion), resulting in positive outcomes.

Reflection and reflective activities

CPD and reflective practice are inter-related: reflection can enhance the benefit of CPD, and reflective approaches to practice can be promoted by CPD. Reflective practice is prominent within the most current CPD schemes and revalidation processes (UK solicitors, UK engineers, UK pharmacists, Ontario pharmacists and others). Key points are:

- It is argued that the ability to reflect is not inherent and practitioners may need to be educated on how to reflect. This ability increases over time and with practice.
- The impact of reflection-on-practice is enhanced when it is undertaken willingly and shared with colleagues. Peer learning, group learning, mentoring and appraisal enhance the professional's ability to reflect on their practice.
- Portfolios can be used to record learning experiences and promote reflection. Portfolio-based learning is used, for example, with UK doctors and Ontario pharmacists. Questions remain as to whether current CPD systems really foster reflective practitioners. The portfolios and other reflective exercises included within the CPD schemes have to be real opportunities for practice improvement and not just a 'box to tick' exercise within the CPD scheme.

Question 2: Areas of best practice

Best practice CPD educational activities are multifaceted. They include design, development and implementation phases, as well as the evaluation of the activity and its impact on the professionals' behaviour, skills and practice. They are based on adult learning principles and may include interactive elements, reflection, feedback, mentoring or other innovative components. Best practice activities are more likely to lead to behavioural/skills changes, ultimately leading to improved patient outcomes. Combinations of different methods include case-based discussions, practical exercises, e-learning, group learning and mentor support.

An important aspect of good practice is relating the CPD course to the participants' learning needs. Courses relevant to practitioners' daily work are more likely to motivate attendance and result in practice improvements. Sustained support after the completion of the course is another best practice feature; it can be accomplished through online materials, prolonged mentorship, virtual communities or booster sessions provided after the course. An exemplar design of a CPD activity would include: needs assessment, instructional design, evidence-based content development, assessment methods, implementation and evaluation.

Impact of CPD on practice

Evaluation of CPD activities refers to both the quality of the activity itself and the impact of the activity on the learner's practice. Few studies evaluate how CPD leads to change in practice. The limited number of papers that report on real impact on patients' health include, for example, the measurement of the number of patients successfully treated after the educational intervention or the clinical data of patients or changes in prescribing patterns.

Most studies report on changes in knowledge, skills or behaviours or the 'reported' intention of the professional to change their practice. Studies using self-reported indicators to evaluate the effect of activities are worthy, especially if evidence is gathered at three time-points: pre-event, immediately post-event and later. Long term impact evaluation is scarce, but confirms the value of sustained support in consolidating the knowledge acquired. Pre- and post- tests are frequently used, but even if the post-test confirms improved knowledge and skills, there is no certainty that these will be transferred in practice. A combination of quantitative and qualitative evaluation methods is also used to obtain a more holistic perspective of the activity's quality and impact.

Findings suggest there are benefits from CPD that uses a combination of methods and those aligned with learning needs relevant to a professional's scope of practice. Personal commitment, enthusiasm and a positive workplace environment can define the impact of learning.

Question 3: Variation across work settings

Rural settings, interprofessional learning and primary/secondary care settings

Rural practitioners have specific CPD needs related to their setting and the communities they serve, as well as to their extended scope of practice (emergency medicine, trauma). Access to CPD for isolated practitioners is an issue and innovative solutions are needed:

- Web-based, regional and educational outreach CPD activities have been identified as effective in addressing the learning needs of rural health professionals, although more evidence on their impact on practice is needed.
- Team and inter-disciplinary education has benefits: it promotes collaboration and mutual understanding and enhances peer engagement. Interprofessional CPD incorporating small-group learning using real-life clinical situations improves engagement with peers which is helpful for practitioners who feel isolated. Participants value the opportunity to interact and learn from each other, engage with peers and offer/receive support. The development of communities of practice either face-to-face or web-based can emerge through such collaborative learning activities.
- Learning in the workplace promotes team collaboration, which may enhance positive practice changes. However, evidence of improvement in patient outcomes as a result of inter-professional education is inconclusive and the effectiveness of CPD shows some variation by primary, secondary or community care setting. No evidence of variation across independent/private or NHS practices or corporate dental practices was detected in this review.

Question 4: CPD choices driven by insight and/or intelligence

On an individual level

At the individual level, CPD choices are typically informed by self-assessment of learning needs. The ability to self-assess is a skill, and professionals may need help in reflecting on their strengths and weakness and identifying learning needs.

There is consensus in the literature of the value of using a PDP or portfolio to document self-assessment of learning needs, plan CPD activity and reflect on its impact. E-portfolios have been recently used within the electronic environments of Colleges and regulators, aiming to facilitate members' activities for registration and revalidation purposes. An e-portfolio may also strengthen engagement between registrants and regulators.

Other tools to identify needs include the use of surveys and multi-source feedback. However, it is difficult to demonstrate that a portfolio of CPD activities changes practice, as it does not necessarily stimulate reflection on learning. Authors link portfolios to appraisal and revalidation processes but views are mixed: although appraisal can support reflection and the identification of CPD needs, some warn against linking it to revalidation based on arguments such as it being time-consuming, or lacking meaningful feedback and guidance.

On an organisational level

Designers of CPD programmes firstly need to identify the target audience's learning needs. CPD courses that address the learning needs of the participants are more likely to have positive effects on their practices. Regulators' and professional associations' updating of CPD systems

and requirements are informed by a series of activities, involving literature reviews, gap analysis, consultation with experts, research, feedback from their membership and piloting. Areas for improvements are also informed by audits, significant event analyses, feedback from events and observed shortfalls. CPD activities required by regulatory bodies are also governed by policy change and new regulations (either governmental- or regulatory-driven).

Question 5: Qualitative-based models

This report classified the models into two main groups: outcome-based and mixed (models which emphasise qualitative elements but which include quantitative aspects). It was sometimes difficult to assign the examples to a category and further engagement with the specific professional councils and bodies is advised. Aspects of these systems include:

- There is a clear transition from quantitative-based models to outcomes-focused ones, as the most recently updated CPD regulations are either solely or predominantly outcomes-based. This shift to outcomes-based models is in part a response to the recognised failure of quantitative based models to lead to improved performance and patient care. Features of qualitative-based models include encouraging registrant ownership, appropriate identification of CPD activities relevant to a registrant's needs, personal development planning and reflection.
- There is some evidence to suggest that a portfolio-based system is superior to a points-based system. Examples of professional groups using outcome-based models in the UK include pharmacy, engineering and solicitors; registrants are not required to amass CPD hours.
- Many systems (even those not outcomes-based) now include qualitative aspects (such as peer feedback, reflection and personal development planning). Systems of quality assurance are used to identify registrants who require greater input from peer support, mentoring and workshops.
- Some regulators have chosen to incorporate CPD within a revalidation process, others have decided against introducing revalidation. Variants of mixed models include a weighted-point system which gives greater value (more points) to interactive activity (such as peer discussion) over passive approaches (e.g. lectures, reading); and skills assessment and enhancement.

Guidance and quality management

Examples of useful supportive materials, guidance, checklists, case studies, video links, templates and apps on regulatory body websites or learning portals aim to support CPD processes and record-keeping by registrants. These easy-to-navigate websites should improve registrant-regulator engagement with continuing education. Quality assurance practices vary. Some regulators engage in the quality management of their CPD processes by requesting CPD providers to follow their code of conduct. Others do not accredit CPD providers or CPD activities.

Conclusions

Synthesising the relevant literature and outlining the approach other professionals are taking, provides the GDC with evidence which can support their development of a more qualitative approach to the delivery and monitoring of CPD for the dental workforce. This review aims to inform and further strengthen GDC policy development for dental CPD which is designed to promote registrants' sense of ownership and pride in their continuing educational achievements and in turn improve engagement between the regulator and the dental workforce.

Aspects of qualitative-based models that could be included in an outcomes-focused model for dental UK professionals include: emphasis on reflection and reflective practice, active learning, portfolios, peer (and mentor) interaction and feedback; development of online, user-friendly tools, enabling registration of required evidence; a well-designed change and implementation process; reinforcement of close engagement of registrants with regulators through easily accessible communication channels; quality-assurance mechanisms embedded in the model, valuable for both regulators and registrants. If the aspiration is to create motivation across all registrants to actively pursue meaningful, relevant CPD activities, then of course the approach to CPD should promote the concept of a responsible professional, who takes pride keeping up-to-date and enhancing their clinical and professional skills and sharing their experience with others.

INTRODUCTION

Background

Professionalism, fitness-to-practise and structured recertification processes are high on all healthcare professionals' agendas. As practitioners, all dental professionals must maintain their professional knowledge and competence, achieved through engaging in continuing professional development (CPD) activities, underpinned by the philosophy of lifelong learning. CPD is an ethical obligation; health professionals must ensure their practice is up-to-date, relevant to their scope of practice and contributes to improving patient outcomes and quality of care (General Dental Council, 2013a).

Dentists and dental care professionals (DCPs - dental nurses, dental technicians, clinical dental technicians, dental hygienists, dental therapists and orthodontic therapists) must be registered to practice. The General Dental Council (GDC) is the regulator of the dental professionals in the UK which currently number approximately 40,000 dentists and 60,000 dental care professionals. The statutory purpose of the GDC is to "*protect patient safety and maintain public confidence in dental services*" by regulating the dental team. This is achieved through the following processes described at the GDC website (General Dental Council, 2018):

- Registering qualified professionals
- Setting and enforcing standards of dental practice and conduct
- Assuring the quality of dental education
- Ensuring professionals keep their skills up-to-date through CPD requirements
- Investigating concerns where the dental professional could be a risk to patients (fitness-to-practise) and taking enforcement action where necessary.

CPD for dental professionals is defined in law as "*learning, training or other developmental activities which can reasonably be expected to maintain and develop a person's practice as a dentist or dental care professional, and is relevant to the person's field of practice*" (General Dental Council, 2018).

There are nine principles that registered dental professionals must abide by at all times (General Dental Council, 2013b). The seventh principle states that a GDC registrant must "*maintain, develop and work within your professional knowledge and skills*". The Standards listed for registrants, under the seventh principle include that they must:

7.1 Provide good quality care based on current evidence and authoritative guidance.

7.2 Work within your knowledge, skills, professional competence and abilities.

7.3 Update and develop your professional knowledge and skills throughout your working life".

This CPD is enshrined in the professional code of practice and as a result, patients should expect: "*to receive good quality care and be assured that all members of the dental team: are appropriately trained and qualified; keep their skills up to date; know their limits and refer patients as appropriate; and work within current laws and regulations*".

There is considerable variance in CPD activities, across countries and health professions, with mandatory and voluntary systems, and formal and informal CPD, sometimes existing side-by-side depending on country and profession (Barnes et al., 2013, Bullock et al., 2013). Mandatory CPD for oral health professionals is a mechanism which contributes to assuring safe patient care by ensuring that clinical and professional practice is appropriate and up-to-date.

In 2004, Europe Economics undertook a comparative analysis of CPD monitoring, audit and enforcement to inform the GDC on possible formats they might use for auditing registrants' CPD activities. They considered the auditing processes of eight UK regulatory bodies and professional associations and five non-UK dental regulators and reviewed the literature. Their findings revealed no 'gold standard' for auditing CPD activities and reported that most of the bodies, as well as the GDC, adopted a similar approach to auditing CPD. They recommended that

compliance with CPD requirements could be enhanced by ensuring registrants realised that non-compliance could lead to their removal from the dental register. The authors recommended more formal auditing of CPD, linking audit to measures of CPD outcomes and providing meaningful feedback to registrants.

However, achieving the intended aims and outcomes of CPD is challenging. In an effort to address the barriers to achieving successful outcomes from CPD, dental regulators internationally and CPD developers are now shifting the emphasis from a ‘top-down’ approach into a practitioner ‘ownership’ and ‘reflection’ approach. The objective is to encourage dental professionals to be self-motivated and take greater responsibility for their own continuing education and personal development plans and so attend to their specific needs with the ultimate aspiration of strengthening the quality of the oral healthcare they provide to their patients.

The two recent GDC publications that provide the central context for this literature review and reflect current policy on CPD are briefly outlined here, namely the “*Enhanced CPD Rules*” (General Dental Council, 2018) and “*Shifting the Balance: a better, fairer system of dental regulation*” (General Dental Council, 2017).

Enhanced CPD Rules

All dental professionals must meet the GDC’s requirements for CPD to remain registered. In 2018, the GDC introduced an enhanced CPD scheme. Central to the new system is the personal development plan (PDP). It is designed to help professionals think about their development needs and the learning activities they need to undertake in order to fulfil them. It also aims to support reflection on learning and how learning might apply to working practice.

Professionals are encouraged to use an appraisal or a needs assessment to facilitate the development of a PDP. The GDC provides an optional PDP template and activity log template for professionals to plan and record their CPD (General Dental Council, 2018). To encourage professionals to align their learning activity to the “Standards for the Dental Team” (the principles of ethical practice), all CPD activity must map to the GDC’s development outcomes, which are derivatives of the standards. As a regulatory body, the GDC also provides guidance on activities that they ‘recommend’ and ‘strongly recommend’. They note that these could be added to in the future through information and intelligence gathering from review of fitness-to-practice issues.

In addition, the GDC provides “*enhanced CPD guidance for providers*”. Any CPD activity, as well as being relevant to the registrants’ ‘field of practice’, must also meet the verifiable criteria set by the GDC, which includes quality assuring the activity. For further guidance on quality assuring CPD, the GDC suggests that CPD providers refer to the UK Committee of Postgraduate Dental Deans and Directors’ (COPDEND) “*Quality Assurance Framework for Dental Workforce Development*” (Committee of Postgraduate Dental Deans and Directors, 2018).

The GDC recognises that, while their “*Enhanced CPD*” scheme is a significant first step in promoting dental professionals’ ownership of their CPD, more work is needed to improve the value of CPD for professionals and ensure that it meaningfully contributes to patient care and public protection.

Shifting the Balance

In their publication “*Shifting the Balance: a better, fairer system of dental regulation*” (General Dental Council, 2017), the GDC recognised that engaging in CPD is inextricably linked to the maintenance of high standards of professionalism and quality care for patients.

Sparse evidence that CPD impacted on the quality of care for patients or on the performance of dental professionals was detected by Eaton et al. (2011) in their literature review. Within this context, the GDC outlined some proposals for future CPD development. These stressed the

importance of: both the dental registrants and the regulatory body taking ownership and responsibility for innovation planning and development; and professionals identifying their specific needs as applied to their scope of practice and how they provide patient care.

Throughout this publication there are references to the importance of professionals using “available information” and “intelligence” to inform their CPD activities. For the GDC as the regulator, they may use “insight” and “intelligence” to inform recommendations to registrants on specific CPD topics. Actions identified for the GDC in “*Shifting the Balance*”, relating specifically to CPD, include:

- to develop a model which encourages and enables professionals and professional bodies to take ownership of CPD
- to incorporate an emphasis on interactive CPD into the developing model, and explore the risks and benefits of this
- to incorporate a significant peer review element into the developing model, and explore the risks and benefits of this
- to explore the development of a quality-based model of CPD, based on professionals determining their development needs and on the GDC highlighting potential areas of focus through available data and evidence.

The enhanced CPD requirements and proposals in “*Shifting the Balance*” support a more innovative concept of a CPD process in which dental professionals take ownership, responsibility and pride in the CPD activities they choose to undertake, instead of merely conforming to external obligatory regulations. This approach is forward thinking and could address barriers to CPD uptake that have been previously identified, such as lack of interest and lack of time (Barnes et al., 2013, Bullock et al., 2003, Turner et al., 2012). To take forward their proposals, the GDC commissioned this review of the available literature on CPD, identifying areas of best practice nationally and internationally across the dental and other health-care professions, to help build an evidence base to inform the further development of their CPD strategy.

Aim of the Review

The aim of this project was to establish an evidence base in relation to the GDC’s policy proposals for CPD development. Through a comprehensive search of the literature, our intention was to summarise evidence related to the GDC’s CPD policy proposals, highlighting possible areas of best practice.

The Research Questions

This project investigated CPD issues in relation to the following groups across the UK and internationally:

- i. Dentists
- ii. DCPs
- iii. The dental team as a whole
- iv. Other healthcare professionals
- v. Non-healthcare professionals

Following discussions with the GDC representatives, we agreed the following research questions.

Q1. What evidence is there for the following CPD activities:

- a. Interactive activities – active learning (e.g. hands-on)
- b. Peer learning
- c. Mentoring and coaching
- d. Reflection and reflective activities

Q2. What are the areas of best practice in relation to the following CPD activities?

- a. Interactive activities – active learning (e.g. hands-on)
- b. Peer learning
- c. Mentoring and coaching
- d. Reflection and reflective activities

Q3. Is there variation across different work settings, and is there evidence of activities working more or less effectively across these settings?

Settings may include:

- a. Independent/private practices
- b. NHS practices
- c. Corporate dental practices
- d. Hospital settings
- e. Community Dentistry settings

Q4. Is there evidence of CPD choices being driven by insight and/or intelligence:

- At an individual level – for example, as a result of an audit, a quality improvement activity, appraisal (including personal development planning), patient feedback, 360-degree feedback etc.
- At an organisational level (regulators/employers/public bodies/professional bodies/expert bodies/government) – for example, as a result of this, making recommendations or mandating certain CPD activities

Q5. What qualitative-based models exist for CPD (i.e. other than quantitative measures such as points or hours-based) and which aspects of these might be considered appropriate in developing a model for dental professionals in the UK?

The Project Team and conclusions from their earlier work

A project team was created under the organisational and managerial responsibilities of the Association for Dental Education in Europe (ADEE). ADEE brings together a broad-based membership (circa 200 organisational members) across Europe and worldwide. The ADEE network is extensive and in addition to dental educators, includes professional associations, university representatives and other stakeholders. The team contained experts on dental education, continuing education, dental and educational research and systematic reviews.

This team had previously undertaken the DentCPD project (DentCPD Project, 2013) which aimed to support the modernisation of dental CPD across Europe. That study included a literature review (Barnes et al., 2013). The authors noted that “*a variety of modes of CPD delivery are available and that the level of learner engagement and the match with learning need can make a difference to the effectiveness of the CPD*”. They also recognised that it can be “*hard for dentists to implement change in practice but they can be helped by supportive colleagues*”. They concluded that “*more attention should be given to the importance of practitioner reflection, the state of the learner’s readiness to engage with education and training and the influence of the workplace environment*”. These conclusions chime with the GDC direction of travel. The value of mapping educational activities to recognised standards and quality frameworks was also highlighted by the DentCPD project (www.DentCPD.org).

The outcomes of the DentCPD project included: core CPD topics for an EU graduate dentist; guidelines for Dental Schools on the organization and quality management of CPD programmes; guidelines for dental educators on the delivery of competence-based CPD modules; and an exemplar competence-based teaching module (“*sterilization and cross-infection control in the dental practice*”) (Kavadella et al., 2013, Kossioni et al., 2013). The project’s results were

published in 2013 as a supplement to the European Journal of Dental Education (<https://onlinelibrary.wiley.com/toc/16000579/17/s1>).

Members of this project team (JC and AK) were also part of the network which reviewed CPD and lifelong learning for health professionals in the EU (EAHC/2013/Health/07, 2013). Funded by the EU Health Programme, this review considered five healthcare professions (dentists, doctors, midwives, nurses and pharmacists) across all 28 Member States. In conclusion, the authors recognised (i) the central role that CPD plays in ensuring professional practice is up-to-date; (ii) that CPD can contribute to improving patient outcomes and quality of care but research evidence on this relationship is limited; (iii) that CPD systems across Europe are highly complex and different approaches are used across professions and countries; and (iv) that cost and lack of time are the main barriers to accessing CPD activities. The report includes 22 recommendations.

LITERATURE RESEARCH METHODOLOGY

Keywords and Databases

The search strategy was designed to be comprehensive and efficient in the retrieval of the most relevant literature. In undertaking this review, the project team followed the PRISMA guidelines (<http://www.equatornetwork.org/reporting-guidelines/prisma/>). Electronic databases for papers from peer reviewed journals were searched, using a predefined range of keywords and combinations of these keywords (see Appendix 1). A glossary of key terminology was developed and is displayed at the front of this report.

The databases searched were: Web of Science; OVID Medline; EMBASE; CINAHL; SCOPUS Life Sciences, Health Sciences, Physical Sciences and Social Sciences & Humanities, Cochrane Database of Systematic Reviews. Others were included to capture educational (ERIC after 1996; British Education Index) or social sciences and psychology aspects (ISI Web of Knowledge; ASSIA after 1987; PsychInfo). HeinOnline and LexisLibrary was searched for publications related to the legal profession. Google Scholar was also utilised. Additional papers were identified by the team members through reviewing the reference lists of retrieved articles and hand searching the *European Journal of Dental Education* and the *British Dental Journal*. Websites of a selection of healthcare and non-healthcare organisations (doctors, nurses, optometrists, health and care professionals, pharmacists, solicitors) were also scrutinised.

Grey literature was also searched, with the aim of identifying areas of literature not readily detected through the literature search engines, namely: reports and documents from government agents and policy developers, reports from scientific working groups, dissertations, non-published guidelines and conference proceedings.

Research Area Experts

The project team contacted organisations and individuals who they believed would have expert knowledge of issues relating to CPD in its broadest sense, with the objective of detecting relevant published and unpublished studies or other relevant documentation. In order to achieve this objective, an online survey was constructed using the Jisc Online Survey platform. The available European and international resources of ADEE enabled this aspect of the project. The survey was based on the research questions and essentially asked for 'links' to additional documentation.

The survey was brought to the attention of respondents through presentations at the International Association for Dental Research (IADR) 2018 conference during group meetings (including the Behavioural, Epidemiologic and Health Services Research Group, the Network for Practice Based Research and the Educational Research Group). In addition, we alerted participants in the 'Game of Training' workshop and 'Altmetrics' symposium to the survey. Contacts were made with stakeholders affiliated to the UK Royal Colleges, Postgraduate Dental Deans through COPDEND, and Deans of UK and Ireland dental schools. The survey was also brought to the attention of attendees at the ADEE 2018 conference, in Oslo. In some cases, the Research Area Experts provided responses through email, including further links and copies of documents for consideration. All information from the online survey was scrutinized to identify relevance in relation to the research questions. The team also contacted authors of selected studies for clarification, where needed.

Exclusion Criteria

The following exclusion criteria were applied at the outset:

1. Not published in English language
2. Published before 2005 (publication date was included in the search filter, but there were occasional instances of publications being incorrectly listed in a database)
3. Contains no human data
4. Does not include the professionals we identify in the keywords
5. Does not include continuing education / CPD
6. Does not apply to the research questions agreed with GDC
7. Refers only to undergraduate education, vocational training or assessment

The Selection Process and Data Extraction

The process for selection (and elimination) of information gathered through the search methodology is summarised in Figure 1.

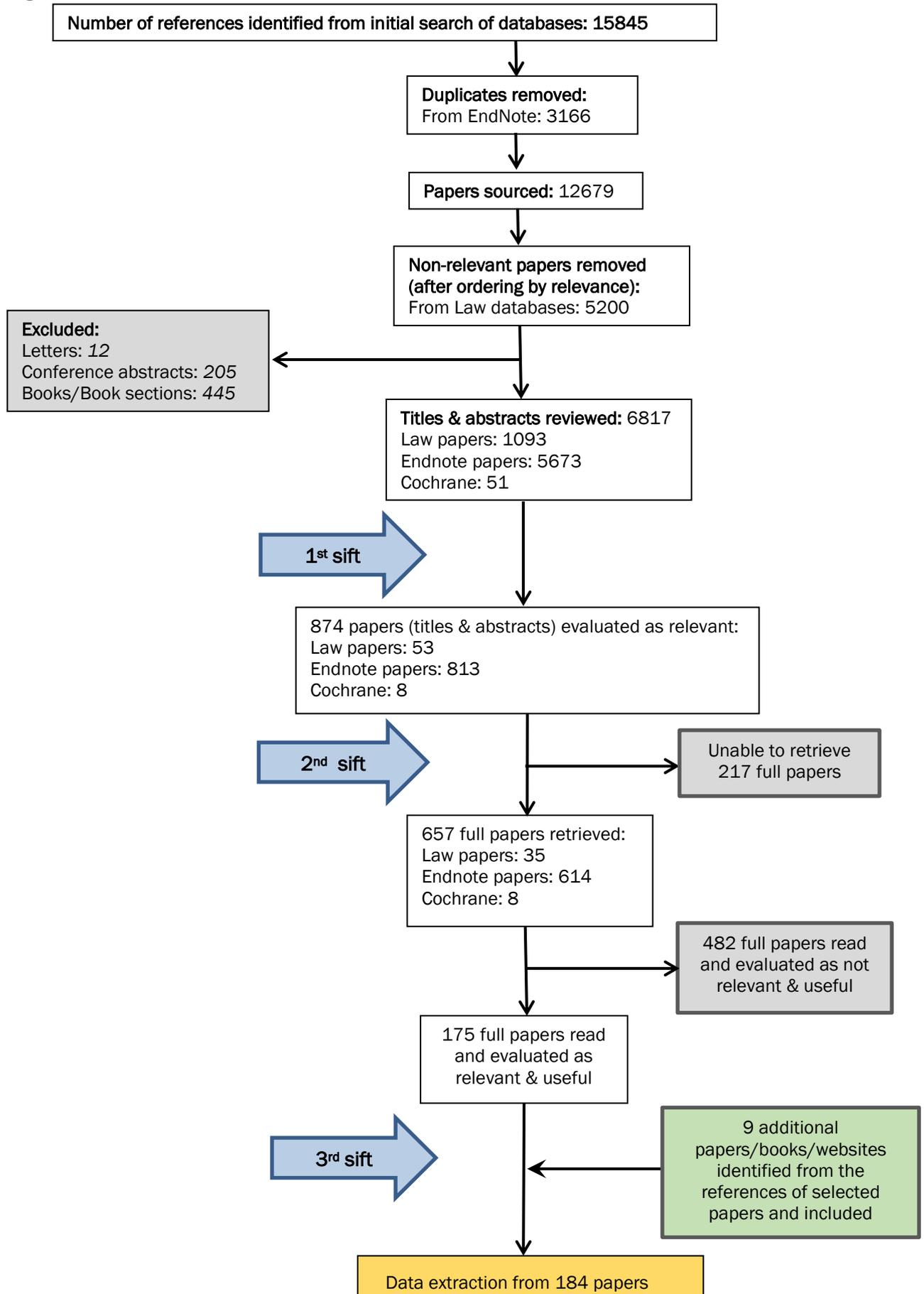
The number of references identified from the initial search of databases was 15,845. After removal of duplicates this left 12,679 papers. The number of non-relevant papers removed were 5200. It is usual during the search process that when a large number (5,000 or more) of results (papers) are identified by the search engines from the databases, the results are ordered by relevance (based on the match with search terms and their location). Approximately the first 10% are extracted and the rest are eliminated due to little or no relevance to the research objectives. This process is akin to a Google search, where the first 2-3 pages have the most relevant results and the remaining (sometimes hundreds) of pages have results of little significance. In addition, 12 letters, 205 conference abstracts and 445 books or book sections were excluded. This completed the automatic database search and elimination process. This resulted in 6817 final documents for review (law papers, 1093; EndNote papers, 5673; Cochrane papers, 51).

The hand reviewing, reading and selection process involving a series of three 'sifts' of the data. During the 1st sift, the researchers read the titles/abstracts of the papers and applied the exclusion criteria described above. To quality assure this sifting process, two members of the team independently reviewed a sample of abstracts to confirm the consistency of the application of the exclusion criteria. However, we also note that in order to select the maximum number of high quality papers, the researchers occasionally selected papers outside these criteria, specifically in two areas: a) papers referring to professionals not identified in the keywords (e.g. teachers) and b) papers not clearly including a continuing education activity (e.g. they included an interprofessional educational activity or an on-the-job training intervention or training activity that was being piloted to become a CPD activity at a later stage). These exceptions were selected on the basis of quality (as concluded from the abstract) and the high relevance to the project research questions.

During the 2nd sift, the researchers retrieved the full-text papers of the titles/abstracts they selected during the 1st sift. This amounted to 874 publications (law papers, 53; EndNote papers, 813; Cochrane papers, 8). Where texts were not accessible via our libraries, we made interlibrary loan requests. However, despite best efforts, we were unable to retrieve some papers.

During the 3rd sift, the retrieved full texts were read in full, their quality graded and the relevant data extracted. During this process, the project team members performed an additional elimination and selection process, when they identified that on reading a paper, it did not fulfil the selection criteria despite it seeming relevant on the basis of title and abstract. For example, there were a number of papers which referred to undergraduate education (students) but within the abstract they were referred to as 'study participants'.

Figure 1: Literature Search Results



At this point, the exclusion criteria were as follows:

1. Not relevant to the research questions; including the exclusion criteria applied during the first sift which were not obvious during that selection process
2. Small scale interventions, usually within a hospital, addressing a specific scientific procedure
3. Overlapping with many other, more recently published selected papers, where no new information is presented
4. Outdated or not offering meaningful evidence (mostly early years' papers, from 2005-2008)
5. Faculty development educational activities
6. Evidence-based practice

Similarly, as with the 1st sift, the researchers occasionally selected full papers somewhat outside the selection criteria, based on the exceptional quality of the paper and the high relevance to the research questions. Some papers addressing the issue of impact-on-practice were also selected, after agreement from the GDC. The final number of papers selected for data extraction from the above process was 175. Additional papers, books, and websites were also retrieved from the references of the selected papers and were included in the final report (nine papers).

During synthesis of the full texts, relevant data were recorded on a data extraction grid. In addition to a quality level grading (see Table 2), we recorded the author/title/date, country, professional group, question(s) addressed, research method and sample, CPD activity, results, conclusions and noted specific elements pertinent to the research questions. To quality assure the process, the data extraction template was initially piloted on 10 articles and reviewed by the team members. The expert advisor (AB) and the project leader (JC) then modified the template.

Study Design Quality Levels – Strength of Evidence

The resulting documented evidence retrieved through the three 'sifts' was synthesized and the strength of the study design was assessed using the five levels of evidence adopted by the National Health Service Research and Development Centre for Evidence-Based Medicine (Ball et al., 1998) and used in the review undertaken by Eaton et al. (2011) for the GDC (see Table 1).

Table 1: Study Design Quality Levels

Grade I	Strong evidence from at least one systematic review of multiple, well-designed, randomised control trial/s
Grade II	Strong evidence from at least one properly designed, randomised control trial of appropriate size.
Grade III	Evidence from well-designed trials without randomisation, single group studied pre and post intervention, cohort, time series of matched, case-control studies
Grade IV	Evidence from well-designed, non-experimental studies from more than one centre or research group
Grade V	Opinions of respected authorities, based on clinical evidence, descriptive studies or reports of expert committees

In Table 2 we provide an overview of the evidence quality of the texts used in this review. Some texts are reported in more than one section. In total, 175 texts were graded for quality. Websites were also included in the review although the information was not graded for quality. A total of 79 website links were reviewed: 42 websites were consulted in relation to the areas listed in questions 1 and 2 (six for interactive activities, 17 e-learning, four peer learning, two mentoring and coaching, 13 reflective practice); five websites were used in question 3 relating to work

settings; 26 were consulted for question 4 (insight and intelligence); and six in relation to CPD models in question 5. Some of these provided information across more than one question/area.

Table 2: Study Design Quality Levels of the texts referred to in this literature review

Section	Quality level					Total
	1	2	3	4	5	
Q1 Introductory section	3	1	8	8	9	29
Interactive	4	-	12	4	7	24
e-learning	1	-	12	4	7	24
Peer learning	2	-	5	5	-	12
Mentoring and coaching	1	1	5	5	5	17
Reflection, reflective activity	1	3	2	2	4	12
Q2 Best practice	1	1	11	4	2	19
Impact-on-practice	4	1	12	5	4	26
Q3 Introductory section	5	-	7	4	1	17
Rural settings	2	-	2	3	3	10
Interprofessional	1	-	3	4	2	10
Q4 Insight & intelligence	2	-	5	7	8	22
Individual level	1	1	2	8	8	20
Organisational level	-	-	-	2	9	11
Q5 CPD models	1	-	-	-	8	9
Total	29	8	86	65	74	262

NOTE: Some texts were referred to across more than one section, so totals do not cross refer to those in Figure 1.

Data from the online survey and additional contacts

The online survey resulted in 23 direct online responses from individual stakeholders and those allied to specific organisations/institutions. In addition, two pdfs of the survey were received as email attachments (a total of 25 completed surveys). There were eleven responses from individual colleagues – six from the UK and five from across the EU. There were 14 responses from individuals affiliated to organisations/institutions – 11 from the UK and three from the EU (see Appendix 1). In addition, the team lead had email communications, telephone-calls and face-to-face conversations with a significant number of colleagues (see Appendix 2). These colleagues and groups provided a significant number of website links for the project team to review. The authors are very grateful to those who provided information.

LITERATURE SYNTHESIS

The findings of this report summarise information retrieved from 184 documents. When the full texts were scrutinised, the final number of publications considered most relevant to the research questions and referred to in this report was 175. Additional relevant material was identified from the references of the selected papers (four papers, four web pages and one book). A further 41 references were identified in the survey responses (33 web pages, four papers, and four reports).

The literature synthesis is arranged in five sections related to the five research questions. A synthesis of the key points is recorded at the end of each section.

Question 1: Evidence on specific CPD activities: interactive, e-learning, peer-learning, mentoring/coaching, reflective practice

In this section we present a synthesis of the literature relating to Question 1. Key themes emerged through reviewing the relevant literature. They included: the pedagogical foundations of the CPD activities, the relevance of the activity to daily practice, the impact-on-practice and on the professionals' knowledge and skills, and the peer-component as a motivating factor contributing to CPD effectiveness.

The pedagogical pillars of CPD activities are considered fundamental for the effectiveness of the activities (Albert and Hallowel, 2013). They are based on the adult learning principles, as defined by Knowles et al (1984). As explained by Casey and Egan (2010), adult learners are independent and self-directed, they have previous experiences, are goal-oriented and motivated to learn in order to tackle real-life problems (Bennetts et al., 2012, Decelle, 2016, Jennings, 2007, Zhang and Cheng, 2012). These ideas relate to the theory of constructivism whose advocates argue that learning is an active process and knowledge and meaning is constructed through experience and reflection on that experience; 'experiential', 'self-directed' and 'problem-based' learning are all expressions of constructivism (Wareing et al., 2017, Decelle, 2016, Libin et al., 2010). With constructivism, the adult learners are actively engaged in the learning experience with the aim of broadening and updating their knowledge, building on their previous experiences and merging new knowledge with established learning (Borgerson and Dino, 2012, Wareing et al., 2017).

The relevance of the educational activity to professionals' daily practices is another issue highlighted within the literature (Allaire et al., 2012, Berggren et al., 2016, Dadich, 2010). For example, Koch et al. (2014) in their study evaluating a training course on clinical and organisational changes in Swedish endodontic practices, concluded that relevance to clinical practice and facilitation of individual learning styles were the most important aspects of the training process. The relevance of the CPD activity to daily practice also affects its impact on the professionals' behaviours and skills and ultimately its impact-on-practice. Educational interventions that include hands-on training, real-life problems, simulation and application opportunities are reported to have the potential to maximize the effectiveness of the CPD (Chung et al., 2018, Dadich, 2010, Libin et al., 2010, Luisa Gracia-Perez and Gil-Lacruz, 2018).

A peer-component, in its many forms (peer learning, peer review, peer support, peer feedback, peer coaching and mentoring, peer observation, peer assessment, peer communication, peer facilitators), was another recurrent theme (Registered Nurses' Association of British Columbia and College of Registered Nurses of British Columbia, 2008, Armson et al., 2007, Austin et al., 2006, Aschbrenner et al., 2016, Beasley et al., 2017, Borus et al., 2017, Bowie et al., 2005, Bryant et al., 2015, Bullock et al., 2014, Chapple et al., 2010, Cunningham and Zlotos, 2016, Cunningham et al., 2014, Berkhout et al., 2018). For example, the role of peers in enabling CPD was a key theme identified in a qualitative study on pharmacists' continuing education (Austin et al., 2005) and peer-communication was a key theme identified within a systematic review of e-learning for health professionals in UK. (Carroll et al., 2009)

Interactive activities

In this section we describe the literature reporting the use of interactive activities. When thinking about interactive activity for practitioners, perhaps the first things that comes to mind is hands-on learning and indeed the literature reports numerous studies of this type of active learning (see for example (Adler et al., 2005, Aeby et al., 2014)). However, there are various other examples of interactive activities including CPD based on OSCEs (objective structured clinical examination) (Arnold and Walmsley, 2008), workshops with standardised patients (Austin et al., 2006) and simulation activity (Brisard et al., 2016). Among the interactive activities, the Nursing and Midwifery Council (NMC) includes: structured learning (direct or by distance learning) when participatory; accredited college or university-level education or training when participatory; learning events such as workshops, conferences, coaching and mentoring in a specific skill; structured professional clinical supervision; short supervised practice for specific skills development; group or practice meetings outside of everyday practice (e.g. to discuss a specific event or new way of working); participation in clinical audits, practice visits to different environments relevant to scope of practice; and training or shadowing related to job rotation or secondment (Nursing and Midwifery Council, 2018).

A Canadian study demonstrates the range of interactive activities and presents a case for their inclusion within programmes for CPD. The study explored family physicians' motivations to participate in training programmes on the topic of shared decision-making (Allaire et al., 2012). From questionnaire data, they detected that the interactive approach of the training in this study was a major incentive for attending similar programmes in the future. Particularly highlighted was the use of videos and reflective exercises, which facilitated group discussions and the provision of patient decision-making support tools. The authors recommend that developers of CPD programmes in this topic (shared decision-making) should include a mix of educational techniques. Support for the inclusion of interactive activities was also shown in a UK study of optometrists' vision-screening of people with intellectual disabilities (Adler et al., 2005). The authors found increases in self-reported knowledge, confidence and change of attitudes amongst those who received both lecture-based training and hands-on supervised practice, in comparison with a group who received lectures-only. They conclude that training that incorporated clinical experience and the use of real patients, was particularly effective. In a study of training for UK dental practitioners in the technique of electrosurgery, Davies et al. (2007) describe interactive, simulation hands-on courses. The sessions were in small facilitated groups. The educator / participant engagement was viewed as a positive aspect. In the responses following the sessions, a significant number of practitioners felt confident to use the electrosurgery technique and retained the knowledge acquired during the sessions.

Conclusions from a non-systematic review of ultrasound training for doctors (Aeby et al., 2014) are that hands-on learning and simulations are effective in continuing educational courses, based on adult learning principles which allow participants to drive the learning agenda. Principles of adult learning were also highlighted in a literature review as part of the development of a training framework for engineers in the US (Albert and Hallowel, 2013). The authors argue that adults are motivated to learn collaboratively and where the focus is on finding solutions to real-life problems. Referring to Knowles et al. (2011), the same authors recommend that CPD programmes should be learner-centric and adopt andragogical principles which "*facilitate mutual inquiry using mutual and inductive learning processes*", rather than providing authoritative instructions. Andragogy recognises that adults learn differently to children: for example, adult learners tend to be self-directed, bring prior experience, are goal-focused and need learning to be relevant to real life/work.

Although supporting the effectiveness of interactive activities, a study of the CPD of physical education teachers in Belgium, based on a literature review and discussions with teachers, found not only that they highly valued opportunities for active participation, collaboration and experiential learning (e.g. microteaching), but also that they emphasised the essential place of theoretical knowledge (Aelterman et al., 2013).

A study by Arnold and Walmsley (2008) described the development and implementation of an OSCE-style CPD activity for UK-based dental practitioners (GDPs). The format included an introductory seminar, discussion of questions in pairs, followed by individual written answers. The aim of the course was not only to remind and update the GDPs' subject knowledge but also to highlight knowledge gaps and signpost them to courses as needed. The evaluation demonstrated that the OSCE activity highlighted areas of weakness in knowledge of certain clinical procedures and how participants appreciated the hands-on component. The value of patient case studies is evidenced in a study by Koole et al. (2015) who reported on an "active learning" training programme for dentists and hygienists, in Belgium and Sweden learning from periodontal patient case studies. The participants agreed that the learning objectives were of particular relevance to their daily clinical practice.

Some of these elements were also evident in a full-day peer learning workshop for Canadian-based pharmacists (Austin et al., 2006). Participants were selected as those who failed to meet standards of practice expectations. The workshop included an introduction to using drug information resources and structured patient-interviewing techniques to elicit information using standardized patients. Participants' learning was then evidenced through a peer review assessment process (at which point 69% of participants demonstrated that they then met the professional standards), a written test and an OSCE.

Other studies, focused on medications, have emphasized the importance of multiple and interactive learning methods. Pimenta et al. (2014) compared the effect of 'active' and 'passive' educational activities on the management of hypertensive patients by primary care physicians in Brazil. The 'active' approach included small group discussion, a workplace visit and follow-up guidance and information. The other group just received the guidelines. The active learning group showed improvement in the prescription of a variety of medicines and more evidence of counselling patients about diet and the risks of cardiovascular disease. However, the authors report no improvement in outcomes for patients between the two groups. A team from Finland (Holmström et al., 2015) investigated the development of an interdisciplinary course supporting medication safety for healthcare professionals. They conclude that the combination of interactive learning opportunities and work-place learning, pre and post reflections and more innovative approaches supported the effectiveness of the course. Hughes and Schindel (2010) investigated the value of CPD supporting medicines management by pharmacists, utilising interactive workshops and distance learning sessions. The participants reported they believed their knowledge had improved as had their confidence in undertaking medicines management. In addition, the participants could demonstrate situations where they had made positive changes to their practice. The activities helped participants to identify personal learning opportunities and utilise reflective practice.

Hurst (2013) in a systematic review of CPD for dentists, concludes that the combination of routine didactic learning opportunities in parallel with a variety of interactive opportunities strengthens learning and is more likely to stimulate improved changes to clinical practice. Kang et al. (2014) developed a modular based programme for primary care healthcare professionals, which also comprised multiple components. The programme included "self-directed learning, interactive tutorials with experts, small group, discussions, case studies, clinical training, one-on-one mentoring and individualized learning objectives". Based on self-report, the participants in this intensive programme improved all areas of their management of chronic HIV disease patients.

The challenge of measuring improvement to practice, following a CPD activity, is highlighted in a study by Brisard et al. (2016) who report on a continuing education programme for French physicians on the management of the difficult airway. The activity included workshops and high-fidelity full-scale simulation sessions. Participants completed questionnaires at three time points: pre-programme, post-programme and a year following the programme. Through the process of self-reporting, participants described a sustained increase in their expertise and changes to their clinical practice. A noted limitation of the study was the lack of on-site evaluation of these self-

reported improvements. Although this might provide a better measure of impact-on-practice, it was judged difficult to achieve for cost and logistical reasons. The issue of measuring impact-on-practice resulting from an educational activity is discussed further in a later section.

A study involving Australian nurses investigated the use of web-based and face-to-face clinical simulation CPD activities (Chung et al., 2018). Whilst the web-based case discussions facilitated access to learning opportunities for nurses, the hands-on clinical simulation sessions strengthened clinical skills and promoted participant interaction and networking. The outcomes were assessed pre- and post-course using an actions check-list (designed to evidence competence), an MCQ assessment of knowledge and self-reported views on confidence levels. The authors concluded that improvements to practice could be achieved through a blend of face-to-face and distance learning experiences. Other researchers (Aebbersold and Tschannen, 2013) report a non-systematic review of the impact on clinical practice of simulation training for nurses, ranging from “*simple role-play*” to high-tech and virtual simulation. They conclude that simulation is beneficial for training nurses in new procedures which could include communication and technical skills as well as non-skills-based activities. This study also demonstrated some of the variety of forms of interactive learning. Further positive results of simulation were found by Kane et al. (2011) in their study with nurses in the USA carrying out videoed simulation of resuscitation followed by review discussions as a group. They report statistically significant differences between pre- and post-simulation scores and self-reported improvement in skills, knowledge base and confidence in resuscitation a year later. Based on an examination of 69 systematic reviews, meta-analyses and literature reviews of evidence-based practice for clinicians and the healthcare team in relation to simulation activities, Dadich (2010) suggest that the effectiveness of simulation is enhanced by feedback during the session, repeated practice and increasing degrees of complexity.

Another form of role play is described by Brüggemann and Persson (2016). They used ‘forum play workshops’ in an effort to develop the skills of practitioners in reducing and preventing abuse in the health-care workplace. The study mainly included nurses involved in a Swedish nephrology clinic. Participants acted out scenarios in a theatrical format. They were encouraged to reflect on their own actions and those of the other colleagues in the group and to note any changes they might introduce in their own future approach to abuse as a result of this peer interaction. The response to forum play was positive both in terms of a learning method and in promoting colleagues working together to address issues. However, it was felt that for the benefits to extend beyond the participants, it would be important to have an approach which included all members of staff.

In a synthesis of systematic reviews of continuing medical education (CME) effectiveness (in terms of physician performance and patient outcomes), undertaken in the US by Cervero and Gaines (2015), the authors conclude firstly, that CME improves both physician performance and patient health outcomes, although the positive impact on physician performance was more reliable than the impact on patient health outcomes. In terms of interactive activities, the review draws the important conclusion that CME activities that are “*more interactive, use more methods, involve multiple exposures, are longer, and are focused on outcomes that are considered important by physicians*” lead to more positive outcomes. They recommend that these strategies are implemented in the design of CME. In another synthesis of reviews of behaviour change interventions (mainly designed for family physicians), undertaken in Canada by Chauhan et al (2017), the authors conclude that “*interactive and multifaceted continuous medical education programs, training with audit and feedback, and clinical decision support systems*” were beneficial in “*improving knowledge, optimizing screening rate and prescriptions, enhancing patient outcomes, and reducing adverse events*”. Echoing a point also raised by Brüggemann and Persson (2016), they conclude that “*collaborative team-based policies involving primarily family physicians, nurses, and pharmacists were found to be most effective*”.

Some of these conclusions are reiterated in the consensus view of CPD in relation to periodontology reported by Chapple et al. (2010). They also argue for combining different

methods that are active and learner-centred. Dadich (2010) too, in a systematic review, also argues for multiple methods and suggests that to be effective, interventions designed to disseminate evidence-based information to clinicians should consist of a multi-blended approach. Grindrod et al. (2006) investigated how Canadian pharmacists strive to improve their prescribing practice. From their systematic review, they note that carrying out activities such as audits, involvement in feedback, mentoring programmes as part of educational visits and 'multifaceted' interventions are the most efficient ways of promoting an improvement in the practice of prescribing.

Key points

- There are a variety of 'interactive' activities: not only hands-on supervised practice but also simulations and virtual simulations, workshops with role play, standardized patients, OSCE-type activity, facilitated small groups, patient case studies and others.
- A strong case is made for the importance of basing activity on adult learning principles, recognising that adults are self-directed, bring prior experience, are goal-focused and need learning to be relevant to real life/work. Experiential learning and active learning theories (in contrast to passive learning) underpin the development of interactive activities.
- It is highlighted that interactive activities (for example hands-on) are a major incentive for participants to choose the specific CPD course. In terms of appeal and effectiveness, the relevance of the interactive activity to clinical practice, through the inclusion of real-life problems or real patients, is of primary importance.
- The reported benefits of interactive activity include enhanced confidence and strengthened clinical skills. In addition, communication skills and team-working skills are reinforced in interactive small-group activities. Group learning during interactive activities (e.g. simulation) strengthens clinical skills and promotes participant interaction and networking.
- Many authors recommend including a mix of active and learner-centred techniques in CPD programmes. For example, small group discussion can be combined with workplace training and reflective exercises or hands-on activities can be complemented with web-based courses, tutorials and mentoring. There is some evidence to suggest that multiple learning methods and repeated interactive activities are more beneficial than isolated one-off educational activities.
- However, it is hard to measure outcomes on patients and/or practice. Data on outcomes is typically presented in terms of self-reported change in confidence, knowledge or skills and intended changes in practice. It is especially difficult to measure change in patient outcomes. We discuss the issue of measuring the impact of CPD on practice later in the report.

e-learning

For more than a decade, the healthcare community has been witnessing an exponential growth of web-based continuing education. For example, a report assessing the CPD provision for chiropractors concluded that although “*most CPD is delivered through face-to-face seminars that combine theory and hands on practice, there is evidence of increasing provision of different types of online learning*” (General Chiropractic Council, 2014). A huge variety of delivery methods, formats and combinations of teaching models, aiming to optimise the learning process have been proposed and evaluated, with mixed results. Online learning may present a cost-effective, time-efficient and sustainable alternative or complement traditional learning for the purpose of delivering up-to-date scientific developments to healthcare professionals. Improved access to affordable hardware and software, fast and reliable networks and the increased popularity of everything that has the prefix e- in its title have contributed to the expansion of technology-mediated educational activities. Apart from online learning (e-learning, web-based learning), which involves solely web-based components, the blended learning approach (web-based and traditional face-to-face elements) has also been extensively used, as well as different combinations of the e- prefix (e-simulation, e-mentoring, e-portfolios, etc). Issues of learner engagement, content design and delivery, assessment methods, evaluation and ongoing development, as well as impact on skills, behaviours and practice are constantly researched.

In a systematic review of e-learning, offered by universities and other institutions, Caroll et al. (2009) explored the “*learning techniques that would most enhance the learning experience of health professionals in UK*”. They identified five key themes: “*peer communication, flexibility, support, knowledge validation and course presentation and design*”. They conclude that the “*effectiveness of online learning is mediated by the learning experience*”. They also highlighted that case studies or scenarios that are directly relevant to the everyday profession contribute to the achievement of the learning objectives of the e-course and that peer-interaction and discussion forums increase learners’ engagement. Similarly, Merzouk et al. (2014) assert that the key factors contributing to successful e-learning are (i) learner engagement with the online course (ii) course design stimulating the learner’s professional development and (iii) communication possibilities.

The teaching approach and course design are the pillars of e-learning. The common theoretical framework for the development of online CPD courses is constructivism. Constructivism underlies the principles of andragogy, active learning and problem-based learning (Decelle, 2016). It is interesting to note that the majority of the more recent papers retrieved for this review (and the educational activities referred within them) have emphasized the importance of basing the development of e-learning courses on sound educational principles. Shichtel (2009) in their review of e-mentoring for UK doctors, conclude that successful e-mentoring activities were “*driven by educational principles*”. Similarly, the training intervention for UK optometrists (including simulation and e-mentoring) adopted “*social constructivism*” as the education theory (Jarvis and Ker, 2014). In the USA, Borgerson and Dino (2012) launched a series of “*interactive synchronous webinars*” to educate clinical research professionals, based on constructivist learning. The webinars included eight case scenarios on “*reporting adverse events in paediatric oncology clinical trials*”. Questionnaire data revealed that participants highly valued the interactivity and immediate feedback of the webinars and confirmed that the training would support their ability to report adverse events. They thought that this was further translated into their clinical practice. Other authors have suggested that the underlying constructivist theory enabled learners to integrate their previous knowledge and experiences into their current clinical situation. Adult educational principles were used for the e-modules (part of the blended learning process) for the postgraduate training of Canadian family physicians (Kadlec et al., 2015) and for the development of a multimedia programme for Australian health professionals (El Sayed et al., 2012).

The design of e-courses and modules aims to enhance learners’ engagement, build communication pathways and promote interaction. Alexander et al. (2010) identified the

principles that guided the development and delivery of training modules for public health practitioners. According to these authors, developers should: *“link the content to competencies and assessed needs, base the design on appropriate cognitive learning levels, develop reusable learning objects, provide technical support and feedback, and continuous evaluation and updating”*. Kavadella et al. (2013) provide specific recommendations for the development of e-modules. They emphasize that this is a team process, involving academics, IT experts, librarians and educationalists, and proposed that the e-modules should be *“attractive, relevant and interactive, promote critical thinking”* and offer feedback.

Online education can present challenges for both tutors and learners. Atack and Luke (2009) reported the problems mentioned by nurses participating in an online course to improve infection prevention. The problems they identified include: inadequate feedback, time-consuming courses and hospital computer systems blocking or slowing down the video downloading. Kavadella et al. (2013) suggest that technology should be *“kept simple and interoperable within different systems and software”*.

Evaluations of blended approaches have shown positive results. A blended learning approach was implemented by Blazer et al. (2012) in the USA for the education of community-based clinicians (nurses, primary physicians and genetic counsellors) on genetic cancer risk assessment. It comprised of three elements: distance learning, face-to-face workshops and *“12 months of professional development”*. The distance learning part included five web conference sessions, during which participants were required to populate a worksheet covering reflective learning, and to keep notes on their questions, subjects of learning and reflections on cases. The knowledge, skills and performance levels were measured before and after the learning intervention. Those who took part in the group work in parallel with distance learning displayed improvement in all measures compared with those who took part only in the workshop groups. Ilott et al. (2014) evaluated a blended learning work-based programme used to educate UK stroke rehabilitation nurses about dysphagia. The programme consisted of a training session and three e-learning courses and had positive learning outcomes. Changes in the participants' knowledge, skills and attitudes were measured through observational records and questionnaires at four time intervals. Self-reported improvement in all three areas was evident immediately after the programme and after a further six months. McHugh et al. (2010) describe a blended approach used to educate surgeons working in Ireland on best practices in relation to infection prevention. The intervention included *“posters, lectures and practical demonstrations”*, complemented by e-learning on a dedicated website which hosted the *“PowerPoint tutorials in the form of Flash audiovisual movies, the streaming videos demonstrating best practice and the database of interactive clinical cases; weekly podcasts were available for free downloading on the iTunes store”*. On the basis of a 5-month audit, the authors identified deficiencies in compliance with standards. They report that the web pages were accessed over 8000 times in a 6-week period; 43% of these were visits to the interactive clinical cases. On average, users spent about one hour per visit and 30% visited multiple times.

Of particular interest to dental continuing education is the blended learning CPD programme in periodontology, the 'Master Online Periodontology and Implant Therapy' offered by the University of Freiburg's Dental School (Ratka-Krueger et al., 2018). The programme aims to educate dental professionals on the theoretical concepts and practical skills of periodontal therapy, as well as equip them with communication, leadership and team-work soft skills. The programme consists of 12 modules, comprising 110 European Credit Transfer and Accumulation System (ECTS) credits. The online portion of the programme was structured to reflect a virtual classroom, where learners could present their own patient cases and discuss them with the tele-tutors and peers. It includes modules presenting the learning material in a sequential process, comprised of lectures, videos of periodontal surgery, interactive PowerPoint presentations, pdf articles and 3D animations. Self-assessment opportunities exist through training sessions where dentists can interactively manage complex patient cases. Tutoring by certified tele-tutors assist the learners throughout the online learning phase. The online phase is followed by the attendance phase, where dentists perform surgical operations on patients in the University of Freiburg campus. The

results of the 7-year operation of the programme are summarised by Ratka-Krueger et al. (2018). Interviews with students and teachers revealed positive outcomes of the programme, both in relation to skills acquisition and the blended methodology.

E-mentoring refers to mentoring in the e-learning environment. In their review of e-mentoring of UK doctors, Ayello et al. (2017) identified specific advantages and challenges of the e-mentoring learning method: learners may have the unique opportunity to be mentored by mentors in geographically remote places; they could communicate online at convenient times and as frequently as they wished; they could decide upon synchronous or asynchronous communication; and they could discuss personal or sensitive issues in their private online space. The challenges of the method included the lack of face-to-face interaction and therefore lack of direct observation of behaviours and skills, and possible technical problems. The authors conclude that for e-mentoring to be efficient it should be driven by the learning needs of mentees and by educational principles. The supporting technology should be regarded as merely the means to achieve positive results. E-mentoring has been used with UK optometrists to support them after training on extending their role in primary eye care (including prescribing, monitoring eye conditions not requiring treatment, monitoring in secondary care) (Jarvis and Ker, 2014). This comprehensive CPD programme was developed by a team of experts in ophthalmology, simulation, optometry and education. It includes the use of simulation to enable optometrists to acquire and practice the necessary skills in a safe environment. The final stage of the programme aims to help optometrists apply the newly acquired skills in their workplace. This is achieved "*via a peer and senior e-mentoring approach*". An NHS email address is set up for the participants to enable both peer support and access to a consultant ophthalmologist for advice on challenging cases and on decision-making. For the evaluation, data were collected from a pre- and post-course assessment of knowledge, MCQ test with open-ended questions and post-course questionnaires. The programme evaluated positively and skills in the working environment were shown to have improved as a result of this continuing educational support process.

The *Mentored Quality Improvement Impact Program (MQIIP)* in the USA is part of an educational initiative aimed at promoting the safe use of insulin pens in hospitals (Lutz et al., 2016). During the MQIIP programme, which also includes web-based resources (webinars, links to literature and recommendations, toolkits, interactive videos), pharmacists with expertise in glycemic control and medication safety provide distance mentoring to nurses, physicians and hospital pharmacists (interprofessional teams) in 14 hospitals. Data were collected from pre- and post-intervention questionnaires and an audit of insulin pen management. Results indicate that there was a significant improvement in nurses' knowledge of managing the insulin pens, despite the short implementation period of the programme. Another online mentoring programme is provided by the American Nephrology Nurses' Association (ANNA). Nurses can engage with the *ANNAConnections program* (Cahill and Payne, 2006) by email or asynchronous communication or through telephone discussions. The programme aims to improve knowledge and skills of nephrology nurses, share information, promote the mentorship culture and address specific learning needs of the mentees. However, it has not been evaluated.

E-simulation combines the advantages of e-learning with the advantages of simulation. Libin et al. (2010) report on the effectiveness of an online training module, the Anatomy of Care (AOC), designed to educate hospital personnel (doctors, nurses, patient transporters, clerical staff) about patient communication and improve their reactions to challenging situations. Within the AOC simulation, the learner plays the role of a professional (doctor, nurse or other) within an unidentified hospital environment, the aim being to gain a perspective on their own behaviours from the point of view of patients, families and hospital employees. In a mixed methods design, the authors collected data from pre- and post-tests of knowledge and "*an in-depth analysis of the assessment framework based on exploring role-playing preferences*". The authors concluded that the simulation-based training tool "*demonstrated partial effectiveness in improving learners' decision-making capacity*" and that the pre- and post-tests did not predict "*how health care personnel may translate knowledge demonstrated in the environment of the gaming training intervention into the environment of the health care organization and practice*".

Other e-simulation developments have been suggested. Brady et al. (2006) proposed (but did not evaluate) a synergetic model for combining online learning with simulation. Community hospitals could collaborate to create a critical care course for nurses, which included online learning and skills practicing in the simulation unit of one of the hospitals. In Australia, an interactive e-simulation module was developed and implemented for improving the cultural competencies of nurses (Perry et al., 2015). To ensure its educational efficiency, the “*Case study: Ms Shu Fen Chen*” simulation module integrates the attributes of effective simulation, including the creation of authentic situations, active participation of the learners, evaluation and reflection. An online survey was used to evaluate the participants’ views and self-reported impact on their practice. It was recognised that the scope of the module could have been widened and that although the findings indicated that the module stimulated participant engagement, increased participants’ knowledge base and confidence and had a positive impact-on-practice, this relied on self-reported feedback by the participants.

Interprofessional digital education is frequently used with hospital staff. Blazer et al. (2012) implemented an interprofessional blended learning approach for the training and skills development of community-based clinicians, on cancer risk assessment. Lavidos and Ruffolo (2017) describe the development, structure and outcomes of a programme on integrated primary care for primary care providers (physicians, nurses, dentists and social workers). The programme is wholly web-based and consists of synchronous (live interactive lectures, online chat) and asynchronous online education (lectures, study materials, modules). Participants’ feedback, through surveys and course evaluations, interviews and focus groups, was positive and some indicated that they had become the expert in integrated primary care within their workplaces. One theme related to the value of learning from other professionals and understanding their roles. Another theme related to learning about the value of “*integrated care models*” and reflecting on how they might introduce these concepts into their own working environment. Participants reported that they learnt about “*motivational enhancement*” which supported their work for some time after taking part in the intervention.

Innovative e-learning interventions were identified in the literature review, highlighting the influence of current technologies on the learning process. For example, educational material on breast cancer screening was prepared as 54 short messages (SMS) and sent to Iranian nurses within the timeframe of 17 days (Alipour et al., 2014). Pre- and post-tests were undertaken by two groups at the same time; a knowledge retention test was also undertaken one month later. Results revealed that nurses’ knowledge increased and was retained one month later. In the UK, two NHS Foundation Trusts partnered to develop a mobile app aiming to deliver pressure injury education to nurses and allied health professionals (Rajpaul and Acton (2015). The educational material was formatted as “*5 bite-sized modules on prevention, classification, treatment and risk assessment*” of pressure ulcers. Focus groups took place at two of the nursing homes to assess the engagement by participants and obtain feedback on the App. Participants reported that the App had improved their confidence and their patient care. Reported advantages of the App were that it was easy to access and use; it was designed to save the progress of the user; the content could be downloaded while the user was online and then studied offline; users could refer to it whenever they needed specific information. In France, an “*e-learning spaced education dermoscopy*” module was developed as part of a blended learning activity for doctors (Boespflug et al., 2015). Spaced education refers to the automated repetition of educational content in the form of questions at specific time intervals. It is informed by ideas from psychology which suggest that small amounts of information repeated over time intervals may increase knowledge acquisition and that information presented in a test format is retained longer. Participants received an email including a hyperlink, within which they could reply to an educational question. Immediate feedback was provided with detailed explanations. Depending on the answer, the system would repeat the question after either 14 days if incorrect or after 40 days if correct. Four months after the course, participants took a post-test assessment. Results showed that using the module in parallel with training in the classroom, significantly increased participants’ retention of knowledge at four-months. In Canada, a Practice Support Program (PSP) comprising “*innovative peer-to-peer continuing medical education*” on a range of topics has been offered to family

physicians (Kadlec et al., 2015). The PSP is a blended learning programme of face-to-face courses and web-based modules. The subject experts who developed the content of the modules also trained a cohort of ‘champions’ across the province of British Columbia. These ‘champions’ then deliver the module in their respective regions, supported by PSP regional members. Surveys were used to collect self-reported, end-of-life (EOL) practice and participants’ views at three time points: at the first session, immediately following training and 3-6 months later. Results showed that the module *“increased the GPs’ confidence on EOL-related communication and collaboration skills...: Increased confidence was maintained at 3-6 months following completion of training”*.

Key points

- E-learning encompasses pure online learning, as well as blended learning (combination of online and face-to-face courses) and various activities with the e- prefix (e-mentoring, e-simulation, etc). There is a huge variety of e-learning delivery methods, formats and combinations of teaching models all designed to optimise the learning process and which have been evaluated with mixed results.
- Writers emphasise the development of e-learning courses based on sound educational principles, i.e. adult learning principles and andragogy. Self-directed learning, self-discipline and self-assessment capabilities are prerequisites for efficient e-learning.
- Relevance of content, inter-activity and feedback are important aspects. The e-content should have specific attributes: be interactive, relevant, visually attractive, include self-assessment exercises and provide feedback. The instructional design of the e-course aims to enhance learners’ engagement with the content and promote interaction. As problems with technology are reported, technology must be kept simple and interoperable within different software.
- The importance of the inclusion of a range of experts in developing the e-learning educational environment is stressed: academics, IT specialists, educationalists and those with relevant content expertise (e.g. clinical specialists).
- Positive outcomes for learners have been shown from the evaluation of blended learning. Examples show the appropriateness of this approach for interprofessional learning, specifically in community-based and hospital settings.
- E-mentoring has been implemented and evaluated, showing a number of benefits and challenges. The benefits of e-mentoring include remote access to geographically dispersed mentors and freedom over frequency and timing of contact. The disadvantages include lack of direct observational opportunities and problems with technology. These benefits and limitations are common to e-learning more generally.
- Features of effective e-simulation include: authentic situations, opportunities for interaction, reflection and feedback. E-simulation offers advantages in the education of non-technical skills, such as communication, cultural competencies or behavioural competencies.
- New innovations include the use of text messaging, apps and ‘spaced’ education.
- Of particular interest to dental continuing education, is the blended learning CPD programme in periodontology, the ‘Master Online Periodontology and Implant Therapy’ offered by the University of Freiburg’s Dental School; its first seven years of implementation were evaluated with positive results.

Peer learning

Peer learning takes a number of forms. Examples described here include peer observation (Borus et al., 2017), case-based discussion in peer groups (Bullock et al., 2014, Deed et al., 2016), and team learning (Beno et al., 2005). In a *“Guide to Peer-to-Peer Learning”*, by Andrews and Manning (2016), the authors provide information on making *“peer-to-peer support and learning effective in the public sector”*. They state that:

“peer learning is a potentially powerful way of sharing knowledge about doing public sector reform. This learning involves individuals exchanging knowledge and experience with each other and diffusing this learning back to their organisations to ensure an impact-at-scale on reform initiatives”.

This guidance document and more details on peer learning can found at the *“Effective Institutions Platform”*. The *Journal of Peer Learning* is a further source of information which includes publications that cover a wide variety of areas which are mainly within the higher education sector (Journal of Peer Learning).

The General Optical Council (GOC) promote peer learning and provide guidance on peer review and peer discussion groups (General Optical Council, 2012). Peer review groups, comprising four to eight peers, utilise case-based discussions. They aim to raise awareness of *“best practice”*, identify ways to improve practice and *“raise standards across the profession”*. A peer review toolkit is available on the GOC website which includes – *“peer review requirements, peer review reflective learning statement, attendance sheets for peer review and discussion events, guidance for facilitators and guidance for peer discussion groups”*. The website provides links to other organisations who offer additional guidance. The GOC requires their registrants to complete a minimum of one case-based discussion in peer groups during their three-year cycle of CPD. Bullock et al. (2014) investigated the value of case-based discussion sessions as an opportunity to support optometry practice. Using pre-session, post-session and a further questionnaire 3-4 months following the CPD activity they ascertained that the opportunity to be involved in peer learning and interaction improved participants’ knowledge base and positively impacted on their clinical practice. This was particularly evident for the practitioners who worked alone rather than in a group practice.

Other studies have also focused on peer discussion groups (without an element of practice observation). A questionnaire study by Maidment (2006) investigated the value of peer review learning opportunities for dentists working in Scotland. The peer review entailed critical examination of workplace events by a group of competent dentists. The feedback, from practitioners, indicated that the approach was both acceptable and effective in improving knowledge and impacted positively on clinical practice. The author highlights the value of peer involvement for those working as single-handed practitioners.

Deed et al. (2016) describe the use of peer-to-peer workshops supporting general medical practitioner education and training in Australia, for the management of diabetes. The interactive workshops were led by diabetes-experienced general practitioners and included nurse experts and endocrinologists. There were case-based discussions and small group learning opportunities. Participants rated their attitudes and confidence at the start and at completion of the session. A positive outcome was observed and improvement in clinical confidence was sustained with associated changes in attitude, at review, three months following the interactive workshop. The study by Lillis (2011) also focused on peer group learning with general medical practitioners. In the participants’ view, it provided a worthwhile opportunity to address a variety of difficult issues that can impact on general practitioners. As well as the educational value of peer group learning, its value in terms of pastoral support was also recognised. The learning opportunity was considered to be enhanced when the participants had a wider range of experience and expertise.

In a simple cost-effectiveness study, undertaken in the USA by Borus et al. (2017) independent practitioners working in the same practice setting volunteered to have their clinical practice

observed by colleagues and vice versa. The participants reported that observing and being observed was a worthwhile learning experience which encouraged reflective practice and which they felt in most cases led to a positive change in their clinical practice. In Dadich's (2010) systematic review, it was also reported that peer review, through planned visits to a practitioner's working environment, provided a valuable learning opportunity. The benefits of peer review were also revealed by Orest and Eyler (2018) in their refinement of a peer audit toolkit for a group of therapists (occupational therapists, physiotherapists and speech therapists). The toolkit involves peer observation in the clinical setting, review of patient recording-keeping and a clinician/peer discussion. Surveys pre- and post- use of the toolkit were completed by participants. It was concluded that the exercise increased staff motivation to be involved in the process and resulted in a more consistent approach to completing the process. Participants felt that the valuable discussion and improved record-keeping promoted critical analysis and enhanced patient care. New guidance was produced as a result.

One of the findings from a focus-group study of Canadian pharmacists use of a portfolio (Austin et al., 2005) suggested that peer interaction is an important aspect of CPD, particularly given the context of competition between pharmacies which undermines collaboration. In dentistry, the Shropshire and Staffordshire Local Dental Network refer to a policy document that encourages the formation of peer review groups (The Local Dental Network (LDN) in Shropshire and Staffordshire, 2018). Peer review groups are seen to stimulate an increase in interprofessional and inter-practice communication, learning and engagement. The argument is that peer review facilitates dental professionals learning through working together to support a high standard of clinical practice. The team can share experiences, review areas of practice and consider possible positive changes. Peer review was also seen to support peer learning, support professionals in difficulty and support the dental team in their audit and quality improvement initiatives. A similar arrangement has been in place in the Wales Deanery for many years, facilitated by the Clinical Audit and Peer Review programme (Health Education and Improvement Wales, 2018) and now geared towards the quality improvement agenda. Audit and quality improvement tasks undertaken by the dental team within general dental practices are facilitated by quality improvement tutors, employed by the dental postgraduate section of the Wales Deanery.

In the USA, Beno et al. (2005) investigated a multidisciplinary team-based approach to training professionals in ways to address excess weight in children. They describe two intervention sessions which included counselling, interactive activities and assessment and concluded that the training strengthened individuals' skills beyond pure knowledge acquisition. Involvement of the whole medical team interacting and working together was clearly beneficial and more likely to stimulate and reinforce positive change in practice across the whole working environment. Dadich's (2010) systematic review also found that interprofessional interaction and collaboration strengthened learning experiences amongst healthcare professionals.

Key points

- Peer learning takes a number of forms including peer review, peer support, peer feedback, peer observation, peer audit, peer discussion groups, peer interaction, peer mentoring and coaching and use of peer facilitators.
- Peer learning facilitates sharing of best practice and promotes high standards of practice which can be especially valuable for lone practitioners. Working together and interacting was reported beneficial and more likely to lead to positive changes in practice.
- In addition, it supports reflective practice and identification of learning needs and its value in terms of pastoral support is also recognised.
- Peer learning can support interaction across professionals at all levels of expertise. Peer review groups can enhance interprofessional and inter-practice communication, learning and engagement. They also strengthen relationships and promote mutual understanding.

Mentoring and Coaching

Based on their reading of the literature, Bryant et al. (2015) define a mentor as “*someone who teaches or gives help and advice to a less experienced and often younger person*”. They highlight that this traditional definition of mentoring describes a “*hierarchical relationship in which an older or more experienced person provides guidance over a sustained period of time to one younger and less experienced*”. This can include some forms of peer-mentoring. The same authors (Bryant et al., 2015) also draw attention to other aspects of mentoring relationships: they can be formal or informal, should be mutually agreed upon and “*tailored to the expertise of the mentor and the needs of the mentee, which may include role modeling, professional development, and emotional and psychological support*”. These authors (Bryant et al., 2015) also noted that individuals may use different mentors at various points in their professional career. Others have reported on examples of online mentoring (Cahill and Payne, 2006) which we describe further below.

Writing about roles and responsibilities, Holt and Ladwa (2010a) make the important point that mentoring is about a group of individuals (mentor or coach and the mentees) sharing experiences, learning and reflecting together and how it can reduce feelings of isolation. They indicate that part of the mentor role is to encourage their mentees to take ownership of their learning experiences. They refer to the FGDP(UK)’s (Faculty of General Dental Practice (UK)) development of a training programme for mentors and in a further paper (Holt and Ladwa, 2010b), and stress the value of mentor training and how all members of the dental team might contribute to the mentoring role. Some similar conclusions about mentoring are made by Schwellnus and Carnahan (2014) who investigated, through a literature search, the use of peer-coaching in the continuing education of Canadian healthcare professionals. The authors report an increase in the use of peer-coaching and identify key factors for successful peer-coaching. These include the need for voluntary participation with shared ownership between the mentee and mentor (who might be a peer or expert). They recommend that the process should centre on the existing strengths of the mentee, focus on actions, positive feedback and reflective practice. Although investigating the impact of multi-source feedback (MSF) in predicting self-reported changes in performance by doctors in the Netherlands, Overeem et al. (2012) draw attention to the importance of mentor engagement, which in this case was a colleague from a different specialty based in the same hospital. The MSF was linked to a portfolio which included reflection and discussions with a mentor as part of their performance assessment. The participants

reported improvement in their performance when their mentor fully engaged and supported their reflection and helped them to critically analyse the MSF findings. Constructive discussion with their mentor on the negative scores from colleagues was a factor in stimulating performance improvement.

Bryant et al.'s (2015) work on mentoring included a study of the development and implementation of a peer mentoring programme for junior gerontologic nurses in the USA. It was aimed at enhancing the experience of young nurses and supporting the continuing development of more experienced nurses. Those being mentored reported valuing the opportunity to network with colleagues, from outwith their present workplace, they benefited from career development support and welcomed the chance to discuss a variety of issues which the more experienced mentors had encountered. Whilst positive about the programme, mentors stressed the importance of clearly defining their roles and responsibilities. They highlighted the place of incorporating online discussion sessions, the value of interdisciplinary learning and the provision of online materials to support issues such as stress and time management.

A paper from the US by Cahill and Payne (2006) describes an online mentoring programme designed to support the development of nephrology nurses from novice to expert. The authors make a case for this approach to mentoring, arguing that it supports the transition into the culture of nephrology nursing by "*sharing the customs, the language, the basics, and by making the mentee feel welcome*". They emphasize the importance of the mentor helping the mentee to identify their learning needs and set goals for their career development. They conclude that "*this sort of support system can be a real boon to ensure success, satisfaction, and retention in the increasingly complex world of nephrology nursing*". However, this is an opinion piece which lacks evidence of use. The value of the mentor in guiding professional development plans is also noted by Chapple et al. (2010) in their consensus statement on periodontology CPD.

Beasley et al. (2017) describe the concept of "*peer-coaching*" within the surgical environment and how this might strengthen relationships between the coaches and the coached. The peer-coach fostered a "*learner-centred approach*" to the continuing medical education of those being coached. The coach promoted and facilitated reflective practice, constructive feedback, helped to define goals, and supported implementation and self-evaluation. The authors argue that such interaction between a coach or mentor and the practitioner across all healthcare professions could enhance continuing professional development. Morgan et al. (2007) also conclude that integrating robust coaching as part of a multifaceted continuing education programme is beneficial for the participants.

In another surgical example, Dort et al. (2017) piloted a combined hands-on course and a mentoring approach (the "*Acquisition of Data for Outcomes and Procedure Transfer*" (ADOPT) programme) for endoscopy and similar interventional procedures. Following the interactive hands-on course, mentors connected with participants through different communication channels throughout the following year. This educational process resulted in the participants undertaking the procedures learnt to a greater extent than those who had not been involved in this initiative.

Gagliardi and Wright (2010) evaluated a surgical skills mentorship programme in Canada. They note that the mentoring experience positively influenced knowledge and attitudes and improved clinical outcomes. The mentorship programme promoted self-reflection and the sharing of knowledge and expertise between mentors and mentees. Mentorship planned with known colleagues and occurring within the mentee's clinical environment were seen as being particularly valuable. Eppich et al. (2016) also report that coaching activities facilitate the sharing of experiences and expertise. In this example, coaching was combined with simulation and case-based clinical discussions.

Other mentoring and coaching examples in surgical settings have been reported by Hu et al. (2012) and Lefebvre and Shore (2016). Hu et al. (2012) utilised videos of surgical procedures which formed the basis of coaching sessions. The coaches carried out "postgame analysis" of the

video-recorded surgical mentoring sessions; this is a method borrowed from football coaches who use it to review the match with the team. The participants reported that they believed that the experience stimulated peer-to-peer/surgical expert sharing of experiences and knowledge and could be a valuable form of CPD. Similar observations were made in the review by Lefebvre and Shore (2016) who discuss the use of mentorship as part of hands-on courses for Canadian doctors aiming to reduce complications in gynaecological surgery. Mentoring was used to strengthen skills as well as improve constructive feedback with the aim of enhancing clinical performance.

Goff et al. (2017) investigated, through a variety of interventional methods and feedback, a national antimicrobial mentoring programme for physicians, nurses and pharmacists in nine hospitals. Over a 12-month period they reported a significant improvement in the appropriate administration of intravenous antibiotics to patients with sepsis. As well as promoting best practice in antibiotic stewardship, this mentoring programme in turn led to hospital administrators providing support to sustain the stewardship programme. Following an investigation of the value of a coaching programme for family doctors in Mexico, Gonzalez-Guajardo et al. (2016) concluded that coaching was of value in supporting participants in the management of patients with type 2 diabetes in the primary care environment.

However, some doubt on the value of coaching was indicated in a study by Lowman (2016) who compared three CPD formats: online learning, a workshop and a workshop combined with online coaching. Improvement was least obvious for the online only learning group. Two months on, improvements were noted for those who took part in the workshop only, but not in the case of those who took part in the workshop combined with online coaching. The coaching involved junior peers providing feedback to each other rather than expert coaching which the author suggests may account for the lack of improvement two months after the workshop.

Key points

- Mentoring can take a number of forms including peer-mentoring and online mentoring. It generally takes place over a sustained time period.
- The modern concept of mentoring presumes that the mentor facilitates the mentee in the process of self-assessment and planning of learning activities, through interaction and feedback.
- For a beneficial mentoring experience, it is important to define roles and responsibilities of mentors and coaches and agree process and goals in advance.
- Mentoring promotes learning (and career development) by facilitating the sharing of experience and expertise.
- Critical thinking and reflection are inherent within mentoring; the mentoring process helps mentees to reflect on their practice and identify learning gaps, aims and career goals.
- Consideration needs to be given to the skills of the mentor or coach; one piece of evidence suggests that benefits were not sustained when feedback was received from a peer of the same level of expertise rather than an expert coach/mentor.
- Mentoring may be combined with other learning approaches (e.g. peer learning, simulation, case-based discussion), resulting in positive outcomes.
- A large portion of the literature on mentoring refers to medical practice, often surgery, and in particular where it takes place in the clinical environment (workplace-based mentoring).

Reflection and reflective activities

The literature points to the growing prominence of reflective practice in CPD schemes. For example, reflective practice is prominent within the UK solicitors' new CPD scheme, implemented in 2016. Solicitors are required to reflect on their current practices and identify their learning needs. After addressing these needs, through the relevant CPD courses of their choice, they are asked to reflect again on the fulfilment of the needs and the future courses they plan to undertake (Rayner, 2017, Brannan, 2017). In a study by Church et al. (2010), participants self-reported that a reflective approach to practice was promoted through an inter-professional training programme for medical and allied medical professionals working in Canadian rural environments. The authors did not investigate whether there was any change in practice as a result of the training programme and were unable to confirm whether or not this improved practice in the long-term.

Dawber (2013) undertook an investigation on the value of "*reflective practice groups*" for nurses and midwives in Queensland, Australia. In the view of the participants, in addition to improving their awareness of situations, enhancing resilience and, strengthening the team approach to clinical management, the interactive, inter-professional activity also promoted reflection on clinical practice which they felt improved as a result. Suggestions of improved clinical practice are also made by Hvidt et al. (2018) who investigated the use of a communications course for general medical practitioners in managing cancer patients. Reflective practice - both self-reflection and sharing experiences as a group - was valued by professionals and stimulated improved communication between peers and between clinicians and patients. Pezzolesi et al. (2013), in an opinion piece, noted positive benefits arising from the use of mindfulness in reflective practice. They explored its effect on reducing mistakes in medicines prescribing for UK pharmacists. The authors conclude that the application of mindfulness training could reduce work stress, increase concentration and raise awareness to possible errors in medicinal prescriptions.

A study by D'Amour and Guimond (2010), of an interactive workshop for Canadian nurses, based on Kolb's learning model, found that participants' skills and knowledge improved, but in particular, it strengthened their reflective practice abilities during a discussion session at the end of the workshop. Another study provides an example of a reflective exercise, included as part of a CPD activity within a professional journal for the Australian nurses (Royal Australian Nursing Federation Queensland Branch Union of Employees, 2015).

According to the systematic review carried out by Dadich (2010), portfolios provide an effective method of promoting reflection and reflective practice on learning experiences. This point is supported by Ingrassia (2013) who writes about portfolio-based learning for UK doctors. Lui and Brennan (2012), in their article on the role of reflection in CPD and revalidation, refer to the Royal College of Anaesthetists' (RCOA) online CPD system which supports the recording and reflection on CPD activities and which has been available since 2011 (Liu and Brennan, 2012). Colleagues are encouraged to make brief records in the "*Outcome of Activity*" and "*Further Learning Needs*" boxes. This facilitates reflection on practice for sharing during their annual appraisal. More information is available on the RCOA website (2018). The British Institute of Radiology provides online access to a self-reflection tool-kit which can be accessed on their website (The British Institute of Radiology, 2018).

Pharmacists in Ontario, Canada, used a portfolio to record their day-to-day practice and to document their learning, both formal continuing education, and "*every-day clinical problem solving*" (Austin et al., 2005). The portfolio is shared as part of the Quality Assurance Practice Review programme where it is reviewed by the Ontario College of Pharmacists (OCP) (which helps identify learning objectives) and where, facilitated by a pharmacist-educator, participants discuss their learning with other pharmacists. Based on focus groups, Austin et al. (2005) report that participants lacked confidence in self-appraisal and recommended that tools are developed to facilitate self-assessment. Pharmacists also needed help (through modelling, mentoring and feedback) to maintain and benefit from the learning portfolio. This point is also supported by

Jayatilleke and Mackie (2013) writing about how reflection may enhance the practice of UK public health professionals who also note, through their literature review, that practitioners may need educational input on how to reflect. The General Medical Council (GMC, (2013b) has also reported that *“doctors recognised the importance of reflection to good continuing professional development. But many struggled to know how to do this effectively.”* In a recent article (Goldie, 2017), it is stated that *“the literature on reflection suggests the ability to reflect is amenable to development over time and with practice”*. However, the author goes on to suggest that *“as a profession, individually and collectively we need to be reflective about whether current training and CPD arrangements can foster truly reflective practitioners”*.

Kelsey and Hayes (2015) question the value of reflective practice and whether reflective practice actually stimulates creativity and creative thoughts. They note the extensive number of reports of frameworks of learning and assessment for which reflective practice is of benefit but are concerned that reflection risks becoming just an *“academic exercise”* rather than a creative opportunity to consider how to improve and how to develop further. In a similar vein, Murdoch-Eaton and Sandars (2014) argue that if reflection is only carried out as a means to an end then it is unlikely to strengthen professionals’ knowledge and skills. However, they also noted that reflection could stimulate professionals to change particularly where there is a willingness to engage in self-reflection or where they work within an environment where they can share reflective practice with other colleagues.

Key points

- CPD and reflective practice are inter-related: reflection can enhance the benefit of CPD, and reflective approaches to practice can be promoted by CPD.
- Reflective practice is prominent within the most current CPD schemes and revalidation processes (UK solicitors, UK pharmacists, UK engineers, Ontario pharmacists and others).
- Practitioners may need to be educated on how to reflect. The ability to reflect increases over time and with practice.
- Portfolios can be used to record learning experiences and promote reflection. Portfolio-based learning is used, for example, with UK doctors and Ontario pharmacists.
- The impact of reflection-on-practice is enhanced when it is undertaken willingly and shared with colleagues. Peer learning, group learning, mentoring and appraisal enhance the professional’s ability to reflect on practice.
- Questions remain as to whether current CPD systems really foster reflective practitioners. The portfolios and other reflective exercises included within the CPD schemes have to be real opportunities for practice improvement and not just a ‘box to tick’ within the CPD scheme.

Question 2. Areas of best practice in relation to the specific CPD activities (Q1)

This section provides synthesis of the literature relating to areas of best practice in relation to the CPD activities discussed above (interactive activities, e-learning, peer learning, mentoring and reflection). For the purpose of this report, we define best practice in CPD as educational activities that are multifaceted, include design, development and implementation phases, as well as the evaluation of the activity and impact on the professionals' behaviour, skills or practice. Best practice in CPD is based on adult learning principles. It may incorporate elements of sustained interactivity over several months, reflection, feedback, mentoring or other innovative features, which are embedded meaningfully within the structure of the educational activity, adding to its value and effectiveness.

Forsethlund et al. (2009) carried out a systematic review of literature on the Cochrane database reporting the impact of educational activity on patient healthcare outcomes and clinical and professional practice of healthcare professionals. Interactive activities alone were found to be the least effective in terms of outcomes for patients and impact-on-practice. What was required was a combination of different educational activities. The authors pointed to the importance of developing initiatives which encourage not only attendance but interaction by participants.

Another aspect of good practice is relating CPD to needs assessment. A Canadian study by Allaire et al. (2012), explored family physicians' motivations to participate in training programmes on the topic of shared decision making, collecting data about their CPD activity through questionnaires. The findings point to the importance of the training matching physicians' perceptions of their learning needs, and that changed behaviour is more likely if content is aligned with the participants' training needs assessment and linked to their day-to-day practice. Mattheos et al. (2010) reported on a consensus workshop that considered the best formats for CPD in periodontology. They recognised the importance of focusing on the needs of the learner and the learner driving their CPD choices and agreed that CPD should address issues relevant to the practitioners' work setting. They determined that evidence-based activities should inform improvement in skills and that there should be flexibility in the educational activities as different educational activities are required to address the needs of the variety of practitioners involved in periodontal treatment. They highlighted the use of activities that promote peer learning and networking with mentors.

The value of peer input is also highlighted by Armson et al. (2007) who describe practice-based small group learning. This approach used peer engagement within small groups of family practitioners to identify and address gaps in their practice. The groups discussed modules involving simulated patients and relevant pre-prepared information. The session facilitators supported reflection and decisions about changes to practice, based on best practice. Over a 15-year period, the authors witnessed an increase in numbers of contributors, positive feedback and indications that areas of practice changed and improved as a result. They suggest that although the programme was successful, there are areas that warrant further investigation, specifically: measuring the gap between current and best practice, strengthening the role of the facilitator, and how to demonstrate change in clinical practice as a result of the reflective, interactive group discussions.

An illustration of sustained support is provided by Bailargeon et al. in a series of publications (2007, 2014). They describe a programme of preceptorships that included virtual community and mentoring or coaching on-site for primary care physicians and nurses in Canada to promote improvements in obesity screening and management processes. The initial activity took place over a two-day period and included interactive sessions, case-base discussions and observation of patient management. A series of online materials then promoted interaction on a monthly basis. Their work indicated an improvement in confidence and ability to identify and address patients' problems which was maintained a year after the two-day educational activity. Self-assessed improvement in clinical practice was also reported.

The value of structured reflection during and following continuing educational workshops was highlighted in an Australian study involving doctors, nurses, counsellors and psychologists (Bennett-Levy and Padesky, 2014). The 'reflective group' participants completed a structured reflection worksheet at the end of each day of the 2-day seminar and at time intervals during the following eight weeks, reminded by email. The results indicated that structured and consistent reflection on learning was valuable for newly acquired knowledge consolidation and application. The authors concluded that providing professionals with a series of follow-up reflective worksheets over a period of time after the educational activity promoted improvement in skills and supported the translation of learning into the professionals' clinical practice.

Berggren et al. (2016) reported on the application of a three-part continuing educational model – ConPrim - for primary healthcare professionals working in Sweden. The model includes a web-based online programme, practical exercises and case examples. The model was based on the 'constructive alignment' learning theory (Biggs and Tang, 2011), which aimed to achieve meaningful learning through aligning learning outcomes, teaching and assessment activities. The authors issued questionnaires to nurses and physicians a week after the exercise and collected views on the value of the model in the primary care setting. The majority of the cohort felt the model promoted interaction within an interprofessional group and was relevant to their clinical practice.

Cardarelli et al. (2018) investigated perceived impact on the opiate prescribing practice of a group of medical and allied medical professionals in the USA. The 15-month programme, called the Central Appalachia Interprofessional Pain Education Collaborative (CAIPEC), is multifaceted and interprofessional. The educational activities include eight webcasts, eight regional (community) interprofessional roundtable events (case-based), and four conference presentations at state-level. The authors detected, through pre- and post-activity feedback, a positive self-reported intention to implement change in practice as a result of these CPD activities.

Halverson et al. (2014) investigated the use of a blended learning surgical skills course for American surgeons working in rural localities. The course aimed to address the unique practice needs of rural surgeons, particularly in relation to a wide range of emergency procedures. It was designed by a multidisciplinary team comprising rural surgeons, academic surgeons, and educators. Interviews with rural surgeons and a needs assessment survey identified the topics of the course, which was delivered through the blended learning methodology (web-based materials and face-to-face instruction). Participant feedback was collected 6-months after the course. According to the rural surgeon participants, the course was well-tailored to their needs in terms of developing skills and broadening their scope of practice. They felt that their knowledge acquisition had improved the delivery of care to their patients. Additionally, their communication and engagement with colleagues also improved.

Adams et al. (2012) describe an interactive, multidisciplinary, face-to-face 1-day seminar on COPD (Chronic Obstructive Pulmonary Disease) for primary care physicians (doctors, nurses, physicians' assistants). The seminar was developed through an exemplar systematic approach, including analysis (needs assessment), design (learning objectives, assessment methods), development (content and instructional strategies), implementation (small group workshops, role-playing, hands-on) and evaluation. Evaluation was performed using self-assessment confidence questions and pre-test and post-test questionnaires. Results revealed that the participants' clinical self-confidence improved, knowledge significantly improved and 70% of the participants implemented at least one "*commitment to change*" statement.

A similar exemplar process was described by Bonevski et al. (2015), for developing the online programme "*the ABCs of vitamin D for GPs*", intended for Australian general practitioners. The development process and resultant programme comprises nine elements: needs assessment (where knowledge gaps are identified), content (based on recommendations, guidelines and a scoping literature review), modularisation of the programme, inclusion of clinical cases, tailoring

and interactivity, audit and feedback, website consistency, patient-education informative leaflets (downloadable), ease of use and navigation. Participants reported that the programme was clear, easy to navigate and to understand, and it was likely to lead to practice changes.

Millery et al. (2014) proposed a comprehensive, inclusive approach for both the development and the implementation of online courses to address the training needs of public health professionals in the USA. The development process started with the identification of learning needs and learning objectives, which informed the breadth and depth of the educational content, and the public health professionals were engaged in the process. Subsequently, the “*Public Health Training Centers*” (PHTC) collaborated with instructional technology designers to develop the online modules, based on the identified competencies and underpinned by the adult learning theory. The implementation process used participatory techniques (case studies, problem-solving activities) and linked theory to practice by asking the learners to apply the theoretical concepts to relevant public health situations. Participants’ feedback after each course was used to inform continuous improvement of the courses, through a quality-improvement cycle.

Smith et al. (2014) describe the evolution of their online learning. The key concept of this educational intervention was the provision of evidence-based information in the format of small, focused “*nuggets*” that were easily accessed by the primary care physicians and enabled direct application in primary care. In addition, the “*nuggets*” concept promoted reflection and included practice tools. The *prototype Actionable Nuggets™ for Spinal Cord Injury (SCI)* were first launched in 2010 and consisted of a series of 20 visually attractive postcards, outlining the 20 most significant health problems of SCI patients seeking primary care. The ‘postcards’ were conventionally mailed to learners at regular time intervals. In 2013, the updated *Actionable Nuggets™* were uploaded on the continuing education portal on the Canadian Medical Association website, after incorporating the results of participants’ feedback and the adult learning educational principles. Next, based on the evaluation of the two previous stages, the *SkillScribe™* mobile application was developed, offering physicians the essential elements of the *Actionable Nuggets™* (time-released modules, interactive assessment, reflection time) through the convenience of the portable medium (smartphones, tablets). Qualitative data revealed the strengths of the format, as stated by the participants: focused content, time for reflection, easy access, relevance to clinical practice and availability of practice tools.

The highlighted feature of the interactive, multimedia programme devised for Aboriginal and Torres Strait Islander health professionals was the process of ‘evidence gathering’ to inform and strengthen the development of the programme (El Sayed et al., 2012). Firstly, a needs assessment survey was conducted to identify the gaps. Then, background information was obtained through a systematic literature review, followed by semi-structured interviews with various stakeholders to explore their expectations and recommendations. The resulting multimedia programme was culturally appropriate for the intended audience and based on sound educational principles.

Bekkers et al. (2010) report on the “*STAR (Stemming the Tide of Antibiotic Resistance) educational program*” concerned with antibiotic prescribing and antibiotic resistance and aimed at general medical practitioners in the UK. The programme consists of seven core parts, uses the blended learning approach and is informed by educational theory. It includes online reflection on the professional’s own practice and a ‘booster session’ provided 6-months after completion of the course, designed to enhance to knowledge retention and the application of knowledge to practice. The programme includes a variety of educational tools, e.g. web forum, video scenarios, and on-site seminars. Participants reported positive changes in prescribing attitudes and changes in clinical practice, including adopting a policy of reduced antibiotic prescription.

The distinguishing features of the multifaceted CPD programme for Canadian primary physicians are the inclusion of mentorship and interactive tutorials within the modules of the blended learning programme (Kang et al., 2014). The programme comprises three modules designed to address the chronic disease management of HIV patients. It consists of an online course,

including self-directed learning and the establishment of personal objectives and clinical training during which participants attend interactive tutorials by HIV experts. Following the programme, 3-months mentorship is provided during which time participants are paired with experts who gave continuous advice and support. Learner satisfaction and performance improvement were evaluated. Results indicate that learners were satisfied with the programme and a 136.76% increase in the number of HIV-positive patients receiving HIV medication refills (prescribed by the learners) was registered.

A mentoring component was also included in a multifaceted course on palliative care for Canadian nurses and physicians, together with other distinct features: multidisciplinary education, on-site implementation and the development of a local educational network (Levine et al., 2017). The 2-year long course was designed to be embedded within the daily busy schedules of the learners and was delivered through conferences, e-learning and individualised mentoring. The mentoring process aimed at creating a 'cohort' of mentors. The learners shadowed the mentors and were educated on the palliative care of adult and paediatric patients. They then applied the acquired knowledge and skills within their institutions. A similar approach to creating a mentor 'cohort' was applied in the "*Practice Support Program*" (PSP) for family physicians, where experts trained a cohort of 'champions' across the province of British Columbia and these champions then delivered the module in their respective regions (Kadlec et al., 2015).

Key points

- Best practice CPD educational activities are multifaceted, include design, development and implementation phases, as well as the evaluation of the activity and impact on the professionals' behaviour, skills or practice. They are based on adult learning principles and may include interactive elements, reflection, feedback, mentoring or other innovative components.
- Best practice activities are more likely to lead to changes in skills and behaviours, ultimately leading to impact-on-practice and improved patient outcomes.
- Combinations of different methods may include case-based discussions, practical exercises, observation of practice, e-learning, group learning and mentor support.
- An important aspect of good practice is relating the CPD course to needs assessment surveys and the participants' identified learning needs. CPD courses that are relevant to practitioners' work settings are more likely to motivate attendance and result in practice improvements.
- Sustained support after the completion of the CPD course is another best practice feature. It can be accomplished through online materials, prolonged mentorship, virtual communities or booster sessions provided at a specified time after the course.
- An exemplar design of a CPD activity would include: needs assessment, instructional design, content development (evidence-based), assessment methods, implementation and evaluation.

Impact of CPD on Practice

Previous sections have summarised aspects of best practice related to CPD activities in the specified areas. This section synthesises the literature relating to its impact-on-practice. There is a clear conceptual overlap between best practice and impact, as best practice will be that which enhances impact-on-practice. A feature of many of the studies described in the best practice section is their concern to demonstrate impact-on-practice. That said, by presenting a more specific focus on impact, we are able to discuss some of the challenges in evidencing practice improvement resulting from CPD. The GMC (2018a) states that CPD “*helps to improve the safety and quality of care provided for patients and the public*”. However, two key findings of their earlier report on the “*impact of continuing professional development on doctors’ performance and patient outcomes*” (General Medical Council, 2013b) were firstly, that

“when undertaking continuing professional development, the emphasis tends to be on the activity itself with comparatively little thought given to subsequent implementation and action”

and secondly that

“the employer usually provides only limited quality assurance and quality enhancement of continuing professional development activities.

Evaluation of the educational activities is essential to both quality assuring the activity itself and assessing the knowledge and skills development of the participants and whether this leads to improvement in their professional practices.

Zhang and Cheng (2012) proposed a four phase evaluation process for e-learning activities, which may be applied to all types of educational activities:

1. *planning evaluation*: needs assessment, target audience, learning objectives, feasibility and finances
2. *development evaluation*: course content and design, pedagogical framework, interactions and communication, assessment methods, tutor support
3. *process evaluation*: assessing the elements of the process that contribute to learner engagement and optimising their learning experience
4. *product evaluation*: comprising the learners’ satisfaction, teaching and learning effectiveness and sustainability.

In relation to ‘product evaluation’ Donald Kirkpatrick’s framework (1967) for evaluating educational activities is widely used in professional education. Kirkpatrick’s model identifies four levels of evaluation (Bullock et al., 2014, Kang et al., 2014, Hammick et al., 2010): learner satisfaction with the training; changes in attitudes, knowledge and/or skills (learning outcomes); behavioural changes; and changes in professional practice (application of knowledge and skills to practice) which benefit to patients. The majority of the evaluations of educational interventions focus on the lower levels (for example, (Jarvis and Ker, 2014, Bullock et al., 2014, Abbot et al., 2014, Allen et al., 2017, Houwink et al., 2014). It is very rare for the fourth level to be addressed and this is an important limitation of the studies of CPD provision. A systematic review on the role of feedback in improving the effectiveness of workplace-based assessments (Saedon et al., 2012) found few high quality studies and none that showed an improvement in performance as a direct result of workplace-based assessments (Kirkpatrick level 4). Similarly, a review on the impact-on-practice of e-learning activities for doctors (Curran and Fleet, 2005) did not identify any studies demonstrating actual impact of web-based CPD activities on patients’ health (level 4). They found two studies demonstrating performance change in professional practices (level 3), but the conclusions were based on self-reported measures.

Evaluations are typically based on self-reported measures, usually at two time-points but sometimes at three time-points: pre-educational activity, immediately post-activity and at a later time point. For example, Allen et al. (2017) detected that confidence in teaching and practising evidence-based medicine was improved following a one-day workshop, based on pre-workshop and post-workshop surveys which were repeated 3-6 months later. In addition, when followed up through telephone interviews 10-14 months later, participants self-reported changes in teaching and clinical practice. The value of pre-course and post-course assessments have proved useful in shedding light on the impact of a continuing educational activity, as observed by Ahlers-Schmidt et al. (2008). Studies of longer-term impact are scarcer. However, they can evidence, for example, the value of ongoing support, such as the provision of online material relating to the activity, to which participants can refer to later, as a way of maintaining knowledge and skills for a period of time after completing the initial activity (see for example, (Baillargeon et al., 2007, Baillargeon et al., 2014).

Houwink et al. (2014) in the Netherlands, implemented a genetics e-learning module designed to improve general practitioners' knowledge about oncogenetics. They conducted a randomized controlled trial to evaluate the outcomes at the first two levels of the Kirkpatrick framework (satisfaction, learning outcomes). Participants were satisfied with the module and they reported they would apply the acquired knowledge in their daily practices, but the analysis did not confirm that this had occurred. The authors conclude that the e-module improved knowledge rather than skills. However, in another randomised control trial Ferrat et al. (Ferrat et al., 2016) assessed the impact of an interactive two-day CPD activity on French general medical practitioners antibiotic prescribing habits. Activities involved problem-solving and reflection on practice utilising examples of clinical incident reports. Case reports and role-play activities were included. This interactive seminar-based activity led to a significant reduction in inappropriate antibiotic prescribing over a four-and-a-half-year period.

Similarly, the ADAPT (*AD*apting *pharmacists' skills and Approaches to maximize Patient's drug Therapy effectiveness*) e-learning programme revealed that participants gained knowledge and enhanced their skills, as well as made changes (e.g. implementation of a systematic approach to medication assessment) and reported intention to change practice (Farrell et al., 2013). The evaluation used mixed methods (qualitative and quantitative) to assess programme effectiveness. The ADAPT programme was based on instructional strategies incorporating expert demonstration, videos, case vignettes, real-world practice activities, discussion boards, peer support and feedback from peers and facilitators.

In a recent systematic review, Nicoll et al. (2018) sought to identify whether there was any impact of e-learning and blended learning on health professionals' practice. They identified a small number of studies evaluating the transfer of knowledge and skills in daily practice. The majority of these reported learner satisfaction outcomes (Kirkpatrick's level 1). The authors report that the literature evaluating web-based education is dominated by pre-test / post-test knowledge evaluation. They expressed concern about the lack of data on the transferability of knowledge in practice. They also questioned the dominance of Kirkpatrick's model of evaluation and proposed that this model should be complemented with new features for the effective evaluation of e-learning for healthcare professionals. The Institute of Medicine (IOM) (2010) argues that:

“a measurement system needs to be established to assess CPD and its impact on health professionals' performance . . . It should allow for straightforward assessment at the higher levels of outcomes.”

Focused on behavioural intentions (as a precursor and potential indicator of actual workplace behaviour), Legare et al. (Legare et al., 2014) developed a “12-item theory-based instrument” which they believe displays validity and reliability in determining the impact of CPD activities on the “*clinical behavioural intentions*” of health-care professionals. They recommend further investigation to determine if the instrument could detect behavioural change and predict future clinical performance. They argue that robust methods of measuring impact on clinical practice of

the variety of CPD activities available to medical and allied professionals should benefit patient care.

In our review we have found few studies that addressed the impact of CPD activities on health professionals' daily practice and patients' health care. Kane et al. (2011) and Rajpaul and Acton (2015) reported positive results of the training at level 4: the simulation training for nurses in resuscitation skills resulted in 'anecdotally' improved performance of actual resuscitations on a paediatric cardiac intensive care unit (ICU) (Kane et al., 2011); and after nurses used an App on ulcer management, the nursing homes increased the number of days free from avoidable pressure ulcers from 100 days pre-intervention to more than 200 days post-intervention (Rajpaul and Acton, 2015). Similarly, Bird et al. (2013), based on an analysis of clinical data from 11,538 patient charts, reported that physicians improved their performance which impacted on patients' health when they participated in a 'performance improvement' online module on diabetes management.

In contrast, Gulati et al. (2015) admitted that although an online, skin cancer recognition toolkit for UK general practitioners improved their confidence and self-reported knowledge in diagnosing skin cancers, it did not actually have an impact on skin cancer diagnoses or appropriate referrals, in the eight months following the launch of the website.

Pimenta et al. (2014) also reported on patient outcomes in their educational intervention focused on the treatment of hypertensive patients in Brazil. The intervention included active learning - small group discussions, educational outreach visit and email/mobile phone reminders. After the intervention, the active learning group outperformed the control group (who only received printed guidelines) in several measures (prescription of antihypertensive drugs, prescription of aspirin, dietary counselling and others), but patient outcomes did not differ between the two groups.

Using semi-structured face-to-face interviews, Kostrzewski et al (2009) investigated the influence of hospital pharmacists' portfolios on their practices. Interviews revealed that although portfolios could enhance participation in educational activities, their influence on professional practice was little or non-existent. These results however are limited by the small number of interviewees (nine pharmacists).

In some cases, although the training demonstrated positive impact-on-practice upon completion, the effects were not sustained over time. An active learning approach to educate Canadian nurses on consulting asthmatic patients, delivered through a small-group discussion workshop and involving daily practice situations, did not result in long term sustainability of the initially positive outcomes on patient referral patterns (Boutin et al., 2006). The knowledge and confidence of the nurses significantly improved after the 3-hours workshop, as did the quality of their consultations, but this was not sustained 9-months after the intervention.

On the basis of a systematic review, Ivers et al. (2012) identified the conditions needed for audit and feedback to result in improvements in clinical practice. The necessary conditions were when: a healthcare professional's performance was initially below the expected level; the lead is the professional's line manager/supervisor or a peer; it is repeated; feedback is provided in person and in writing; and there is a clear action plan to address future goals. The authors could not determine whether a combination with other interventions would improve the process. Grindrod et al. (2006) remarked that audits and involvement in feedback multifaceted interventions promoted improvement in the practice of prescribing. In a Cochrane systematic review of physicians' "*interventions to improve antibiotic prescribing practices*", Arnold et al. (2005) concluded, from the 39 studies reviewed, that very little influence on the prescribing of antibiotics resulted from using "*printed educational materials or audit or feedback alone*". The use of "*interactive educational meetings appeared more effective than didactic lectures*". The results were unequivocal in relation to the use of educational outreach visits and where physicians were provided with reminders. The best way for decreasing the inappropriate prescribing of antibiotics was by using multi-professional and multi-faceted methods and

meetings involving health professionals, communities and patients together. The use of 'reminders' to physicians and educating patients were considered worthy of further investigation.

In another Cochrane systematic review, O'Brien et al. (2007) investigated the value of educational outreach visits. They concluded, from the 69 studies reviewed, that educating professionals in their own working environment appears to be successful in improving the healthcare they provide to patients. These types of educational visits also produced positive improvements in the practices of prescribing. If combined with other types of educational training these changes would likely be extremely valuable.

Mattheos et al. (2010), on the basis of a consensus workshop, argued that to detect improvements in clinical practice, there is a need to incorporate meaningful assessment methods and feedback to participants. There is also a need to consider learner motivation and the context of the workplace. Lee (2011) used semi-structured discussions to review the impact of CPD on change in practice amongst nurses and healthcare practitioners in the UK. The findings suggest the importance of personal commitment and enthusiasm to change practice and working in a positive workplace environment. CPD impact was enhanced where there was positive peer engagement and on-going support and following up after the learning opportunity. The value of considering learning needs through the appraisal process including completing a PDP was highlighted. In a systematic review of workplace-based learning for nurses in Finland, Nevalainen et al. (2018) draw a number of conclusions about how the workplace context and culture make a difference. They argue that:

“The culture of the work community and learned courses of action shape the attitudes of nurses towards work-based learning, which also affects the expectations of learning and willingness to take responsibility for personal learning and professional development.”

They also suggest that adapting the ward context – its physical structures and spaces, and *“taking the work-based learning perspective into account when sharing and organising duties”* could enhance opportunities for work-based learning. Further, they emphasise the importance of nurses in managerial roles to support workplace-based assessments and propose that good relationships across the team improves the learning environment which could ultimately lead to improved patient care.

In conclusion, only a few papers report on real impact-on-practice, for example by measuring the number of patients successfully treated after an educational intervention was applied. This limitation must be stressed here as it was in the Eaton et al (2011) report. It is perhaps unsurprising that few studies include measures of impact as it is difficult to determine, firstly, if changes to practice or behaviour *have* occurred and secondly, any causal relationship with the educational activity rather than influence from other factors or simply further workplace experience. It is difficult to disentangle impact-on-practice from other reports of CPD effects and we have noted how much evidence of impact relies on self-reported changes (in behaviour or sometimes just confidence) or intention to change practice rather than observation of workplace practice or more objective assessments of impact. Such self-reports do not reflect the actual impact of a defined CPD activity on the professional's practice. Further, self-reported gains in knowledge and skills do not necessarily translate to practice changes. This is noted in many papers.

Key points

- Evaluation of CPD activities refers to both the quality of the activity itself and the impact of the activity on the learner's practice. A commonly used evaluation framework is Kirkpatrick's model of programme evaluation. It evaluates the effect of the educational activity on four levels from learner's satisfaction to changes in practice.
- Few studies evaluate how CPD leads to change in practice. Most studies report on changes in knowledge, skills or behaviours or the 'reported' intention of the professional to change their practice.
- Pre- and post- surveys are frequently used. Even if the post-test confirms improved knowledge and skills, there is no certainty that these will be transferred in practice. Long term impact evaluation is scarce but confirms the value of sustained support which is offered to participants with the aim of consolidating the knowledge acquired and influencing practice changes.
- Self-reported changes are commonly used to evaluate the effect of activities. Studies using self-reported indicators do have some worth, especially if evidence is gathered at three time-points: pre-event, immediately post-event and later.
- A combination of evaluation methods (both quantitative and qualitative) are also used to obtain a more holistic perspective of the activity's quality and impact.
- The limited number of papers that report on real impact on patients' health include, for example, the measurement of the number of patients successfully treated after an educational intervention was applied or the clinical data of patients or changes in prescribing patterns.
- Findings suggest there are benefits from CPD that uses a combination of methods, including outreach visits and reminders, and those aligned with learning needs of specific relevance to a professional's scope of practice. Personal commitment, enthusiasm and a positive workplace environment can make a difference to the impact of learning.

Question 3. Evidence on CPD activities across different workplace settings

In this section we present a synthesis of the literature relating to Question 3, namely: is there variation across different work settings, and is there evidence of activities working more or less effectively across these settings? The settings may include: independent/private or NHS practices; corporate dental practices; hospital or community settings.

We found evidence in the literature on interdisciplinary learning and learning in different clinical workplace settings. Interprofessional/ interdisciplinary education has been implemented within hospital, primary care and community settings, bringing together a range of different health professionals (doctors, nurses, pharmacists, physiotherapists, and even managerial staff) for a common educational experience. Such experience promotes collaboration and shared knowledge. There is evidence that interprofessional education may improve relationships, communications and mutual understanding within the disciplines involved, and assist in the development of teamwork skills (Hammick et al. (2007), cited by Church et al. (2010). Effective interprofessional continuing education incorporates small group learning using real-life clinical situations, where participants' personal, social and professional experiences are brought to the learning process (Church et al., 2010, Dowling et al., 2018). Examples of interprofessional small group learning were included for primary care doctors and nurses in Sweden (Berggren et al., 2016), primary care practices (Berrett-Abebe et al., 2018), community-based clinicians (Blazer et al., 2005) and hospital health professionals (Goff et al., 2017) all in the USA, and community-

based clinicians in Canada (Lineker et al., 2011). Cameron et al. (2012) in their literature search, report that there is “a growing body of literature to support the positive outcomes of *Interprofessional Education and the utilisation of Work Based Learning in developing practice*”. Interprofessional education, delivered through online technology, was offered to rural health professionals in Canada, in order to strengthen the collaborative practice skills (Church et al., 2010).

Other literature refers to differences between rural and urban settings, with a focus on the particular challenges of rural practitioners. Rural and remote health professionals face unique challenges, both in terms of their extended scope of practice, as well as in seeking relevant continuing education courses (Curran et al., 2012, Curran and Fleet, 2005). In a systematic review on the CPD of rural general practitioners, professional isolation and access to CPD were identified as key factors for practitioner recruitment and retention (Dowling et al., 2018). The majority of evidence on rural and remote CPD within this particular review was identified in Australia, Canada and the USA. These are countries with vast territories and large non-urban populations. Web-based, regional and educational outreach CPD activities have been identified as effective in addressing the learning needs of rural health professionals (Curran and Fleet, 2005, Curran et al., 2006, D'Aprano et al., 2015, Dowling et al., 2018). Educational outreach visits (or academic detailing), either alone or combined with other interventions, can be effective in improving professionals' practice, as reported in a number of systematic reviews (Dadich, 2010, Cervero and Gaines, 2015, Chauhan et al., 2017).

The development of communities of practice (or communities of enquiry) either face-to-face or web-based, can emerge through collaborative learning activities. Examples are reported for rural Australian health workers (Masters et al., 2017), USA community-based clinicians (Blazer et al., 2012) and UK social work practitioners (Lamendola et al., 2009).

Rural settings

In their comparison of CPD activities undertaken by rural and urban general practitioners (GPs) in Australia, based on survey results, Alan and Schaefer (2005) detected clear similarities in the learning needs of both GP cohorts. However, for the rural practitioners, there was a higher demand for activities relating to rural practice, namely: procedural medicine, community-based care and care of indigenous populations. In a systematic review of rural physicians' CPD, their needs in emergency medicine and trauma management were higher (Dowling et al., 2018). As well as specific content, Abbott et al. (2014) found that the GP surgeons in Australia that they audited through telephone interviews, needed improved continuing education training opportunities, particularly support beyond initial and/or structured specialist training, to help maintain advanced rural surgical skills. Some practitioners referred to the value of engaging with a mentor.

Masters et al. (2017) in what is described as a 'quality improvement report' on access to simulation in Australian rural communities, reviewed data on numbers being trained through simulation, locality of training and the number of clinical educators located in rural areas who were providing simulation training. They identified a reduced access to simulation learning opportunities in rural and remote areas. The authors suggest that a “*collaborative model*” could promote more training led by those clinicians within their rural communities and potentially address the concern that lack of access to clinical simulation by rural healthcare workers contributes to deskilling.

Access to continuing educational activities to meet needs was one issue identified by Curran et al. (2012) in their study of factors that could influence the resuscitation skills of a variety of healthcare professionals in Canada. They reported, using focus groups and a survey, that professionals who worked in non-urban areas had difficulty in accessing CPD. They were also less likely to experience resuscitation situations which affected retention of their knowledge and skills. The authors concluded that there was a need to identify innovative CPD strategies to address the needs of these rural professionals. In earlier work, Curran et al. (2006), using

interviews and online surveys, highlighted the need for additional resources, including funds, and the identification of innovative technology-based resources which could be used in parallel with structured self-directed learning opportunities. Lamendola et al. (2009) described a facilitated learning programme for social workers in remote rural areas. It included e-learning and group meetings using case scenarios. The authors undertook text analysis of participant discourse and reported that the programme supported networking between professionals and stimulated discussion and enquiry. For those practitioners who work in rural and remote communities, web-based continuing educational resources provide CPD that may otherwise not be available. Community based strategies, such as academic detailing, practice-based methods, such as reminders and patient-mediated strategies, and multiple interventions also appear to be more effective activities for this group of professionals (Curran and Fleet, 2005).

Dowling et al. (2018) undertook a systematic review of the literature examining continuing educational opportunities for general medical practitioners living in rural areas. They focused on those papers which explored patient-care outcomes and the changes, if any, in practitioner performance. Most of the literature reported small group teaching, workshops and distance-learning with very little record of evidence of patient-care outcomes and the changes in practitioner performance. Although distance-learning opportunities did not appear to impact measurably on performance or improved patient care in rural communities, the authors conclude that access to CPD activities remains an issue for isolated rural practitioners and they refer to similar published findings in Australia, Canada and the USA.

The issue of access was also discussed by Bailey et al. (2013). They reviewed the verifiable CPD activities undertaken by general dental practitioners (GDPs) across Wales, UK. Amongst other differences, they observed that single-handed GDPs recorded less CPD than practitioners based in practices with multiple surgeries and there was variation across the different regions in Wales. The authors suggest that some of these differences relate to the rural location of some practices where practitioners' access to CPD activities is affected by distance and travelling time. This disadvantage could mean that the rural practitioners are less likely to achieve CPD targets than counterparts in urban areas. Bailey et al's (2013) study found no gender variation, but differences related to practice skill-mix and career stage. More CPD was undertaken by those employing hygienists and/or therapists. Those in the mid to later stages of their careers were undertaking more CPD.

Based on self-report and observation in the workplace, the study by D'Aprano et al. (2015) reported improvements in the confidence and skills of Australian healthcare workers in remote rural areas. The training included interactive role-play and training facilitated through coaching, referred to as 'educational outreach visits'. However, they make the important point that improvement (in knowledge, confidence, skills, competence) does not necessarily impact on clinical practice.

Interprofessional learning and primary/secondary care settings

In the context of interprofessional learning, studies have drawn attention to workplace settings and whether a specific educational activity is relevant for both primary (community) and secondary (hospital) settings. Power et al. (2011) used a questionnaire to investigate what pharmacists in Scotland felt about CPD and found mixed results across settings. Primary care pharmacists reported more support from within their workplace to undertake CPD activities and better access to CPD opportunities than their counterparts in the community and hospital-based settings. Primary care pharmacists also reported higher motivation to engage with CPD. Pharmacists working in hospital appeared to believe that CPD was more valuable than those working in the community. Community pharmacists appeared in the most need of support and encouragement. In further studies of pharmacists in Scotland, Cunningham et al. (2014) investigated the value of a practice-based small group learning (PBSGL) experience. The process was "audio-recorded and transcriptions made. Transcripts were coded and themes developed using grounded theory methods" The findings included evidence that involvement in PBSGL

made community pharmacists feel more equal to their hospital counterparts. Independent pharmacy prescribers working on their own felt that they became less isolated as a result of involvement with PBSGL. There was a willingness, by the pharmacists in the study to be engaged in interprofessional training and education which they perceived to be particularly valuable when carried out with general medical practitioners and practice nurses. In a similar investigation of PBSGL over a ten-year period, involving surveys of general medical practitioners, Cunningham and Zlotos (2016) concluded that practitioners believed that PBSGL met their learning needs and improved their engagement with their peers and stimulated support from their peers. This was particularly the case for those practitioners who were working as locums or out-of-hours, who felt more isolated.

Berrett-Abebe et al. (2018) recognised the increasing popularity of interdisciplinary team training opportunities in primary care. They utilised a brief training course (30 minutes) for participants that included physicians, nurse practitioners and social workers in six different primary care settings in the USA. Surveys were completed prior to the commencement of the training session and again at the end of the session. The findings suggested that the training experience increased knowledge and self-confidence across the multidisciplinary team in how to address the fear of cancer recurrence in cancer survivors. The study included support for active and interactive learning opportunities within the health professionals' normal workplace. Cameron et al. (2012) also investigated the use of work-based learning and interprofessional education in the primary care setting. In this discussion article, the authors carried out a critical review of literature relevant to practice in primary care. They observed that team collaboration provided a positive learning experience which in turn could lead to improved changes to practice. A concise overview of the benefits and barriers to work-based learning and the issues that support or challenge this type of learning experience is clearly described. In another interdisciplinary programme for nurses and doctors, Levine et al. (2017) reported on a 'practice improvement program' which combined self-directed online learning, conferences and mentoring with the aim of improving palliative care practice. The knowledge of the participants was assessed prior to the training programme and then again eighteen months later, using an MCQ test. In addition, the participants' confidence and ability to carry out defined core skills was assessed via pre- and post-training surveys. The results showed that participants valued the opportunity to interact and believed their knowledge base was strengthened as was their confidence in delivering palliative care to all age groups. Mentoring over a continuous period of time, learning as a team, and networking within their working environment were identified as some of the benefits of the programme. Benefits were also reported from another interdisciplinary programme (Lineker et al., 2011). These authors evaluated a multifaceted programme of training for primary care professionals. The programme involved a hands-on workshop with small group interaction at the end of the session addressing the management of patients with arthritis. At facilitated group discussions, a plan of action was agreed for each participant or team. Continuing educational support, in the form of training exercises, was provided over the following six months to assist with the implementation of the action plan. Three arthritis case-based scenarios were utilised to determine participants' expertise just prior to the training programme and six months following training. It was concluded that interdisciplinary education improves dissemination of information and potentially could lead to improvement in patient care. A pilot investigation sought feedback from some of the patients who had been treated by the participants on the programme and this suggested improvement in some aspects of arthritis patient care.

Coulson-Thomas (2010) provide a descriptive narrative about how to strengthen performance and productivity in the healthcare sector (and other public services) through structured educational activities. Learning in the clinical workplace was argued to be particularly valuable for professionals especially when it is perceived as benefiting patient care. The employing organisation was seen as well-placed to monitor the use of learning opportunities, respond to feedback from professionals and refine these supportive educational tools.

Investigating interprofessional training in cancer risk assessment, Blazer et al. (2005) conclude, on the basis of pre- and post-course surveys at 6-months and 12-months, that their study

demonstrates the strengths and importance of team training, interdisciplinary collaboration between professionals, in this case doctors, genetic counsellors and nurses. The authors note that the participants were motivated to engage and learn together.

In a review of 15 studies of the use of interprofessional education (IPE), Reeves et al (2013) determined that evidence of improvement in outcomes for patients and methods of healthcare delivery as a result of IPE is inconclusive. They suggest that further research is needed and call for comparisons between IPE and stand-alone professional educational activities, cost-benefit analyses and randomized-controlled or similar trials considering the effects of IPE on professionals' practice.

Key points

- Rural practitioners have specific CPD needs related to their setting and the communities they serve, as well as to their extended scope of practice (emergency medicine, trauma).
- Access to CPD for isolated practitioners is an issue. Innovative solutions are needed; web-based, regional and educational outreach CPD activities have been identified as effective in addressing the learning needs of rural health professionals, although more evidence on the impact of CPD on practice is needed.
- Team and inter-disciplinary education have benefits: it promotes collaboration and mutual understanding and enhances peer engagement.
- Interprofessional continuing education incorporating small group learning using real-life clinical situations improves engagement with peers which is particularly helpful for those practitioners who feel isolated. Participants value the opportunity to interact and learn from each other, engage with peers and offer/receive support. The development of communities of practice (or communities of enquiry) either face-to-face or web-based, can emerge through such collaborative learning activities.
- Learning in the workplace promotes team collaboration, which may enhance positive changes in practice and benefit patient care.
- However, evidence of improvement in outcomes for patients as a result of interprofessional education is inconclusive and the effectiveness of CPD shows some variation by primary, secondary or community care setting.
- We found no evidence of variation across independent/private or NHS practices or corporate dental practices.

Question 4. Evidence on CPD choices driven by insight and intelligence

This section outlines a synthesis of the literature relating to Question 4, namely evidence of CPD choices being driven by insight and/or intelligence, at either an individual or an organisational level. The literature provides evidence of CPD choices being informed at the individual level by the identification of learning needs. Self-assessment and the identification of learning needs is an essential part of a professional approach to CPD. However, learning needs assessment is a skill and Austin et al. (2005) reported that pharmacists in Ontario “*were concerned about their lack of skills in self-identification of learning needs and vehicles by which this could be addressed*”. A professional portfolio is a tool which can help professionals to reflect on their practices, their strengths and weaknesses and identify their needs (Foucault et al., 2018).

There is ample evidence of reflection on learning needs. In a survey exploring the status of implant dentistry in Europe, 40% of the respondents (European dentists), reported they were using Personal Development Plans (PDPs) to guide their learning needs in the field of implant dentistry (Ucer et al., 2014). A CPD programme based on the andragogical principles required active learners to reflect on their training needs (Bennetts et al., 2012). In addition, a CPD programme which meets learning needs is more likely to impact on professionals’ practice (Allaire et al., 2012). For example, general practitioners in Scotland reported that the main reason for joining and staying in the ‘practice-based small group learning’ (PBSGL) programme, was that it met their learning needs (Cunningham and Zlotos, 2016). In a workshop for pharmacists in Finland, participants proposed that the course should begin with reflection on their personal learning needs (Holmström et al., 2015). In their systematic review examining the implementation of evidence-based practice, Dadich (2010) concluded that one component of the most effective interventions was that they addressed the identified needs of participants.

Some assessment of learning need is an essential part of the CPD process at the individual level. It should also inform organisational development of CPD programmes. Identification of the target audience’s learning needs is the first step when organisations design CPD programmes (Austin et al., 2006). Alexander et al. (2010) state that one of the 10 principles guiding the development of training modules is to “*base educational offerings on the assessed needs of the target audience*”. For example, the learning needs of urban and rural physicians differed significantly (Halverson et al., 2014, Allan and Schaefer, 2005).

The process by which organisations assess their membership’s educational needs may include a range of activities: literature review combined with discussions with institutional leaders and surveys of local education groups (Allen et al., 2017); a baseline survey to assess knowledge, attitudes and related practices (Bonevski et al., 2015); qualitative semi-structured interviews with various stakeholders (El Sayed et al., 2012); one-to-one and group interviews followed by a needs assessment survey to assess the relevance of potential subjects (Halverson et al., 2014). The European Federation of Radiographer Societies (EFRS) recommendations for CPD were developed from the results of a needs/gap analysis (Wareing et al., 2017), and similarly, the North Tyneside Primary Care Trust in the UK undertook a training needs and skills analysis of local practice and district nurses, resulting in the development of a 5-day public health training programme (Newby et al., 2005).

On an individual level

In a discussion paper, Casey and Egan (2010) considered the value of a portfolio for UK nurses. They acknowledged that registered nurses and midwives in the UK are required to maintain an up-to-date portfolio of all their activities. They identify wide-ranging benefits, including recording evidence of their clinical practice, their continuing educational needs and achievements, demonstrating improvement in knowledge and skills and impact on career progression and their contribution to patient care. Similar positive outcomes from using a portfolio were reported by Foucault et al. (2018) in their review of a mandatory electronic portfolio to support the CPD activities of occupational therapists in Quebec, Canada. Most practitioners felt the portfolio

supported them in developing and planning their CPD activities and this related to how they felt the activities would be best suited to their practice needs. The e-portfolio comprises four areas: self-assessment, objectives, actions, and integration. Through self-assessment, the professionals determine their level of expertise and their practice needs and then identify one or two CPD activities to be completed over the following year. At each year-end they reflect on and evaluate how those activities have impacted on their practice and how they may have influenced changes and whether as a result they have become more competent practitioners.

Gordon and Campbell (2013) explored the value of the e-portfolio (available through the Royal College of Physicians and Surgeons of Canada), on physicians' CPD activities. It was noted that the portfolio promoted identification of needs, targets and learning opportunities to address the objectives of the CPD activities the physicians identified through a process of self-reflection. Building on this, a new approach to continuing competency is described by the College of Physicians and Surgeons of Alberta, Canada (College of Physicians and Surgeons of Alberta, 2018). The approach links self-reflection, a personal development plan and changed practice following CPD activity to CPD credits. Physicians are expected to reflect on their practice, consider ways to improve practice and identify CPD activities to achieve their objectives. Those who demonstrate self-reflection, produce a personal development plan and make changes to their practice as a result of their CPD activity, are eligible for CPD credits awarded by the College of Family Physicians of Canada or the Royal College of Physicians and Surgeons of Canada.

Credits for engaging in such a process may well be needed as some have found that reflection on educational needs is rarely undertaken. In interviews with a small number of 'mid-career' GPs in the UK, Brown and Wassif (2017) observed that CPD was influenced by the requirements of the regulatory body and the needs of the practice team and that reflection on their educational needs took place infrequently. The need for 'protected time' and appropriate feedback and support were highlighted as ways to promote reflective practice on learning needs which could enhance the benefit of continuing educational development. The findings of Brown and Wassif (2017) contrast with the CPD preferences of hospital doctors surveyed in Wales who stated that their CPD choices were driven by their own learning needs rather than by policies and points collection (Brigley et al., 2006).

Some doubt about the value of the PDP per se was suggested by Jennings (2007) who provided a review of self-directed learning and PDPs in relation to educational practice. The conclusions were that PDPs do not necessarily stimulate reflection on learning and that a PDP is not a prerequisite for improving self-directed learning. This opinion piece suggests that the PDP may be of more use to the trainer or to the appraiser. Kostrzewski et al. (2009) investigated UK hospital pharmacists' views of the value of a portfolio of their CPD activities on their daily practice. Although records of their practice stimulated attendance at relevant educational courses, the authors found it difficult to demonstrate that a portfolio of CPD activities strengthened and instigated changes in practice in hospital pharmacies.

Others have suggested tools that might inform the identification of learning needs and a personal development plan. Howlett et al. (2018) utilised a needs assessment survey on managing heart failure, with primary care physicians and nurses across six countries. They concluded that a survey such as this is useful in identifying future educational learning opportunities and could reduce gaps in knowledge and clinical practice. Crossley (2015) reported how a multi-source feedback (MSF) tool for nurses in the UK could make a valuable contribution to the appraisal process for nurses. However, the article stressed the need for appropriate validation of the MSF tool through psychometric analysis. Mackillop et al. (2011) drew attention to the limitations of MSF in that it relies on subjective judgements by those providing the feedback. From the results of their study they suggested how MSF could be improved. In a systematic review of publications about workplace-based assessments, Miller and Archer (2010) concluded that MSF is more likely to instigate changes in performance if the feedback was meaningful (a point also made by Overeem et al. (2009)) and where further guidance and coaching were offered. They noted that

there are very few studies that investigate the impact of workplace-based assessments on doctors' continuing education and performance.

Allen and Dennis (2012) reported that UK nurses are expected to record that they have maintained their knowledge and skills, post-registration, recording the required hours of practice (450 hours) and CPD (35 hours). They should complete a personal portfolio which includes reflection on their practice. There is no audit process in place and the introduction of an effective process of appraisal was recommended. The value of linking portfolios to appraisal is recognised by Ahmed et al. (2011) in their description of the process of revalidation for specialist urologists in the UK. The portfolio they proposed aimed to address four key areas: clinical practice performance, reflective practice and maintenance of skills, patient safety and quality care and communication skills.

Documentation from the GMC gives advice to doctors on what they are required to reflect on and discuss at an annual appraisal (General Medical Council, 2018d). This includes: CPD, quality improvement activity, significant event analysis, feedback from patients and colleagues, including compliments and complaints. In addition to their CPD, this other information provides insight and intelligence into the future direction of their CPD plans.

In a study investigating UK GPs' views on appraisal, Boylan et al. (2005) reached a number of conclusions on the basis of their analysis of focus group data: agreement amongst those acting as appraisers and those being appraised that appraisal supports reflection on clinical practice and continuing educational needs; that targeted learning could be identified through the appraisal process, but that resources and learning materials were needed to facilitate the achievement of those targets; that appraisal and revalidation should not be inextricably linked, but rather they should complement each other. Miller and Kemp (2013) reviewed the process of appraisal for dentists in general practice in the UK. They concluded that appraisal worked best when the appraiser possessed effective appraisal skills which included coaching or mentorship skills. Such expertise was more likely to support appraisees in identifying their educational needs and agreeing useful goals for their future practice. In their study of CPD for implant dentists in Europe, based on questionnaire responses, Ucer et al. (2005) detected the importance of the support of an expert mentor to the development and implementation of a PDP. The mentor could review an individual's record of achievement and thus provide external audit to their activities. This suggested role of the mentor seems akin to the appraiser role.

Appraisal and revalidation processes for general medical practitioners were investigated, through a survey, by Dale et al. (2016). Their findings suggested that practitioners, whilst supportive of the concepts of revalidation and appraisal, felt that it impacted negatively on their workload. The validity and educational value were questioned, and the processes were generally considered very time-consuming and threatening which suggested that they did not serve their designed purpose namely, supporting the profession and protecting the public. This additional burden seemed in many cases to contribute to practitioners leaving the workforce and in particular having a negative impact on part-time and locum practitioners. There was a consensus that the processes of revalidation and appraisal along with other practice inspections could be more streamlined, flexible and less onerous.

Finlay et al. (2009) investigated the impact of the appraisal process on UK GPs' learning, practice and individual CPD. Data from questionnaires revealed that 56% thought the appraisal process had fortified their CPD and 40% felt that the appraisal process had improved their practice. Changes in practice were reported by 38% of the respondents and 51% reported that appraisal had an impact on their CPD choices. GPs emphasised the independent role for the appraiser, as well as the time-consuming nature of the current appraisal process, and the need for protected time to complete this task. Respondents stated that appraisal strengthened their reflection and use of audit. Interestingly, respondents proposed that appraisal could be replaced by an e-portfolio.

In discussing the NMC revalidation process, Lanlehin (2018) argued that whilst requirements promote registrants' taking responsibility for their CPD which is of value to both the registrant and their employer, the benefits to patients remains unclear. The author noted that employers are not required to provide resources or time for registrants to undertake CPD which could influence registrants' engagement with CPD. In addition, the author maintains that it is unclear how the NMC validates the evidence recorded by the registrant and suggests that it would be useful to the registrant to receive feedback from the NMC at least on the quality of the information provided and the CPD that has been completed.

Ahmed et al. (2009), in reviewing the recertification process for doctors specialising in cardiovascular practice from different geographical areas (USA, Canada, UK), highlighted the need for a process which not only assesses "*performance and competence*" but also promotes the use of "*innovative technologies*" within a practitioner's continuing educational activities. The authors identified assessment tools which address competence and performance under the headings i. patient care (including patient safety and professionalism), ii. non-technical skills (including knowledge, communication, decision making and situational awareness), and iii. technical or procedural skills (including a portfolio of procedures, assessments and peer reviews).

Key points

- At the individual level, CPD choices are typically informed by self-assessment of learning needs. The ability to self-assess is a skill, and professionals may need help in reflecting on their strengths and weakness and identifying learning needs.
- There is consensus in the literature of the value of using a PDP or portfolio to document self-assessment of learning needs, plan CPD activity and reflect on its impact-on-practice. A further extension of this process is to link it to CPD credits. E-portfolios have been recently used, particularly within the electronic environments of Colleges and regulators, aiming to facilitate members' activities for revalidation or re-licensure purposes. An e-portfolio may also strengthen engagement between registrants and regulators.
- Other tools to identify needs include the use of surveys and multi-source feedback.
- However, it is difficult to demonstrate that a portfolio of CPD activities changes practice, as it does not necessarily stimulate reflection on learning.
- Authors link portfolios to appraisal and revalidation processes but views are mixed: although appraisal can support reflection and the identification of CPD, some warn against linking it to revalidation and others refer to it being time-consuming and threatening.

On an Organisational Level

A number of examples demonstrate the use of intelligence gathering to inform specific CPD developments. The Local Dental Network (LDN) for Shropshire and Staffordshire carried out two surveys in their region to assess the needs and requirements, for training, among their dental professionals. They used the results to direct future dental training and courses. They also developed a dental peer review toolkit for use by local dental professionals who wish to set up peer review groups. In addition, they pioneered a downloadable App to support training and information sharing (including dissemination of information on CPD opportunities), improve communication and increase engagement across dental professionals and dental teams. (South Staffordshire Local Dental Committee, 2018). A second example comes from Ireland. In order to identify gaps in infection prevention practices of surgical trainees, in the general surgery department of the Beaumont Hospital in Dublin, an audit was carried out over a 5-month period. Based on its results, the areas for improvement were identified and a blended learning course for surgeons was developed (2010). In the US, the American Nephrology Nurses' Association continuing education programme (*ANNAConnections*) was informed by the Oncology Nursing Society (ONS) mentoring programme and a recent survey of ANNA membership on their views and preferences (which confirmed the need for such a programme, preference for the online format, peer networking, mentoring and sharing knowledge and support) (Cahill and Payne, 2006). Policy change can also result in changes to regulatory body requirements. Lewney and Boland (2015), in referencing the Care Act 2014, provided an overview and update on the important responsibility of dental professionals in relation to safeguarding adults. Using scenarios, they concentrated specifically on 'adults at risk'. They noted that as a result of this Act, the GDC added "*safeguarding vulnerable adults*" to the list of recommended CPD topics for dental professionals. This is an example of the regulatory body utilising intelligence to strengthen the continuing education of their registrants. As a result of similar information gathering and insight, they had also added the topics "*oral cancer: early detection*" and "*safeguarding children and young people*" to the list of recommended CPD topics.

The content of the training syllabus used in the aviation industry aims to develop and improve the skills and capabilities of crews and is tailored to put focus on specific areas of training where it is required, or will be of most benefit, following feedback from operational events, industry experience or observed shortfalls in performance amongst crew performance on a specific fleet or across an airline (Hawkins, 2018). A routine requirement to review performance and behaviours after every flight online using a simple "Post Flight Review" format is also employed by some operators. This has encouraged honest and open feedback, with an aspiration to identify how to avoid mistakes but also how to recognise and replicate when something was handled well. This is in addition to the open sharing of comprehensive post event analysis of significant safety and operational events and the structured debriefs which take place after formal simulation-based assessment and training events. Evidence of safety performance across aviation can be found in the International Air Transport Association (IATA) and European Aviation Safety Agency (EASA) Annual Safety Reports. All airlines require an Air Operators Certificate (AOC). In Europe, the rules governing the granting and maintenance of an AOC are written by EASA. The UK CAA acts as an agent of EASA and oversees the compliance of UK registered airlines. These are the rules that an airline is required to operate within and cover every aspect of managing the operation and the people within the airline (Hawkins, 2018).

Other organisations use approved guidelines. Alahuhta et al. (2007) report the guidelines for CPD approved by the European Union of Medical Specialists (Union Européenne des Médecins Spécialistes – UEMS) anaesthesiology section, applicable to those working in intensive care medicine. These were based on credits/points but included the need to embrace active learning methods and utilise a personal portfolio that supports verification of a practitioner's CPD activities.

Apart from gathering information and evidence to inform small-scale CPD activities (e.g. within a hospital), organisations and professional associations also gather evidence to inform large-scale

CPD interventions or recommendations (on a national basis), for example when embarking to update the revalidation system and the accompanying CPD requirements.

When the American Nurses Credentialing Center (ANCC) decided to update the accreditation criteria, they formed a Quality Improvement committee to undertake the task. To fulfil their purpose, they performed a gap analysis, reviewed the relevant literature, assessed the current continuing education landscape, sought expert opinion and membership feedback. They used this information to develop a conceptual model which served as a basis for the new accreditation criteria (Chappell and Drenkard, 2010). In another example, the *Midwifery Practice Review* process in Australia was developed through literature review, consultation with nursing leaders on a draft *Practice Review*, piloting, development of a National Reviewer training programme, and finalisation and implementation of the *Practice Review* process (Griffiths and Homer, 2008)

Similarly, solicitors in the UK employed a thorough process to inform their new CPD system. The development process was informed by a series of activities related to review, research and piloting (Finley et al, 2011, Brannan, 2013, Dean, 2011, Rothwell, 2011, Shirley, 2010). In 2011, the Solicitors Regulation Authority (SRA) undertook a comprehensive review of CPD, which involved extensive consultation [indicative question: *should we move from a scheme based on input (hours) to an outcomes (results) based scheme?*]. Within this review process, the SRA commissioned research on CPD models in other professions (medicine, accountancy, pharmacy), both in the UK and internationally (including Canada and Australia) to identify best practices and learn from their CPD approaches. The review was informed by research into CPD, also commissioned by the SRA. The research and review phase concluded in 2012-2013. The Legal Education and Training Review (LETR) was published in July 2013 and recommended the adoption of models of CPD that would motivate participants to take ownership of their CPD, through reflecting, planning and evaluating their training needs. In response to the LETR review, the SRA published its policy statement "*Training for Tomorrow*", (Solicitors Regulation Authority, 2015) where they proposed replacing the present CPD scheme (based on counting the hours of training), with a system which focuses on the effectiveness of CPD and which enables solicitors to align their professional development to their individual circumstances. Online monitoring of solicitors' CPD uptake was also proposed. In parallel, the SRA engaged with their stakeholders to seek their views, through a series of journeys across England and Wales. A new website was also launched, where the stakeholders could submit their thoughts and views. In 2015, the new CPD scheme was piloted with 76 barristers participating.

Key points

- Designers of CPD programmes need to identify the target audience's learning needs as a first step. CPD courses that address the learning needs of the intended audience are more likely to have positive effects on their practices.
- Regulators' and professional associations' updating of CPD systems and requirements are informed by a series of activities, involving literature reviews, gaps analysis, consultation with experts, research, feedback from membership and piloting.
- Areas for improvements are also informed by audits, significant event analysis, feedback from events and observed shortfalls.
- CPD activity required by regulatory bodies is also governed by policy change and new regulations.

Question 5. Evidence of qualitative-based CPD models

In this section we provide a synthesis of the evidence of qualitative-based models for CPD other than those based on quantitative measures (such as points or hours) (Question 5). We classify the models into two main groups which we refer to as either outcome-based or mixed (models which emphasise qualitative elements, but which include quantitative aspects). However, these groupings should be interpreted with some caution and we suggest that our classification warrants further research and engagement with the specific professional councils and bodies. Our grouping represents our best effort given limited time, but we note that, on the basis of the description we had available, it was sometimes difficult to judge which category the models as described best suited.

It seems there is a clear transition from quantitative-based models to outcomes-focused ones, as the most recently updated CPD regulations are either solely or predominantly outcomes-based. Yet many regulatory bodies across the health professions globally, continue to impose mandatory hours of CPD activities in the belief that this is essential to protect the public and is the sole way to influence professional clinical practice (Austin, 2013). However, Wareing et al. (2017) carried out a *“collaborative European meta-ethnography literature review”* of research relating to radiography and noted that although many countries still employ models that include credits/points/hours of CPD, they detected a move towards outcomes-based models and a more reflective-based approach combined with clinical simulation and technical training. They suggest that consideration should be given to the beneficial impact of CPD on the professional, the profession itself, the service needs and improved patient care and safety.

Outcomes-based models

Wallace and May (2016) performed a literature search and noted that many professional organisations have questioned the value of *“input-based”* CPD activities and shed doubt on whether they lead to improved performance and patient care. They argue that there should be a clear structure to a series of defined learning experiences. These should include interaction with peers and the wider team, include a reflective component and provide opportunities to practice skills. The activities should be *“outcomes-based”*, not undertaken in isolation and there should be opportunities for repeating the learning experiences. It is believed that the outcomes-based approach is more likely to impact positively on personal performance and improve patient care. May and Kinnison (2015) reported on CPD in veterinary practice. They stated that the previous CPD process, which was not outcomes-based had failed to produce meaningful and sustained changes in clinicians’ clinical practice. The aim of their investigation was to explore the effect of the Royal College of Veterinary Surgeons individual *“outcomes-focused”* approach to the delivery of CPD through the reflective accounts of participating registrants. They recommend engagement with training covered by the *“Certified Advance Veterinary Practice”* programme, facilitated by a *“Professional Key Skills Module”*. They conclude that *“individual learning led to changed approaches to knowledge acquisition and use, and clinical practice. This led to direct benefits to the patient/owner and the whole practice team, with evidence of further benefits to patient/owner via this indirect practice team route”*.

The Health and Care Professions Council (HCPC), which regulates sixteen professions, does not approve or accredit activities, nor does it set a specific number of hours; the approach is based on outcomes not inputs (Health and Care Professions Council, 2017). It has a flexible approach to CPD to cater for the variety of healthcare registrants and their different roles. However, it has five defined CPD standards which registrants can meet by recording and reflecting on their activities and completing a variety of learning opportunities. The HCPC requires its registrants to own their CPD by addressing their educational needs in support of their particular scope of practice. The HCPC’s view of CPD is that it is about learning and developing throughout a career. It can be formal and informal and should be aimed at keeping the professional up-to-date and improve knowledge and skills to strengthen safe and appropriate care for patients. CPD may take different forms - learning in the workplace, learning from professional activities and self-directed

learning - all of which should include reflection and forward planning. Some registrants may be audited at random and be required to submit details and evidence of their CPD.

Pharmacy in the UK has moved towards an 'outcomes-based approach' with measures in place to identify success of a CPD activity. This approach is intended to help the regulatory body demonstrate its commitment to quality CPD and its benefit to patient care. For pharmacy registrants (pharmacists and pharmacy technicians), CPD and registration have been combined under the new revalidation process (General Pharmaceutical Council, 2018b, Royal Pharmaceutical Society, 2018). Registrants must record their learning experiences, reflect on them and link them to their scope of practice. At the end of March 2018, the General Pharmaceutical Council (GPhC) initiated their new online portal so that their registrants can record their learning and development activities in a new format (General Pharmaceutical Council, 2018a). In the initial phase, in 2018, registrants must submit four CPD records, two of which are planned learning activities, one reflection and a peer discussion. From 2019 onwards, they will be required to submit six CPD records including two new types of activity. Peer discussions and reflective accounts are mandatory components of the new revalidation process. Registrants will not be required to log hours of CPD activity.

The Royal College of Occupational Therapists (RCOT) has recently produced a "*Career Development Framework: Guiding Principles for Occupational Therapy Royal College of Occupational Therapists*" and its accompanying implementation guide (Royal College of Occupational Therapists, 2017). The Career Framework provides a set of guiding principles for the nine 'levels' within each of four Framework 'pillars'. Using the Framework supports occupational therapists in mapping their present skills and experience with the 'pillars' at various 'levels' ideally in discussion with a peer or colleagues and when planning future learning opportunities. The Framework can also be used by service users, employers, managers, funders, commissioners and the profession. When reviewing their existing development needs they should do this in parallel with considering the UK national occupational standards (NOS) (National Organisational Standards, 2018). Occupational therapists are not required to log number of hours of CPD activity.

The Solicitors Regulatory Authority (SRA) introduced a new process for CPD or what they refer to as "*continuing competence*", effective from November 2016 (Solicitors Regulation Authority, 2016). The new scheme is outcomes-based, promoting solicitors' reflection on their learning needs and review of their CPD activities. Under the new system, solicitors are no longer required to complete a specific number of training hours or to collect CPD points. In addition, they are not obliged to participate in courses offered solely by approved providers; a wide range of learning activities are acceptable, such as podcasts, reading, delivering training, provided that the activity addresses the solicitor's learning objectives as identified within the individual CPD plan (Rayner, 2017, Davis, 2017). All solicitors are still required to make an annual declaration as part of the Practising Certificate Renewal exercise, confirming that they have addressed their learning needs. In summary, to comply with the new system, solicitors must: 1) reflect on their current practice and identify knowledge gaps, 2) establish learning objectives and plan the activities, 3) participate in activities to address their learning needs and identify ways to incorporate the learning into their practices, 4) keep records of the activities, review the outcomes and identify further learning needs (Brannan, 2017, Rayner, 2017). Stated benefits of the new system include the abolition of the bureaucracy within the Bar Standards Board (BSB) who were charged with keeping records of CPD hours, and the freedom of solicitors to choose activities that are most relevant to their practice area, instead of activities that merely added CPD points (Davis, 2017).

The case of the engineering profession provides another illustration of an outcomes-based model of CPD (Bernstein, 2014) (Engineering Council, 2018). In a policy statement in June 2017 the Engineering Council (2017) announced that they believed that an outcome-based plan of action for CPD, which the professional has ownership of, should be based on quality rather than just a measure of hours/credits/points. To strengthen confidence in the profession, engineers are

obliged by the Engineering Council to maintain their skills through CPD, record what they have undertaken and contribute to the learning opportunities of their colleagues. The “*Engineering CPD Code for Registrants*” (Engineering Council, 2018) applies to engineering technicians, ICT technicians, incorporated engineers and chartered engineers. Registrants are encouraged to consult available frameworks against which they can benchmark their activities. The CPD code is outcomes based; a minimum amount of time in CPD activities annually is not specified within the code. However, there is variation in the CPD requirements dependent on expertise and the area that is relevant to their scope of practice. The registrant is responsible for ensuring that the CPD they undertake is relevant to their needs but may also be informed by their employers or work colleagues. Each activity should have defined objectives and registrants should reflect on what they have learnt which should inform their future structured personal development plan. In summary, engineers are expected to:

- “1. Take ownership of their learning and development needs and develop a plan to indicate how they might meet these, in discussion with their employer, as appropriate.*
- 2. Undertake a variety of development activities, both in accordance with this plan and in response to other opportunities which may arise.*
- 3. Record their CPD activities.*
- 4. Reflect upon what they have learned or achieved through their CPD activities and record these reflections.*
- 5. Evaluate their CPD activities against any objectives which they have set and record this evaluation.*
- 6. Review their learning and development plan regularly following reflection and assessment of future needs.*
- 7. Support the learning and development of others through activities such as mentoring and sharing professional expertise and knowledge.”*

Professional engineering institutions (PEI) are licensed by the Engineering Council to provide guidance, resources and mentoring educational programmes to support their members’ CPD activities. These PEIs may sample/audit a random selection of registrants to encourage engagement, ownership and responsibility for undertaking appropriately planned and relevant CPD.

There is some evidence to suggest the superior value of a portfolio-based system over a points-based system. Asadoorian and Locker (2006) compared two CPD quality assurance systems for dental hygienists in Canada: British Columbia which had a mandatory credit-based process and Ontario which used a portfolio-based CPD process. Those hygienists in Ontario reported participating in significantly more activities which they believe promoted change in practice. The process in Ontario incorporates a mechanism for linking self-assessment to practice professional standards (Bilawka, 2003). A detailed overview of Ontario’s quality assurance programme for dental hygienists was updated in 2015 and is available from the College of Dental Hygienists of Ontario (College of Dental Hygienists of Ontario, 2018). This programme includes three related components: (i) self-assessment, continuing and professional development; (ii) peer and practice assessment and (iii) on-going support.

Mixed models

The main principles of the GMC’s revalidation process include: an annual appraisal which covers the whole of a doctor’s scope of practice; a focus on the quality of their learning and development activities rather than the quantity; identification of both strengths of practice and areas requiring development, and this should stimulate continued reflection on their practice. The six steps in the CPD process include: determining CPD need, planning CPD, carrying out CPD,

evaluating and recording impact, and the role of the GMC and others in a registrant's CPD. In addition, there is advice on considering the learning requirements / opportunities that apply to the needs of registrants', their patients and the healthcare team, the importance of taking into account the domains of "Good Medical Practice" (General Medical Council, 2013a) and the relevance to job planning and appraisal. Supporting information available at the annual appraisal should demonstrate evidence of reflection on what has been learnt and acted upon as a result of their chosen CPD activities and future learning needs and opportunities. (General Medical Council, 2018d). The PDP should be used to record their personal objectives but may refer to impact on the wider working team. Multi-professional team training and peer-based learning are encouraged, to promote a robust team approach to patient care. Reflection on what has been learnt and sharing experiences and expertise with colleagues and the wider team is considered to be equally valuable (General Medical Council, 2018c).

The new model for the renewal of registration of nurse practitioners in British Columbia, Canada places much greater emphasis on personal development planning. Registrants are required to meet the requirements of the College of Registered Nurses of British Columbia (CRNBC) (Registered Nurses' Association of British Columbia and College of Registered Nurses of British Columbia, 2008). Whilst the new requirements, implemented in 2018, still include a quantitative aspect ("*practice hours requirements*"), there is increased emphasis on self-assessment, peer feedback, multisource feedback, portfolio completion and the production of a personal development plan (PDP). These "*personal practice review requirements*" comprise: (i) self-assessment of practice mapped to the CRNBC professional standards; (ii) peer feedback; (iii) development and implementation of a learning plan (informed by (i) and (ii)); and (iv) an evaluation of the impact on their clinical practice of the learning plan. At least one activity should be unique to their scope of practice and three activities from a set of prescribed development activities. Further information on the nurses CPD Framework is available on the British Columbia website (British Columbia College of Nursing Professionals, 2018).

The Nursing and Midwifery Council (NMC) launched revalidation in 2015. Revalidation takes place on a three-year cycle and requirements include seven components: practice hours; CPD (35 hours during their three-year cycle of which 20 hours must be 'participatory'); five examples of practice-related feedback; five written reflective accounts; a reflective discussion with a 'confirmer' (typically a line-manager); and declarations in relation to health and professional indemnity. The CPD activities should be relevant to the registrant's scope of practice and mapped to the NMC's Code. The Code sets out the professional standards of practice and behaviour for nurses and midwives (Nursing & Midwifery Council, 2015a), akin to 'GDC standards for dental team' (General Dental Council, 2013b). The revalidation process thus reinforces the NMC's Code. Registrants use it as the reference point for all the requirements, including their 'written reflective accounts' and 'reflective discussion' with another NMC registrant, covering their five reflective accounts'. The Code is at the centre of the revalidation process and acts as a focus for reflective practice by registrants. Recording their clinical and continuing educational activities and other relevant data within a structured portfolio is recommended but there is no specific NMC portfolio. Registrants may be randomly selected by the NMC to present their records and evidence. A full account of their CPD activities would be included in this process. All information on NMC revalidation can be found on their revalidation microsite (Nursing & Midwifery Council, 2017a).

When developing the revalidation policy, the NMC gathered information and evidence from the KPMG report (KPMG, 2015), the Ipsos Mori research report (Ipsos MORI Social Research Institute for the Nursing and Midwifery Council, 2017) and the NMC revalidation pilot findings report (Nursing & Midwifery Council, 2015b). The report on the key findings of the NMC's revalidation pilot (Nursing & Midwifery Council, 2015b), noted a positive response on the proposals for 'writing reflections' and for 'reflective discussions'. The report referenced Hughes' (2005) statement that "*the focus on hours and CPD points takes the onus away from reflection and impact on practice*". An 'outcome-based' rather than an 'input-based' model was advocated.

The General Chiropractic Council (GCC) describe the development of their CPD scheme on their website (General Chiropractic Council, 2018) due to be introduced in 2019. The Council have chosen to develop their current CPD scheme rather than pursue a process of revalidation. Additional CPD components will include: mandatory subjects to be completed over a three-year cycle, structured discussions about CPD with peers (there will be a pool of Council peers identified), the need for reflection, objective activities to ensure that registrants receive feedback from others about their practice. These may in part be identified through fitness-to-practice cases and further details are available on the GCC website along with links about being observed by a peer, patient feedback and clinical audit requirements.

The College of Physicians and Surgeons of Alberta (CPSA), in Canada has introduced a new approach to the physicians' assessment process since 2017. The aim of the new system is to engage its members in proactive pursuit of professional development activities. Regulated members are obliged to complete a quality improvement project at least once every five years. This includes the 'Practice Check-up' for all physicians, and 'Individual Practice Review (IPR)' and 'Group Practice Review (GPR)' for selected physicians (in general and specialist practices) and clinics. The 'Practice Check-up' is an annual report that supports self-assessment and highlights opportunities for improvement and professional development. The IPR is an in-depth competence assessment process, tailored to individual physician needs and offering options for practice improvement. IPR includes the multisource feedback (MSF+), where colleagues and patients provide input on the physician's performance and professionalism. CPD credits are awarded to physicians who develop personal learning plans, perform practice changes based on the 'Practice Check-up' report or complete an IPR (College of Physicians and Surgeons of Alberta, 2018).

This approach is not dissimilar to another Canadian example. The quality assurance process for pharmacists in Ontario, Canada is two-tier (Austin et al., 2006). Pharmacists are required to complete a structured practice review process which assesses their practice quality and their CPD activities. Austin et al. (2006) reported that the majority met the required expectations and were placed in the 'self-directed' category. Those who did not meet the requirements were placed in the 'peer support' category and were required to provide a written education plan in which they identified how they would address their skills gap. This group took part in professional skills enhancement workshops comprising peer learning, reflection and feedback from simulated patients and facilitated by volunteer pharmacist mentors. (See earlier discussion in interactive activities, p13).

Since 2013, the College of Dental Hygienists of British Columbia (CDHBC) in Canada has implemented a 'Quality Assurance Program' (QAP), which requires registrants to renew their license every 5 years. Registrants have to complete 75 continuing dental hygiene education credits in topics of their choice. They also have to create individual learning plans and register their Continuing Competency Activities within the 'Online Learning Plan' (OLP), on the CDHBC website. To support registrants in their identification of knowledge gaps and the creation of learning plans, the QAP 'Assessment Tool' is also available on the website, which is a 75-question assessment tool, designed to provide feedback to registrants regarding their knowledge. Results of the 'QAP Assessment Tool' are incorporated within the 'Online Learning Plan' (OLP) and inform their learning process. (College of Dental Hygienists of British Columbia, 2018).

A weighted-points system

Although not an outcomes-based model, the General Optical Council (GOC) have in place a mandatory continuing education training (CET) scheme for its registrants (optometrists, dispensing opticians, contact lens opticians, therapeutic specialist optometrists) based on a weighted points system. Registrants are required to achieve 36 general CET points over a three-year cycle (a minimum of six points each year) but activities involving peer discussions and/or clinical skills acquisition are of greater value than, for example, attendance at lectures or reading

journals. For the individual GOC registrants a series of 'competency units' are listed under the CET requirements for each professional. The GOC audit on annual basis by randomly selecting registrants. These individuals are requested to "*verify information..., provide copies of qualification certificates and proof of insurance*". The GOC's present CET scheme was first introduced back in 2013. They state that they intend to "*introduce significant improvements to the scheme from 2020 onwards*" (General Optical Council, 2017)

Skills assessment and enhancement

All airline companies are required to have in place a comprehensive training programme which covers the recurrent or continuing training of their pilots and cabin crew. For pilots this includes comprehensive simulator training and assessment events which are generally scheduled bi-annually. A number of training and assessment programmes are used by airlines (Hawkins, 2018). These programmes include the training and assessment of technical as well as non-technical skills. The most advanced programme in current use is known as Evidence Based Training (EBT). Within an EBT framework, the regulatory requirements to assess key technical capabilities are met by conducting specific checks or assessments of a crew's ability to manage and perform key tasks to the required standard. Alongside the assessments, significant tailored training is included which covers all the requirements of a comprehensive syllabus over a 3-year cycle (Hawkins, 2018). Annually, pilots and cabin crew also undertake a training day to cover all generic aspects of managing the aircraft, cabin scenarios, emergency equipment and passengers. This involves interdisciplinary team training. All personnel should have a knowledge and understanding of other staff activities - pilots and cabin crew - and in many cases review significant events together as a team. The 'post-event review' promotes the analysis and constructive criticism of where things went wrong but also where things went right and how issues were dealt with appropriately. The intention is to engender a positive environment for reviewing all activities rather than just errors (Hawkins, 2018).

The Wales Centre for Pharmacy Professional Education (WCPPE) has streamlined a process for enhanced services accreditation, entitled "National Enhanced Services Accreditation" (NESA) (Wales Centre for Pharmacy Postgraduate Education, 2018). They provide video introduction to the process of accreditation of pharmacists and pharmacy technicians. Three steps are involved: pass a generic skills assessment; pass a clinical knowledge assessment for the service; and complete and submit a statement of competence. Learning resources to support these steps are available on the WCPPE website.

Key points

- The models are classified into two main groups: outcome-based and mixed (models which emphasize qualitative elements, but which include quantitative aspects). It was sometimes difficult to assign the examples to a category and further engagement with the specific professional councils and bodies is advised.
- There is a clear transition from quantitative-based models to outcomes-focused ones, as the most recently updated CPD regulations are either solely or predominantly outcomes-based.
- This shift to outcomes-based models is in part a response to the recognised failure of more quantitative based models to lead to improved performance and patient care.
- There is some evidence to suggest that a portfolio-based system is superior to a points-based system.
- Examples of professional groups using outcome-based models in the UK include pharmacy, engineering, and solicitors. Those regulators do not now require registrants to amass numbers of CPD hours.
- Features of qualitative-based models include encouraging registrant ownership, appropriate identification of CPD activities relevant to a registrant's needs and scope of practice, personal development planning and reflection.
- Many systems (even those not outcomes-based) now include qualitative aspects (such as peer feedback, reflection and personal development planning).
- Systems of quality assurance can be used to identify registrants who require greater input from peer support, mentoring and workshops.
- Some regulators have chosen to incorporate CPD within a revalidation process, others have decided against introducing revalidation.
- Variants of mixed models include a weighted-point system which gives greater value (more points) to interactive activity (such as peer discussion) over passive approaches (e.g. lectures, reading); and skills assessment and enhancement.

Good Guidance

As an element of good practice, in this short section we bring together some examples of guidance to registrants that is provided by some organisations. In some cases, this guidance is very detailed and includes examples, templates and apps.

Guidance on “*How to complete your Continuing Professional Development profile*” is provided on the Health and Care Professions Council (HCPC) website (Health and Care Professions Council, 2017). In addition, the HCPC provides sample CPD profiles applicable for the different professions they regulate. This information is to support registrants constructing their CPD profile. The profile includes, practice history, a statement on how standards have been met, a full record of CPD activities and supporting evidence. The appendices, within this guidance, provide the assessment criteria for each of these audit components.

The Engineering Council and the Institute of Mechanical Engineers' (IMechE) website provides video guidance on CPD activities for engineers (Institute of Mechanical Engineers, 2018). Formal

and informal learning examples for registrants and further information on non-technical skills are available. There are links to reflective practice. Five percent of registrants may be sampled as part of an audit of CPD activity by registrants. There are links for individuals who are audited that cover information that should be submitted and also a SWOT (strengths, weaknesses, opportunities, strengths) analysis example and links to guidance on benchmarking. Engineering registrants are encouraged to utilise a toolkit - mycareerpath® - to record their activity (Engineering Council, 2018). The use of this toolkit facilitates the appraisal process for professionals.

On the General Optical Council (GOC) continuing education training (CET) website there is a facility, MyGOC which enables registrants to maintain an e-portfolio and a record of the CET activities. There is a link to guidance about the scheme (General Optical Council, 2017).

On their website, the General Pharmaceutical Council (GPhC) provide an e-portfolio and example records for revalidation for pharmacy professionals. These address different registrant roles and workplaces. They include information relating to planned and unplanned CPD, peer discussion and reflective accounts (General Pharmaceutical Council, 2017). The Royal Pharmaceutical Society's (RPharmS) website contains links to support, to advise on the types of records required of registrants (Royal Pharmaceutical Society, 2018, General Pharmaceutical Council, 2018b). In addition, they provide MyCPD webinars, examples of CPD entries, details of revalidation learning events, online tools and resources and peer discussion prompt sheets.

The GMC website includes a link to 'CPD Guidance' (General Medical Council, 2018a). MyCPD App can be downloaded and there is a link to examples of 'reflective narratives'. In the CPD guidance section, there are details about peer-based learning, peer-reviewing and peer-tutoring which should be related to the registrant's scope practice. In the section on reflective narratives, there is advice on reflecting with a peer.

Online guidance is available to NMC registrants, including a 'checklist of revalidation requirements' on how to gather the required evidence (Nursing & Midwifery Council, 2017a) (although uploaded evidence is not required). The NMC website contains supporting resources in the form of case studies, films etc for registrants (Nursing & Midwifery Council, 2017d). There are links to the Code within the NMC's online guidance sheet (Nursing and Midwifery Council, 2018) and to examples of CPD activities – including those considered to be 'participatory'. The NMC requires registrants to produce five written reflective accounts on their CPD and/or practice-related feedback and/or an event or experience in their practice and how this relates to the Code. Information on reflective discussion is available on the NMC website along with a guidance sheet and a form to record the reflective discussion (Nursing & Midwifery Council, 2017c, Nursing & Midwifery Council, 2017b). Registrants are advised to use the NMC template to log their CPD activities and a link to a downloadable word document is provided. In addition, there are links to examples of completed forms and templates (Nursing & Midwifery Council, 2017b). As well as the reflective accounts form, these include: CPD log template and practice hours log template, feedback log template, a template log for registrants to enter their 'practice related feedback' as well as examples of completed forms and templates. The College of Registered Nurses of British Columbia (CRNBC) provide a mobile app to facilitate registrants in meeting their personal practice review requirements (Registered Nurses' Association of British Columbia and College of Registered Nurses of British Columbia, 2008).

Resources to support the process of using the Career Framework for occupational therapists (Royal College of Occupational Therapists, 2017), including the 'Implementation Guide', are available on the RCOT website (Royal College of Occupational Therapists, 2018).

The Solicitors Regulatory Authority (SRA) provide a competence toolkit on their website, which they believe is of use to individual practitioners and to the organisations who employ solicitors (Solicitors Regulation Authority, 2016). The toolkit includes additional information on their regulatory obligations as solicitors, advice on how to plan their continuing competence, how to

address their learning needs and how best to apply reflective practice and evaluate the success of their continuing activities. In addition, there are links to 'development plan' and 'development record' templates and to information relating to 'case studies'.

Flight crews have access to a learning material which in many cases is hosted within a learning portal which includes, for example: pre-simulation training, supportive material through technology such as iBooks, monthly safety updates and a repository of relevant documentation (Hawkins, 2018).

Quality Management Systems

Another aspect of good practice is quality assurance or quality management processes. These are the process that organisations have in place in an effort to assure the maintenance of high standards of CPD. The General Optical Council (GOC) has a quality management system for their continuing education system. There is a 'code of conduct' for CET providers (General Optical Council, 2017).

Whilst some providers designate credits or points for CPD activities, the GMC do not endorse or provide accreditation for CPD providers or CPD activities (General Medical Council, 2018b). The registrant has the responsibility to provide evidence that an activity is relevant and effective.

The NMC are continuously collecting revalidation data and have independently commissioned a yearly evaluation of revalidation which can be found on their website (Nursing & Midwifery Council, 2018).

A small proportion of providers of CPD for chiropractors demonstrated that they had CPD quality assurance processes in place (General Chiropractic Council, 2014).

Key points

- There are examples of useful supportive materials, guidance, checklists, case studies, video links, templates, examples and apps on regulatory body websites or learning portals which support CPD processes and record-keeping by registrants. These easy to navigate websites should improve registrant-regulator engagement with continuing education and training
- Quality assurance practices vary. Some regulators engage in the quality management of their CPD processes by requesting CPD providers to follow their code of conduct. Others do not accredit CPD providers or CPD activities.

CONCLUSIONS

A proposed qualitative-based model for UK dental professionals

The GDC's future model of CPD aims to embrace a more qualitative approach rather than a purely quantitative approach. The aspiration is for CPD to make a difference to practitioner behaviour and enhance the quality of the oral healthcare they provide to their patients. In this goal they are not unlike many other professional groups. This review, by providing a synthesis of the relevant literature and outlining the approach other professionals are taking, aims to support the GDC in its quest to achieve a more qualitative approach to the delivery and monitoring of CPD for the dental workforce. The report suggests that an emphasis on reflective practice is appropriate and should contribute to improving the delivery of oral healthcare to patients through high standards of clinical practice. Further, the review sets out information gathered through this review that will support the work of the GDC's recently formed CPD Advisory Group as they endeavour to strengthen the GDC's direction for CPD for dental professionals.

The GDC's approach to CPD promotes the concept of a responsible professional, who takes pride keeping up-to-date and enhancing their clinical and professional skills and sharing their experience with others. Registrants' meaningful and productive engagement with CPD activities should support their delivery of oral healthcare. Our review suggests that this could be enhanced by a reliable, comprehensive online portfolio of activities, which is easy for the registrants to populate. The portfolio should be owned by the registrant, but they should feel comfortable with the regulatory body accessing their reflective records and evidence of quality educational activities as part of a random audit of dental registrants' CPD. This approach would be similar to that used in pharmacy and optometry in the UK.

Where there are a significant number of online resources (examples of how to record, how to reflect, how to plan ahead for activities that will have a positive impact on practice), our impression is that such resources could improve registrants' engagement in quality continuing education and training. Many of the other healthcare regulatory bodies provide such helpful online resources.

CPD underpinning lifelong learning throughout the registrant's career is an essential requirement for the dental professional. Failure to comply with the regulatory body's CPD requirements can result in removal from the dental register. Thus, it is vital that continuing educational activities are believed to be of significant value to professional practice, both by registrants and the regulatory body, more so than has been the perception up until now. The acquisition of CPD on a regular basis should be to the registrant, meaningful, objective, enjoyable, educational and not just a case of 'a means to an end'. Where CPD is recognised to be of high quality and relevant to a registrant's field of practice and to the environment in which they work, registrants are more likely to embrace the variety of CPD opportunities. The educational activities are in turn more likely to lead to positive outcomes in terms of improved professional and technical skills, enhanced impact-on-practice and lead to clinical care for patients which is of a high standard.

As a result of the findings from this extensive review of the literature about CPD across healthcare and non-healthcare professions, we have compiled suggestions for the GDC to consider on the way forward as they refine and strengthen their CPD policies and procedures for all dental registrants. The GDC may wish to consider the following:

- The model should be forward thinking and future-proofed. As it takes time to implement any development of the CPD system, the model should address the concepts and practices of future innovative continuing education and training activities.
- One conclusion from our review is that there is a shift from CPD schemes based on 'points/hours' to schemes based on quality criteria, such as personal engagement, reflective practice, ownership, blended and active learning and peer interactions. The GDC would be

advised to consider following this trend and design its future CPD policies and procedures based on this evidence.

- The new model could be solely outcomes-focused. For an intermediate period of 2-3 years, a blended qualitative/quantitative approach might be considered - minimum points could exist. Following this period of transition, only quality criteria should be in force, unless a process of weighting the quality and quantity components could be identified.
- The model should include and highlight reflection and reflective practice, active learning, portfolios, peer (and mentor) interaction and feedback. The aspiration must be to create motivation across all registrants to actively pursue meaningful, relevant CPD activities. Individual responsibility should continue to be emphasised, through the freedom of the registrants to attend activities of their choice that best match their learning needs, scope of practice and professional aspirations.
- The required evidence registrants have to submit, should be easy to complete, user-friendly, not time-consuming and offer an added opportunity for self-assessment. Ideally, a comprehensive, easy to navigate online portfolio, which enables registrants to populate it with all the required aspects relevant to their CPD, should be available on the regulatory body's website. Registrants should feel proud of their achievements and own what they have undertaken to the extent that they feel comfortable that their CPD information is readily accessible to the regulatory body. This should make the annual review of a registrant's CPD more robust and meaningful. It would also facilitate the random selection of registrants as part of a robust strengthened quality management process for dental CPD.
- The new scheme should be mainstreamed in the early stages, through publications, journal articles and presentations. The aim should be to reach all interested parties, start the process of mind-changing and gradually familiarising all stakeholders with the new concepts and proposals.
- Before implementation of the new scheme, a comprehensive 'process to change' should be devised. It could include: consultation with stakeholders, discussions with experts and leaders, interviews and surveys, focus groups and open questionnaires. All stakeholders (dental professionals, professional associations, providers, colleges, patients, governmental bodies, etc) should be actively involved in the process and have an opportunity to express their views and thoughts. Through this process, the identification of challenges and proposed measures to address them should take place. Development of a draft/ proposed scheme and wide dissemination to seek feedback could also be included within this 'process to change'.
- Engagement of the regulatory body with registrants during the 'process to change' will be critical to the success of the new scheme and should be reinforced, through focused and consistent activities, including a variety of tools and educational activities, such as presentations, printed and electronic material. It is of the utmost importance that registrants should clearly understand the benefits of the new scheme and really wish to embrace it. The success of the scheme and ultimately the professional development of the registrants and the public safety depend a successful outcome based on close engagement between the regulatory body and its registrants. This engagement needs to be sustained beyond the 'process for change' to ensure that the new CPD model achieves its objective, to strengthen patient safety.
- Within the new scheme, the engagement of registrants with regulators should be reinforced, through easily accessible communication channels. Clear online guidance should be in place, which is applicable to registrants and also to CPD providers. Of paramount importance is a dedicated online platform, including CPD tools relevant to the new scheme (e-portfolio, e-

mentoring, clear instructions, recommendations, exemplar documents) where registrants can easily find guidance, upload their documentation and pose their questions or offer views.

- The tools of the new scheme should include an all-inclusive high-specification online portfolio. This e-portfolio should be personalised and adjustable to each registrant's own preferences and practice, within a framework of continuous improvement. It should be recognised that CPD needs and opportunities can differ across different working environments – hospital/ community professionals, urban/rural professionals, group/ independent practices. Interprofessional learning and peer interactions are to be highly recommended and should strengthen the value of CPD activities across different working environments.
- In terms of a quality management system for dental CPD, to ensure compliance with the new regulations, there should continue to be a random selection of a number of registrants each year to audit their CPD activities. This should not be perceived as threatening to the registrant but rather as an opportunity to display their achievements. A comprehensive online portfolio which is accessible to the regulatory body (and acceptable to the registrants) could strengthen and enhance the quality management process. Constructive feedback and support where required should be provided by the regulatory body following this random audit process. Guidance on how to address the requirements, if randomly selected as part of the regulatory body's CPD quality management process, should also be available online
- There is evidence that some regulatory bodies 'recognise' organisations/professional bodies as 'CPD providers' and use them to support their quality management/audit of professionals CPD.
- A pilot implementation of one year could provide reliable insight into the strengths and challenges of the new scheme and allow for modifications and adjustments.

Final remarks

The ADEE research team were asked to review the literature for evidence of CPD activities that can be broadly defined as 'addressing the higher order thinking' of dental professionals. Such activities go beyond the basic observation of facts and memorisation. Thus, they go beyond book reading, conference attendance and passive learning and embrace critical thinking, reflective practice, active learning, mentoring, appraisal and feedback, portfolio and personal planning. Their role in CPD development and regulation is emerging, clearly confirmed by the recent revalidation and CPD schemes in a range of professions worldwide, including the GDC's own agenda for CPD development, which unanimously advocate the inclusion of such activities. It should be recognised that the GDC has itself stated its intention to further develop the CPD scheme for dental professionals. The reason for this shift from passive CPD uptake to active engagement is not due to the proven effectiveness of these activities in enhancing practice changes and improving patients' health; it is mainly due to the failure of the 'passive' CPD model to engage learners and create 'ownership' of CPD at the individual level. This, in combination with newer educational theories which promote active participation, reflection, personal responsibility, interprofessional education and tailored interventions, results in the fundamental change of the continuing education concept from 'externally driven' to 'internally driven' CPD.

Unquestionably, it is not an easy task for a regulatory body to base its CPD requirements on qualitative elements, particularly since the quantitative ones are so straightforward and easy to assess: number of hours, CPD points, number of conferences attended, number of journal articles read and similar. But, when the regulator aims to ensure the fitness-to-practise of its registrants, the convenience of mechanisms is not the decisive factor, as we conclude from this review. In contrast, the critical review of new evidence and the exploration of ways to incorporate them in the scheme, are essential. This accords with the conclusions of Prescott-Clements et al.

(2015) who extended previous earlier research conducted by the Picker Institute Europe (2012), in relation to a future GDC model for 'continuing assurance of fitness to practise'. They investigated how fitness to practise could be evidenced from CPD information, PDPs, audit, MSF, significant events, complaints, case-based discussions and feedback from patients. They concluded that evidence from these different sources should be combined rather than used as stand-alone information sources. The strength of the evidence from these sources varied and was stronger where it included analysis and reflection rather than logs or raw data. The usefulness of evidence was associated with its relevance, generation of feedback and practitioner engagement. The overall conclusion was that such evidence could be valuable in formative assessment rather than summative.

Interactive activities, peer learning, e-learning, mentoring/coaching and reflective activities are well documented within the literature. They present important benefits (active participation, engagement, reinforcement of cognitive skills, enhancement of collaboration, team-working and communication skills) and are widely used, often in variable combinations. Their relevance to practice and to the learning needs of participants is highly important. Nevertheless, results on their impact-on-practice are inconclusive. The majority of studies report on the learners' satisfaction or on self-reported changes or they evaluate the post-intervention knowledge and skills. These are the criteria that may be indicative of a probable change of practice, but they are not a measure of the actual effect on practice and improvement of patients' health, as a result of these CPD activities.

Health professionals possess a variety of tools and processes to assist them in evaluating their needs and plans for future learning. Portfolios, appraisal, multi-source feedback, personal development plans are all learning tools which require the capability to critically reflect on oneself, objectively evaluate personal strengths and weaknesses, and plan for future relevant learning activities, in a continuous improvement cycle. Reflection is the key word within these processes and tools, and it is also the crucial element that makes the difference between learning as a rewarding experience and an obligatory, bureaucratic exercise. Still, the actual impact-on-practice of these processes has yet to be proven.

Some of the more active CPD activities are particularly relevant for isolated practitioners (for example, rural, remote, single-handed practitioners etc.), who face unique challenges: web-based learning, educational outreach activities and group-based activities are preferred methods that may address the learning needs of this professional group. In hospital and community settings, interprofessional education, work-based learning, peer and team-learning are proposed as efficient for not only addressing specific learning gaps, but also improving the 'soft' skills of practitioners, such as teamwork, communication and collaboration.

'Higher order thinking' CPD activities exist in the most recent CPD models and revalidation schemes, in different formats and to different extents. The direction of travel, that aligns with the on-going approach of the GDC to their registrants' CPD, is that any new approach to CPD should acknowledge that individual practitioners should be actively responsible for their own professional development and must actively pursue it, by undertaking education that is relevant and tailored to their individual needs. The new CPD schemes should aim to create, within each professional, the feeling of 'ownership' over their professional development, in contrast to the previous schemes which created the feeling of 'obligation' and 'conformance to regulations'. Regulators must support the registrants throughout this transition, by offering them guidance and educational tools, provide feedback and most importantly, engage closely with them using all available methods of communication and engagement. It is important to note that the GDC's recent publication, "*Shifting the Balance: a better, fairer system of dental regulation*" (GDC, 2017) speaks directly to these sentiments of dental professionals taking ownership and responsibility for their future CPD aspirations, planning and development in support of safe practice for their patients.

REFERENCES

- ABBOT, B., LAURENCE, C. & ELLIOTT, T. 2014. GP surgeons: what are they? An audit of GP surgeons in South Australia. *Rural and Remote Health*, 14.
- ADAMS, S. G., PITTS, J., WYNNE, J., YAWN, B. P., DIAMOND, E. J., LEE, S., DELLERT, E. & HANANIA, N. A. 2012. Effect of a Primary Care Continuing Education Program on Clinical Practice of Chronic Obstructive Pulmonary Disease: Translating Theory Into Practice. *Mayo Clinic Proceedings*, 87, 862-870.
- ADLER, P., CREGG, M., DUIGNAN, A., ILETT, G. & WOODHOUSE, J. M. 2005. Effect of training on attitudes and expertise of optometrists towards people with intellectual disabilities. *Ophthalmic and Physiological Optics*, 25, 105-118.
- AEBERSOLD, M. & TSCHANNEN, D. 2013. Simulation in nursing practice: the impact on patient care. *Online Journal Of Issues In Nursing*, 18, 6-6.
- AEBY, T. C., WONG, S. & ZALUD, I. 2014. Current trends in obstetrics and gynecology ultrasound continuing medical education. *Donald School Journal of Ultrasound in Obstetrics and Gynecology*, 8, 60-64.
- AELTERMAN, N., VANSTEENKISTE, M., VAN KEER, H., DE MEYER, J., VAN DEN BERGHE, L. & HAERENS, L. 2013. Development and evaluation of a training on need-supportive teaching in physical education: Qualitative and quantitative findings. *Teaching and Teacher Education*, 29, 64-75.
- AHLERS-SCHMIDT, C. R., WETTA-HALL, R., BERG-COPAS, G., JOST, J. C. & JOST, G. 2008. Evaluating Program Effectiveness: Creating a Reliable and Valid Tool. *Journal of Continuing Education in Nursing*, 39, 139-144.
- AHMED, K., ASHRAFIAN, H., HANNA, G. B., DARZI, A. & ATHANASIOU, T. 2009. Assessment of specialists in cardiovascular practice. *Nature Reviews Cardiology*, 6, 659-667.
- AHMED, K., ZAKRI, R., ROWLAND, S., JOYCE, A., CHALLACOMBE, B., DASGUPTA, P. & KHAN, M. S. 2011. What is the current status of revalidation in urology? *Bju International*, 108, 1248-1253.
- ALAHUHTA, S., MELLIN-OLSEN, J., BLUNNIE, W. P. & KNAPE, J. T. A. 2007. Charter on continuing medical education/continuing professional development approved by the UEMS Specialist Section and European Board of Anaesthesiology. *European Journal of Anaesthesiology*, 24, 483-485.
- ALBERT, A. & HALLOWEL, M. R. 2013. Revamping occupational safety and health training: Integrating andragogical principles for the adult learner. *Australasian Journal of Construction Economics and Building*, 13, 128-140.
- ALEXANDER, L. K., HORNEY, J. A., MARKIEWICZ, M. & MACDONALD, P. D. M. 2010. 10 Guiding principles of a comprehensive internet-based Public Health Preparedness Training and Education Program. *Public Health Reports*, 125, 51-60.
- ALIPOUR, S., JANNAT, F. & HOSSEINI, L. 2014. Teaching Breast Cancer Screening via Text Messages as Part of Continuing Education for Working Nurses: A Case-control Study. *Asian Pacific Journal of Cancer Prevention*, 15, 5607-5609.

- ALLAIRE, A.-S., LABRECQUE, M., GIGUERE, A., GAGNON, M.-P. & LEGARE, F. 2012. What Motivates Family Physicians to Participate in Training Programs in Shared Decision Making? *Journal of Continuing Education in the Health Professions*, 32, 98-107.
- ALLAN, J. A. & SCHAEFER, D. 2005. Do the learning needs of rural and urban general practitioners differ? *Australian Journal of Rural Health*, 13, 337-342.
- ALLEN, D., ABOURBIH, J., MAAR, M., BOESCH, L., GOERTZEN, J. & CERVIN, C. 2017. Does a one-day workshop improve clinical faculty's comfort and behaviour in practising and teaching evidence-based medicine? A Canadian mixed methods study. *Bmj Open*, 7.
- ALLEN, J. & DENNIS, M. 2012. Who's fit to practise? *Nursing Management - UK*, 19, 11-11.
- ANDREWS, M. & MANNING, N. 2016. *EIP Peer-to-Peer Learning Guide* [Online]. Available: <https://www.effectiveinstitutions.org/en/our-approach/2> [Accessed 17.10.18].
- ARMSON, H., KINZIE, S., HAWES, D., RODER, S., WAKEFIELD, J. & ELMSLIE, T. 2007. Translating learning into practice: Lessons from the practice-based small group learning program. *Canadian Family Physician*, 53, 1477-1485.
- ARNOLD, R. C. & WALMSLEY, A. D. 2008. The use of the OSCE in postgraduate education. *European Journal of Dental Education*, 12, 126-130.
- ASADOORIAN, J. & LOCKER, D. 2006. The impact of quality assurance programming: a comparison of two canadian dental hygienist programs. *Journal of dental education*, 70, 965-71.
- ASCHBRENNER, K. A., NASLUND, J. A., SHEVENELL, M., MUESER, K. T. & BARTELS, S. J. 2016. Feasibility of Behavioral Weight Loss Treatment Enhanced with Peer Support and Mobile Health Technology for Individuals with Serious Mental Illness. *Psychiatric Quarterly*, 87, 401-415.
- ATAK, L. & LUKE, R. 2009. Improving infection control competency through an online learning course. *Nursing times*, 105, 30-32.
- AUSTIN, Z. 2013. CPD and revalidation: Our future is happening now. *Research in Social & Administrative Pharmacy*, 9, 138-141.
- AUSTIN, Z., MARINI, A., GLOVER, N. M. & CROTEAU, D. 2005. Continuous professional development: A qualitative study of pharmacists' attitudes, behaviors, and preferences in Ontario, Canada. *American Journal of Pharmaceutical Education*, 69.
- AUSTIN, Z., MARINI, A., GLOVER, N. M. & TABAK, D. 2006. Peer-mentoring workshop for continuous professional development. *American Journal of Pharmaceutical Education*, 70.
- AYELLO, E. A., ZULKOWSKI, K., CAPEZUTI, E., JICMAN, W. H. & SIBBALD, R. G. 2017. Educating Nurses in the United States about Pressure Injuries. *Advances in Skin & Wound Care*, 30, 83-94.
- BAILEY, S. E. R., BULLOCK, A. D., COWPE, J. G., THOMAS, H. S., YUEN-LEE, F., WOOD, M. & NEWCOMBE, R. G. 2013. An evaluation of CPD activity of dentists in Wales. *European Journal of Dental Education*, 17, e49-e55.
- BAILLARGEON, J.-P., CARPENTIER, A., DONOVAN, D., FORTIN, M., GRANT, A., SIMONEAU-ROY, J., ST-CYR-TRIBBLE, D., XHIGNESSE, M. & LANGLOIS, M.-F. 2007. Integrated obesity care management system - implementation and research protocol. *Bmc Health Services Research*, 7.

- BAILLARGEON, J.-P., ST-CYR-TRIBBLE, D., XHIGNESSE, M., GRANT, A., BROWN, C. & LANGLOIS, M.-F. 2014. Impact of an integrated obesity management system on patient's care - research protocol. *BMC Obesity*, 1.
- BALL, C., SACKETT, D., PHILLIPS, B., HAYNES, B. & STRAUS, S. 1998. Levels of Evidence and Grading Recommendations. Centre for Evidence Based Medicine. Retrieved from <http://www.eboncall.org/content/levels.html>; No longer available online. Now available online <https://archive.is/N5Zwh>.
- BARNES, E., BULLOCK, A. D., BAILEY, S. E. R., COWPE, J. G. & KARAHARJU-SUVANTO, T. 2013. A review of continuing professional development for dentists in Europe*. *European Journal of Dental Education*, 17, 5-17.
- BEASLEY, H. L., GHOUSSEINI, H. N., WIEGMANN, D. A., BRYNS, N. A., QUAMME, S. R. P. & GREENBERG, C. C. 2017. Strategies for building peer surgical coaching relationships. *JAMA Surgery*, 152.
- BEKKERS, M.-J., SIMPSON, S. A., DUNSTAN, F., HOOD, K., HARE, M., EVANS, J., BUTLER, C. C. & TEAM, S. S. 2010. Enhancing the quality of antibiotic prescribing in Primary Care: Qualitative evaluation of a blended learning intervention. *Bmc Family Practice*, 11.
- BENNETT-LEVY, J. & PADESKY, C. A. 2014. Use It or Lose It: Post-workshop Reflection Enhances Learning and Utilization of CBT Skills. *Cognitive and Behavioral Practice*, 21, 12-19.
- BENNETTS, C., ELLISTON, K. & MACONACHIE, M. 2012. Continuing professional development for public health: An andragogical approach. *Public Health*, 126, 541-545.
- BENO, L., HINCHMAN, J., KIBBE, D. & TROWBRIDGE, F. 2005. Design and implementation of training to improve management of pediatric overweight. *Journal of Continuing Education in the Health Professions*, 25, 248-258.
- BERGGREN, E., STRANG, P., ORREVALL, Y., OLIN, A. O., SANDELOWSKY, H. & TORNKVIST, L. 2016. Evaluation of ConPrim: A three-part model for continuing education in primary health care. *Nurse Education Today*, 46, 115-120.
- BERKHOUT, J. J., HELMICH, E., TEUNISSEN, P. W., VAN DER VLEUTEN, C. P. M. & JAARSMA, A. D. C. 2018. Context matters when striving to promote active and lifelong learning in medical education. *Medical Education*, 52, 34-44.
- BERNSTEIN, A. 2014. CPD AND YOUR CAREER. *MWP*, 158, 16-16.
- BERRETT-ABEBE, J., CADET, T., NEKHLYUDOV, L., VITELLO, J. & MARAMALDI, P. 2018. Impact of an Interprofessional Primary Care Training on Fear of Cancer Recurrence on Clinicians' Knowledge, Self-Efficacy, Anticipated Practice Behaviors, and Attitudes Toward Survivorship Care. *Journal of Cancer Education*.
- BIGGS, J. & TANG, K. 2011. *Teaching for quality learning at University*, Maidenhead, Oxford University Press.
- BILAWKA, C. E. B. 2003. Quality assurance and dental hygiene. *International Journal of Dental Hygiene*, 1, 218-222.
- BIRD, G. C., MARIAN, K. & BAGLEY, B. 2013. Effect of a Performance Improvement CME Activity on Management of Patients With Diabetes. *Journal of Continuing Education in the Health Professions*, 33, 155-163.

- BLAZER, K. R., CHRISTIE, C., UMAN, G. & WEITZEL, J. N. 2012. Impact of web-based case conferencing on cancer genetics training outcomes for community-based clinicians. *Journal of Cancer Education*, 27, 217-225.
- BLAZER, K. R., MACDONALD, D. J., RICKER, C., SAND, S., UMAN, G. C. & WEITZEL, J. N. 2005. Outcomes from intensive training in genetic cancer risk counseling for clinicians. *Genetics in Medicine*, 7, 40-47.
- BOESPFLUG, A., GUERRA, J., DALLE, S. & THOMAS, L. 2015. Enhancement of customary dermoscopy education with spaced education e-learning: A prospective controlled trial. *JAMA Dermatology*, 151, 847-853.
- BONEVSKI, B., MAGIN, P., HORTON, G., BRYANT, J., RANDELL, M. & KIMLIN, M. G. 2015. An internet based approach to improve general practitioners' knowledge and practices: The development and pilot testing of the "ABC's of vitamin D" program. *International Journal of Medical Informatics*, 84, 413-422.
- BORGERSON, D. & DINO, J. 2012. The Feasibility, Perceived Satisfaction, and Value of Using Synchronous Webinars to Educate Clinical Research Professionals on Reporting Adverse Events in Clinical Trials: A Report From the Children's Oncology Group. *Journal of Pediatric Oncology Nursing*, 29, 316-322.
- BORUS, J., PITTS, S. & GOODING, H. 2017. Acceptability of peer clinical observation by faculty members. *The clinical teacher*.
- BOUTIN, H., ROBICHAUD, P., VALOIS, P. & LABRECQUE, M. 2006. Impact of a continuing education activity on the quality of telephone interventions by nurses in an adult asthma client base. *Journal Of Nursing Care Quality*, 21, 335-343.
- BOWIE, P., MCKAY, J., DALGETTY, E. & LOUGH, M. 2005. A qualitative study of why general practitioners may participate in significant event analysis and educational peer assessment. *Quality & Safety in Health Care*, 14, 185-189.
- BOYLAN, O., BRADLEY, T. & MCKNIGHT, A. 2005. GP perceptions of appraisal: professional development, performance management, or both? *British Journal of General Practice*, 55, 544-545.
- BRADY, D., MOLZEN, S., GRAHAM, S. & O'NEILL, V. 2006. Using the synergy of online education and simulation to inspire a new model for a community critical care course. *Critical care nursing quarterly*, 29, 231-6.
- BRANNAN, J. 2013. A new take on training. *New Law Journal*, 1st November.
- BRANNAN, J. 2017. CPD: time to sharpen up. *New Law Journal*, 21st January.
- BRIGLEY, S., JOHNSON, C., BIRD, J. & YOUNG, H. 2006. Hospital doctors' views of their CPD and its relationship to learning in the organization. *Medical Teacher*, 28, 379-381.
- BRISARD, L., PEAN, D., BOURGAIN, J.-L., WINER, A., COMBES, X., LANGERON, O., FISCHLER, M. & LEJUS, C. 2016. Training experts in difficult airway management: Evaluation of a continuous professional development program. *Anaesthesia Critical Care & Pain Medicine*, 35, 115-121.
- BRITISH COLOMBIA COLLEGE OF NURSING PROFESSIONALS. 2018. *Support & quality assurance* [Online]. Available: <https://www.bccnp.ca/PracticeSupport/Pages/Default.aspx> [Accessed 17.10.18].

- BROWN, T. & WASSIF, H. S. 2017. Understanding continuous professional development participation and choice of mid-career general dental practitioners. *European Journal of Dental Education*, 21, 46-51.
- BRÜGGEMANN, A. J. & PERSSON, A. 2016. Using forum play to prevent abuse in health care organizations: A qualitative study exploring potentials and limitations for learning. *Education for Health: Change in Learning and Practice*, 29, 217-222.
- BRYANT, A. L., BRODY, A. A., PEREZ, A., SHILLAM, C., EDELMAN, L., BOND, S. M., FOSTER, V. & SIEGEL, E. O. 2015. Development and Implementation of a Peer Mentoring Program for Early Career Gerontological Faculty. *Journal of Nursing Scholarship*, 47, 258-266.
- BULLOCK, A., BAILEY, S., COWPE, J., BARNES, E., THOMAS, H., THOMAS, R., PHILLIPS, S., KAVADELLA, A., KOSSIONI, A., TSIKLAKIS, K., KARAHARJU-SUVANTO, T., SUOMALAINEN, K., KERSTEN, H., POVEL, E., GILES, M., WALMSLEY, A. D., SOBOLEVA, U., LIEPA, A. & AKOTA, I. 2013. Continuing professional development systems and requirements for graduate dentists in the EU: survey results from the DentCPD project. *European Journal of Dental Education*, 17, 18-22.
- BULLOCK, A., BARNES, E., RYAN, B. & SHEEN, N. 2014. Case-based discussion supporting learning and practice in optometry. *Ophthalmic and Physiological Optics*, 34, 614-621.
- BULLOCK, A., FIRMSTONE, V., FIELDING, A., FRAME, J., THOMAS, D. & BELFIELD, C. 2003. Participation of UK dentists in continuing professional development. *British Dental Journal*, 194, 47.
- CAHILL, M. & PAYNE, G. 2006. Online mentoring: ANNAConnections. *Nephrology Nursing Journal: Journal Of The American Nephrology Nurses' Association*, 33, 695-697.
- CAMERON, S., RUTHERFORD, I. & MOUNTAIN, K. 2012. Debating the use of work-based learning and interprofessional education in promoting collaborative practice in primary care: A discussion paper. *Quality in Primary Care*, 20, 211-217.
- CARDARELLI, R., ELDER, W., WEATHERFORD, S., ROPER, K. L., KING, D., WORKMAN, C., STEWART, K., KIM, C. & BETZ, W. 2018. An examination of the perceived impact of a continuing interprofessional education experience on opiate prescribing practices. *Journal of interprofessional care*, 1-10.
- CARROLL, C., BOOTH, A., PAPAIOANNOU, D., SUTTON, A. & WONG, R. 2009. UK Health-Care Professionals' Experience of On-Line Learning Techniques: A Systematic Review of Qualitative Data. *Journal of Continuing Education in the Health Professions*, 29, 235-241.
- CASEY, D. C. & EGAN, D. 2010. The use of professional portfolios and profiles for career enhancement. *British journal of community nursing*, 15, 547-8, 550-2.
- CERVERO, R. M. & GAINES, J. K. 2015. The Impact of CME on Physician Performance and Patient Health Outcomes: An Updated Synthesis of Systematic Reviews. *Journal of Continuing Education in the Health Professions*, 35, 131-138.
- CHAPPELL, K. & DRENKARD, K. 2010. Credentialing: achieving quality in continuing nursing education. *Journal Of Continuing Education In Nursing*, 41, 292-293.
- CHAPPLE, I. L. C., WALMSLEY, A. D., MATTHEOS, N. & SCHOONHEIM-KLEIN, M. 2010. Conclusions and consensus statements on: Innovative educational methods and technologies applicable to continuing professional development in periodontology - consensus view 4. *European Journal of Dental Education*, 14, 41-42.

CHAUHAN, B. F., JEYARAMAN, M., MANN, A. S., LYS, J., SKIDMORE, B., SIBLEY, K. M., ABOU-SETTA, A. & ZARYCHANKSI, R. 2017. Behavior change interventions and policies influencing primary healthcare professionals' practice-an overview of reviews. *Implementation Science*, 12.

CHUNG, C., COOPER, S. J., CANT, R. P., CONNELL, C., MCKAY, A., KINSMAN, L., GAZULA, S., BOYLE, J., CAMERON, A., CASH, P., EVANS, L., KIM, J.-A., MASUD, R., MCINNES, D., NORMAN, L., PENZ, E., ROTTER, T., TANTI, E. & BREAKSPEAR, T. 2018. The educational impact of web-based and face-to-face patient deterioration simulation programs: An interventional trial. *Nurse Education Today*, 64, 93-98.

CHURCH, E. A., HEATH, O. J., CURRAN, V. R., BETHUNE, C., CALLANAN, T. S. & CORNISH, P. A. 2010. Rural professionals' perceptions of interprofessional continuing education in mental health. *Health and Social Care in the Community*, 18, 433-443.

COLLEGE OF DENTAL HYGIENISTS OF BRITISH COLOMBIA. 2018. *Quality assurance* [Online]. Available: <http://www.cdhbc.com/Professional-Development/Quality-Assurance.aspx> [Accessed 17.10.18].

COLLEGE OF DENTAL HYGIENISTS OF ONTARIO. 2018. *The Quality Assurance Program* [Online]. Available: <http://www.cdho.org/my-cdho/quality-assurance-program/about> [Accessed 17.10.18].

COLLEGE OF PHYSICIANS AND SURGEONS OF ALBERTA. 2018. *Website* [Online]. Available: <http://www.cpsa.ca/> [Accessed 17.10.18].

COMMITTEE OF POSTGRADUATE DENTAL DEANS AND DIRECTORS. 2018. Available: <http://www.copdend.org/> [Accessed 17.10.18].

COULSON-THOMAS, C. 2010. Transforming productivity and performance in healthcare and other public services: How training and development could make a more strategic contribution. *Industrial and Commercial Training*, 42, 251-259.

CROSSLEY, J. G. M. 2015. Development and Validation of a Trustworthy Multisource Feedback Instrument to Support Nurse Appraisals. *Journal of Continuing Education in the Health Professions*, 35, 91-98.

CUNNINGHAM, D. E. & ZLOTOS, L. 2016. Ten years of practice-based small group learning (PBSGL) in Scotland - a survey of general practitioners. *Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors*, 27, 306-13.

CUNNINGHAM, D. E., ZLOTOS, L. & POWER, A. 2014. Scottish pharmacists' perceptions and experiences of a practice-based small group learning pilot: a qualitative study. *Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors*, 25, 155-62.

CURRAN, V., FLEET, L. & GREENE, M. 2012. An exploratory study of factors influencing resuscitation skills retention and performance among health providers. *Journal of Continuing Education in the Health Professions*, 32, 126-133.

CURRAN, V. R. & FLEET, L. 2005. A review of evaluation outcomes of web-based continuing medical education. *Medical Education*, 39, 561-567.

CURRAN, V. R., FLEET, L. & KIRBY, F. 2006. Factors influencing rural health care professionals' access to continuing professional education. *Australian Journal of Rural Health*, 14, 51-55.

D'AMOUR, R. & GUIMOND, P. 2010. An experiential learning model applied to nurses working with patients with Creutzfeldt-Jakob disease. *Canadian Journal Of Neuroscience Nursing*, 32, 34-39.

D'APRANO, A., SILBURN, S., JOHNSTON, V., OBERKLAID, F. & TAYLER, C. 2015. Culturally Appropriate Training for Remote Australian Aboriginal Health Workers: Evaluation of an Early Child Development Training Intervention. *Journal of Developmental and Behavioral Pediatrics*, 36, 503-511.

DADICH, A. 2010. From bench to bedside: Methods that help clinicians use evidence-based practice. *Australian Psychologist*, 45, 197-211.

DALE, J., POTTER, R., OWEN, K. & LEACH, J. 2016. The general practitioner workforce crisis in England: a qualitative study of how appraisal and revalidation are contributing to intentions to leave practice. *Bmc Family Practice*, 17.

DAVIES, B. R., MILLAR, B. J. & LOUCA, C. 2007. Going interactive: six strategies to meet the challenge of teaching electrosurgery to general dental practitioners. *British Dental Journal*, 203, 473-477.

DAVIS, V. 2017. Setting the Bar for CPD. *New Law Journal*, 27th January.

DAWBER, C. 2013. Reflective practice groups for nurses: A consultation liaison psychiatry nursing initiative: Part 2 - the evaluation. *International Journal of Mental Health Nursing*, 22, 241-248.

DEAN, J. 2011. Solicitors Regulation Authority launches review of CPD rules. *The Law Society Gazette*.

DECELLE, G. 2016. Andragogy: A Fundamental Principle of Online Education for Nursing. *Journal of Best Practices in Health Professions Diversity: Education, Research & Policy*, 9, 1263-1273.

DEED, G., KILOV, G., PHILLIPS, P., SHARMA, A., LEOW, S., ARTHUR, I., BARLOW, J. & KENNEDY, M. 2016. Peer-to-Peer, Interactive GP Education can Reduce Barriers to Best Practice in Diabetes Management. *Diabetes Therapy*, 7, 153-161.

DENTCPD PROJECT 2013. Harmonization & Standardization of European Dental Schools' Programs of Continuing Professional Development for Graduate Dentists. DentCPD. Dental Continuing Professional Development (CPD) Reference Manual. *European Journal of Dental Education*, 17, i-iv, 1-84.

DORT, J., TRICKEY, A., PAIGE, J., SCHWARZ, E. & DUNKIN, B. 2017. Hands-on 2.0: improving transfer of training via the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Acquisition of Data for Outcomes and Procedure Transfer (ADOPT) program. *Surgical Endoscopy and Other Interventional Techniques*, 31, 3326-3332.

DOWLING, S., LAST, J., FINNIGAN, H. & CULLEN, W. 2018. Continuing education for general practitioners working in rural practice: a review of the literature. *Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors*, 29, 151-165.

EAHC/2013/HEALTH/07 2013. Study concerning the review and mapping of CPD and lifelong learning for health professionals in the EU

EATON, K., BROOKES, J., PATEL, R., BATCHELOR, P., MERALI, F. & NARAIN, A. 2011. The Impact of Continuing Professional Development in Dentistry: a Literature Review. London: General Dental Council.

EL SAYED, F., SOAR, J. & WANG, Z. 2012. Key factors for the development of a culturally appropriate interactive multimedia informative program for aboriginal health workers. *Australian Journal of Indigenous Education*, 41, 162-172.

ENGINEERING COUNCIL. 2017. *Update to Engineering Council's CPD policy* [Online]. Available: <https://www.engc.org.uk/news/engage-enewsletter/july-2017/update-to-engineering-council-s-cpd-policy/> [Accessed 17.10.18].

ENGINEERING COUNCIL. 2018. *Continuing Professional Development (CPD)* [Online]. Available: <https://www.engc.org.uk/cpd> [Accessed 17.10.18].

EPPICH, W. J., MULLAN, P. C., BRETT-FLEEGLER, M. & CHENG, A. 2016. "Let's Talk About It": Translating Lessons From Health Care Simulation to Clinical Event Debriefings and Coaching Conversations. *Clinical Pediatric Emergency Medicine*, 17, 200-211.

EUROPE ECONOMICS 2004. Comparative analysis of continuing professional development (CPD) monitoring, audit and enforcement. A report for the General Dental Council. London: Europe Economics.

FARRELL, B., JENNINGS, B., WARD, N., MARKS, P. Z., KENNIE, N., DOLOVICH, L., JORGENSON, D., JONES, C. & GUBBELS, A. 2013. Evaluation of a pilot e-learning primary health care skills training program for pharmacists. *Currents in Pharmacy Teaching and Learning*, 5, 580-592.

FERRAT, E., LE BRETON, J., GUERY, E., ADELIN, F., AUDUREAU, E., MONTAGNE, O., ROUDOT-THORAVAL, F., ATTALI, C., LE CORVOISIER, P. & RENARD, V. 2016. Effects 4.5 years after an interactive GP educational seminar on antibiotic therapy for respiratory tract infections: A randomized controlled trial. *Family Practice*, 33, 192-199.

FINLAY, K. 2009. Does appraisal enhance learning, improve practice and encourage continuing professional development? A survey of general practitioners' experiences of appraisal. *Quality in Primary Care* 17, 387-95.

FINLEY ET AL 2011. By the Book: Date of destiny. *The Law Society Gazette*, October.

FORSETLUND, L., BJORNDAL, A., RASHIDIAN, A., JAMTVEDT, G., O'BRIEN, M. A., WOLF, F., DAVIS, D., ODGAARD-JENSEN, J. & OXMAN, A. D. 2009. Continuing education meetings and workshops: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*.

FOUCAULT, M. L., VACHON, B., THOMAS, A., ROCHETTE, A. & GIGUÈRE, C. É. 2018. Utilisation of an electronic portfolio to engage rehabilitation professionals in continuing professional development: results of a provincial survey. *Disability and Rehabilitation*, 40, 1591-1599.

GAGLIARDI, A. R. & WRIGHT, F. C. 2010. Exploratory evaluation of surgical skills mentorship program design and outcomes. *Journal of Continuing Education in the Health Professions*, 30, 51-56.

GENERAL CHIROPRACTIC COUNCIL 2014. An assessment of CPD provision for chiropractors in the UK

GENERAL CHIROPRACTIC COUNCIL. 2018. *Continuing Professional Development* [Online]. Available: <https://www.gcc-uk.org/education/continuing-professional-development/> [Accessed].

GENERAL DENTAL COUNCIL. 2013a. *Scope of Practice* [Online]. Available: <https://www.gdc-uk.org/api/files/Scope%20of%20Practice%20September%202013.pdf> [Accessed 17.10.18].

GENERAL DENTAL COUNCIL. 2013b. *Standards for the Dental Team* [Online]. Available: <https://www.gdc-uk.org/api/files/NEW%20Standards%20for%20the%20Dental%20Team.pdf> [Accessed 17.10.18].

GENERAL DENTAL COUNCIL. 2017. *Shifting the balance: your views and next steps* [Online]. Available: <https://www.gdc-uk.org/api/files/Shifting%20the%20Balance.pdf> [Accessed 17.10.18].

GENERAL DENTAL COUNCIL. 2018. *What we do* [Online]. Available: <https://www.gdc-uk.org/about/what-we-do> [Accessed 17.10.18].

GENERAL MEDICAL COUNCIL. 2013a. *Good medical practice* [Online]. Available: <https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/good-medical-practice> [Accessed 17.10.18].

GENERAL MEDICAL COUNCIL. 2013b. *The impact of continuing professional development on doctors performance and patient outcomes* [Online]. Available: <https://www.gmc-uk.org/about/what-we-do-and-why/data-and-research/research-and-insight-archive/the-impact-of-continuing-professional-development-on-doctors-performance-and-patient-outcomes> [Accessed 17.10.18].

GENERAL MEDICAL COUNCIL. 2018a. *Continuing professional development* [Online]. Available: <https://www.gmc-uk.org/education/standards-guidance-and-curricula/guidance/continuing-professional-development> [Accessed 17.10.18].

GENERAL MEDICAL COUNCIL. 2018b. *Continuing professional development: Guidance for all doctors* [Online]. Available: https://www.gmc-uk.org/-/media/documents/cpd-guidance-for-all-doctors-0316_pdf-56438625.pdf [Accessed 17.10.18].

GENERAL MEDICAL COUNCIL. 2018c. *Examples of reflection* [Online]. Available: <https://www.gmc-uk.org/education/standards-guidance-and-curricula/guidance/continuing-professional-development/examples-of-reflection> [Accessed 17.10.18].

GENERAL MEDICAL COUNCIL. 2018d. *Guidance on supporting information for appraisal and revalidation* [Online]. Available: <https://www.gmc-uk.org/registration-and-licensing/managing-your-registration/revalidation/guidance-on-supporting-information-for-appraisal-and-revalidation> [Accessed 17.10.18].

GENERAL OPTICAL COUNCIL. 2012. *Peer review and peer discussion groups* [Online]. Available: <https://www.optical.org/en/Education/CET/peer-review.cfm> [Accessed 17.10.18].

GENERAL OPTICAL COUNCIL. 2017. *Continuing Education and Training (CET)* [Online]. Available: <https://www.optical.org/en/Education/CET/index.cfm> [Accessed 17.10.18].

GENERAL PHARMACEUTICAL COUNCIL. 2017. *Revalidation resources for pharmacy professionals* [Online]. Available: https://www.pharmacyregulation.org/revalidation-resources-pharmacy-professionals#revalidation_examples [Accessed 17.10.18].

GENERAL PHARMACEUTICAL COUNCIL. 2018a. *Renewing your registration* [Online]. Available: <https://www.pharmacyregulation.org/renewal> [Accessed 17.10.18].

GENERAL PHARMACEUTICAL COUNCIL. 2018b. *Revalidation for pharmacists and pharmacy technicians* [Online]. Available: <https://www.pharmacyregulation.org/revalidation> [Accessed 17.10.18].

GOFF, D. A., KARAM, G. H. & HAINES, S. T. 2017. Impact of a national antimicrobial stewardship mentoring program: Insights and lessons learned. *American Journal Of Health-System Pharmacy: AJHP: Official Journal Of The American Society Of Health-System Pharmacists*, 74, 224-231.

GOLDIE, J. 2017. Do training and CPD foster truly reflective GPs? *British Journal of General Practice*, 67, 83-83.

GONZALEZ-GUAJARDO, E. E., SALINAS-MARTINEZ, A. M., BOTELLO-GARCIA, A. & MATHIEW-QUIROS, A. 2016. Clinical coaching in primary care: Capable of improving control in patients with type 2 diabetes mellitus? *Primary Care Diabetes*, 10, 171-178.

GORDON, J. A. & CAMPBELL, C. M. 2013. The role of ePortfolios in supporting continuing professional development in practice. *Medical Teacher*, 35, 287-294.

GRIFFITHS, M. & HOMER, C. 2008. Developing a review process for Australian midwives: A report of the Midwifery Practice Review project process. *Women and Birth*, 21, 119-125.

GRINDROD, K. A., PATEL, P. & MARTIN, J. E. 2006. What interventions should pharmacists employ to impact health practitioners' prescribing practices? *Annals of Pharmacotherapy*, 40, 1546-1557.

GULATI, A., HARWOOD, C. A., ROLPH, J., POTTINGER, E., MCGREGOR, J. M., GOAD, N. & PROBY, C. M. 2015. Is an online skin cancer toolkit an effective way to educate primary care physicians about skin cancer diagnosis and referral? *Journal of the European Academy of Dermatology and Venereology*, 29, 2152-2159.

HALVERSON, A. L., DAROSA, D. A., BORGSTROM, D. C., CAROPRESO, P. R., HUGHES, T. G., HOYT, D. B. & SACHDEVA, A. K. 2014. Evaluation of a blended learning surgical skills course for rural surgeons. *American Journal of Surgery*, 208, 136-142.

HAMMICK, M., DORNAN, T. & STEINERT, Y. 2010. Conducting a best evidence systematic review. Part 1: From idea to data coding: BEME Guide 13. *Medical Teacher*, 32, 3-15.

HAMMICK, M., FREETH, D., KOPPEL, I., REEVES, S., BARR, H. & () 2007. A best evidence systematic review of interprofessional education: BEME Guide 9. *Medical Teacher*, 29 735-751.

HAWKINS, S. August/September 2018. RE: Chief Training Pilot of a major UK airline. *Personal communication*. Aug/Sept 2018.

HEALTH AND CARE PROFESSIONS COUNCIL 2017. Continuing professional development and your registration. London: Health & Care Professions Council.

HEALTH EDUCATION AND IMPROVEMENT WALES. 2018. *Dental Postgraduate Training and Education in Wales: Clinical Audit and Peer Review for Dental Practice Teams in Wales* [Online]. Available: <https://dental.walesdeanery.org/improving-practice-quality/carro> [Accessed 17.10.18].

HOLMSTRÖM, A. R., AIRAKSINEN, M. & LAAKSONEN, R. 2015. Introducing basic principles of medication safety: Development of a three-day continuing education course for health care professionals. *Currents in Pharmacy Teaching and Learning*, 7, 716-723.

HOLT, V. P. & LADWA, R. 2010a. Developing a mentoring culture in dentistry. Making a difference in a changing world. *Primary dental care : journal of the Faculty of General Dental Practitioners (UK)*, 17, 93-8.

HOLT, V. P. & LADWA, R. 2010b. Mentoring. A quality assurance tool for dentists. Part 6: Outcomes: patient care, professional development and personal growth. Authentic happiness for dentists. *Primary dental care : journal of the Faculty of General Dental Practitioners (UK)*, 17, 15-20.

HOUWINK, E. J. F., VAN TEEFFELLEN, S. R., MUIJTJENS, A. M. M., HENNEMAN, L., JACOBI, F., VAN LUIJK, S. J., DINANT, G. J., VAN DER VLEUTEN, C. & CORNEL, M. C. 2014. Sustained effects of online genetics education: a randomized controlled trial on oncogenetics. *European Journal of Human Genetics*, 22, 310-316.

HOWLETT, J., COMIN-COLET, J., DICKSTEIN, K., FUAT, A., POLZL, G. & DELANEY, S. 2018. Clinical practices and attitudes regarding the diagnosis and management of heart failure: findings from the CORE Needs Assessment Survey. *Esc Heart Failure*, 5, 172-183.

HU, Y. Y., PEYRE, S. E., ARRIAGA, A. F., OSTEEEN, R. T., CORSO, K. A., WEISER, T. G., SWANSON, R. S., ASHLEY, S. W., RAUT, C. P., ZINNER, M. J., GAWANDE, A. A. & GREENBERG, C. C. 2012. Postgame analysis: Using video-based coaching for continuous professional development. *Journal of the American College of Surgeons*, 214, 115-124.

HUGHES, C. A. & SCHINDEL, T. J. 2010. Evaluation of a professional development course for pharmacists on laboratory values: can practice change? *The International journal of pharmacy practice*, 18, 174-9.

HUGHES, E. 2005. Nurses' perceptions of continuing professional development. *Nursing Standard*, 19, 41-49.

HURST, D. 2013. Multifaceted and mixed didactic-interactive methods are more effective ways to learn and change behaviour. *Evidence-based dentistry*, 14, 67-8.

HVIDT, E. A., AMMENTORP, J., SØNDERGAARD, J., TIMMERMANN, C., HANSEN, D. G. & HVIDT, N. C. 2018. Developing and evaluating a course programme to enhance existential communication with cancer patients in general practice. *Scandinavian Journal Of Primary Health Care*, 36, 142-151.

ILOTT, I., BENNETT, B., GERRISH, K., POWNALL, S., JONES, A. & GARTH, A. 2014. Evaluating a novel approach to enhancing dysphagia management: Workplace-based, blended e-learning. *Journal of Clinical Nursing*, 23, 1354-1364.

INGRASSIA, A. 2013. Portfolio-based learning in medical education. *Advances in Psychiatric Treatment*, 19, 329-336.

INSTITUTE OF MECHANICAL ENGINEERS. 2018. *Continuing Professional Development* [Online]. Available: <http://www.imeche.org/membership-registration/continuing-professional-development> [Accessed 17.10.18].

INSTITUTE OF MEDICINE 2010. *Redesigning Continuing Education in the Health Professions* Washington, DC, National Academies Press.

IPSOS MORI SOCIAL RESEARCH INSTITUTE FOR THE NURSING AND MIDWIFERY COUNCIL 2017. Independent evaluation of revalidation for Nurses and Midwives. Interim report (Year One).

IVERS, N., JAMTVEDT, G., FLOTTORP, S., YOUNG, J. M., ODGAARD-JENSEN, J., FRENCH, S. D., O'BRIEN, M. A., JOHANSEN, M., GRIMSHAW, J. & OXMAN, A. D. 2012. Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*.

- JARVIS, I. & KER, J. 2014. Ensuring standards for the extended role of optometry. *The clinical teacher*, 11, 184-7.
- JAYATILLEKE, N. & MACKIE, A. 2013. Reflection as part of continuous professional development for public health professionals: A literature review. *Journal of Public Health (United Kingdom)*, 35, 308-312.
- JENNINGS, S. F. 2007. Personal development plans and self-directed learning for healthcare professionals: are they evidence based? *Postgraduate Medical Journal*, 83, 518-524.
- JOURNAL OF PEER LEARNING. Available: <https://ro.uow.edu.au/ajpl/> [Accessed 17.10.18].
- KADLEC, H., HOLLANDER, M. J., CLELLAND, C., KALLSTROM, L. & HOLLANDER, M. 2015. Family physicians enhance end-of-life care: evaluation of a new continuing medical education learning module in British Columbia. *Bmc Medical Education*, 15.
- KANE, J., PYE, S. & JONES, A. 2011. Effectiveness of a Simulation-Based Educational Program in a Pediatric Cardiac Intensive Care Unit. *Journal of Pediatric Nursing-Nursing Care of Children & Families*, 26, 287-294.
- KANG, H., YIP, B., CHAU, W., NOHPAL DE LA ROSA, A., HALL, D., BARRIOS, R., MONTANER, J. & GUILLEMI, S. 2014. Continuing professional development in HIV chronic disease management for primary care providers. 1-4, 2014 Dec 09.
- KAVADELLA, A., KOSSIONI, A. E., TSIKLAKIS, K., COWPE, J., BULLOCK, A., BARNES, E., BAILEY, S., THOMAS, H., THOMAS, R., KARAHARJU-SUVANTO, T., SUOMALAINEN, K., KERSTEN, H., POVEL, E., GILES, M., WALMSLEY, D., SOBOLEVA, U., LIEPA, A. & AKOTA, I. 2013. Recommendations for the development of e-modules for the continuing professional development of European dentists. *European Journal of Dental Education*, 17, 45-54.
- KELSEY, C. & HAYES, S. 2015. Frameworks and models - Scaffolding or strait jackets? Problematising reflective practice. *Nurse Education in Practice*, 15, 393-396.
- KIRKPATRICK, D. L. 1967. Evaluation of training. In: CRAIG, R. L. & BITTEL, L. R. (eds.) *Training and Development Handbook*. New York: McGraw Hill.
- KNOWLES, M. 1984. *Andragogy in Action. Applying modern principles of adult education*, San Francisco, Jossey Bass.
- KNOWLES, M. S., HOLTON, E. F. & SWANSON, R. A. 2011. *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*, Amsterdam Elsevier Butterworth-Heinemann.
- KOCH, M., ENGLANDER, M., TEGELBERG, A. & WOLF, E. 2014. Successful clinical and organisational change in endodontic practice: A qualitative study. *European Journal of Dental Education*, 18, 121-127.
- KOOLE, S., THEVISSSEN, E., LINDEN, U., KLINGE, B. & DE BRUYN, H. 2015. Using clinical cases to stimulate active learning in a short periodontal continuing professional development course. *Swedish Dental Journal*, 39, 1-10.
- KOSSIONI, A. E., KAVADELLA, A., TZOUTZAS, I., BAKAS, A., TSIKLAKIS, K., BAILEY, S., BULLOCK, A., COWPE, J., BARNES, E., THOMAS, H., THOMAS, R., KARAHARJU-SUVANTO, T., SUOMALAINEN, K., KERSTEN, H., POVEL, E., GILES, M., WALMSLEY, D., SOBOLEVA, U., LIEPA, A. & AKOTA, I. 2013. The development of an exemplar e-module for the continuing professional development of European dentists. *European Journal of Dental Education*, 17, 38-44.

KOSTRZEWSKI, A. J., DHILLON, S., GOODSMAN, D. & TAYLOR, K. M. G. 2009. The influence of continuing professional development portfolio records on pharmacy practice. *The International journal of pharmacy practice*, 17, 107-13.

KPMG 2015. Revalidation of nurses and midwives.
<https://www.nmc.org.uk/globalassets/sitedocuments/councilpapersanddocuments/council-2015/kpmg-report---nmc-impact-of-revalidation-on-the-health-and-care-system---1.pdf>.

LAMENDOLA, W., BALLANTYNE, N. & DALY, E. 2009. Practitioner Networks: Professional Learning in the Twenty-First Century. *British Journal of Social Work*, 39, 710-724.

LANLEHIN, R. M. 2018. Self-tracking, governmentality, and Nursing and Midwifery Council's (2016) revalidation policy. *Nurse Education Today*, 64, 125-129.

LAPIDOS, A. & RUFFOLO, M. 2017. Access to Interprofessional Continuing Education in Integrated Care Through Digital Instructional Technology. *Journal of Social Work Education*, 53, S40-S46.

LEE, N.-J. 2011. An evaluation of CPD learning and impact upon positive practice change. *Nurse Education Today*, 31, 390-395.

LEFEBVRE, G. G. & SHORE, E. M. 2016. Avoiding complications by a hands-on mentor programme. *Best Practice and Research: Clinical Obstetrics and Gynaecology*, 35, 3-12.

LEGARE, F., BORDUAS, F., FREITAS, A., JACQUES, A., GODIN, G., LUCONI, F., GRIMSHAW, J. & TEAM, C.-K. 2014. Development of a Simple 12-Item Theory-Based Instrument to Assess the Impact of Continuing Professional Development on Clinical Behavioral Intentions. *Plos One*, 9.

LEVINE, S., O'MAHONY, S., BARON, A., ANSARI, A., DEAMANT, C., FRADER, J., LEYVA, I., MARSCHKE, M. & PREODOR, M. 2017. Training the Workforce: Description of a Longitudinal Interdisciplinary Education and Mentoring Program in Palliative Care. *Journal of Pain and Symptom Management*, 53, 728-737.

LEWNEY, J. & BOLAND, B. 2015. Adult safeguarding; guidance for dental professionals. *British Dental Journal*, 219, 287-291.

LIBIN, A., LAUDERDALE, M., MILLO, Y., SHAMLOO, C., SPENCER, R., GREEN, B., DONNELLAN, J., WELLESLEY, C. & GROAH, S. 2010. Role-Playing simulation as an educational tool for health care personnel: Developing an embedded assessment framework. *Cyberpsychology, Behavior, and Social Networking*, 13, 217-224.

LILLIS, S. 2011. The educational value of peer groups from a general practitioner perspective. *Journal of primary health care*, 3, 218-21.

LINEKER, S. C., BELL, M. J. & BADLEY, E. M. 2011. Evaluation of an Inter-Professional Educational Intervention to Improve the Use of Arthritis Best Practices in Primary Care. *Journal of Rheumatology*, 38, 931-937.

LIU, D. & BRENNAN, L. 2012. The role of reflection in CPD and revalidation Bulletin. *Royal College of Anaesthetists*, September, 12-13.

LOWMAN, J. J. 2016. A Comparison of Three Professional Development Mechanisms for Improving the Quality of Standards-Based IEP Objectives. *Communication Disorders Quarterly*, 37, 211-224.

- LUISA GRACIA-PEREZ, M. & GIL-LACRUZ, M. 2018. The impact of a continuing training program on the perceived improvement in quality of health care delivered by health care professionals. *Evaluation and Program Planning*, 66, 33-38.
- LUTZ, M. F., HAINES, S. T., LESCH, C. A. & SZUMITA, P. M. 2016. Facilitating the safe use of insulin pens in hospitals through a mentored quality-improvement program. *American Journal Of Health-System Pharmacy: AJHP: Official Journal Of The American Society Of Health-System Pharmacists*, 73, S17-S31.
- MACKILLOP, L., PARKER-SWIFT, J. & CROSSLEY, J. 2011. Getting the questions right: non-compound questions are more reliable than compound questions on matched multi-source feedback instruments. *Medical Education*, 45, 843-848.
- MAIDMENT, Y. 2006. A comparison of the perceived effects on Scottish general dental practitioners of peer review and other continuing professional development. *British Dental Journal*, 200, 581-584.
- MASTERS, S. C., ELLIOTT, S., BOYD, S. & DUNBAR, J. A. 2017. Using local clinical educators and shared resources to deliver simulation training activities across rural and remote South Australia and south-west Victoria: A distributed collaborative model. *Australian Journal of Rural Health*, 25, 311-316.
- MATTHEOS, N., SCHOONHEIM-KLEIN, M., WALMSLEY, A. D. & CHAPPLE, I. L. C. 2010. Innovative educational methods and technologies applicable to continuing professional development in periodontology. *European Journal of Dental Education*, 14, 43-52.
- MAY, S. & KINNISON, T. 2015. Continuing professional development: learning that leads to change in individual and collective clinical practice. *Veterinary Record*, 177.
- MCHUGH, S. M., CORRIGAN, M., DIMITROV, B., COWMAN, S., TIERNEY, S., HUMPHREYS, H. & HILL, A. 2010. A targeted e-learning program for surgical trainees to enhance patient safety in preventing surgical infection. *Journal of Continuing Education in the Health Professions*, 30, 257-259.
- MERZOUK, A., KUROSINSKI, P. & KOSTIKAS, K. 2014. e-Learning for the medical team: The present and future of ERS Learning Resources. *Breathe*, 10, 296-304.
- MILLER, A. & ARCHER, J. 2010. Impact of workplace based assessment on doctors' education and performance: a systematic review. *British Medical Journal*, 341.
- MILLER, A. & KEMP, T. 2013. Appraisal for general dental practitioners. *Dental update*, 40, 679-682.
- MILLERY, M., HALL, M., EISMAN, J. & MURRMAN, M. 2014. Using Innovative Instructional Technology to Meet Training Needs in Public Health: A Design Process. *Health Promotion Practice*, 15, 39S-47S.
- MORGAN, J. C., HAVILAND, S. B., WOODSIDE, M. & KONRAD, T. R. 2007. Fostering supportive learning environments in long-term care: The case of WIN A STEP UP. *Gerontology & Geriatrics Education*, 28, 55-75.
- MURDOCH-EATON, D. & SANDARS, J. 2014. Reflection: moving from a mandatory ritual to meaningful professional development. *Archives of Disease in Childhood*, 99, 279-283.
- NATIONAL ORGANISATIONAL STANDARDS. 2018. *What are National Occupational Standards?* [Online]. Available: <https://www.ukstandards.org.uk/Pages/index.aspx> [Accessed 17.10.18].

- NEVALAINEN, M., LUNKKA, N. & SUHONEN, M. 2018. Work-based learning in health care organisations experienced by nursing staff: A systematic review of qualitative studies. *Nurse Education in Practice*, 29, 21-29.
- NEWBY, K., WALLACE, L. & WAREING, H. 2005. District and practice nurses' public health practice and training needs. *British Journal Of Community Nursing*, 10, 214.
- NICOLL, P., MACRURY, S., VAN WOERDEN, H. C. & SMYTH, K. 2018. Evaluation of technology-enhanced learning programs for health care professionals: Systematic review. *Journal of Medical Internet Research*, 20.
- NURSING & MIDWIFERY COUNCIL. 2015a. *The code for nursing and midwives* [Online]. Available: <https://www.nmc.org.uk/standards/code/> [Accessed 17.10.18].
- NURSING & MIDWIFERY COUNCIL. 2015b. *Revalidation pilot key findings report* [Online]. Available: <https://www.nmc.org.uk/globalassets/sitedocuments/councilpapersanddocuments/council-2015/revalidation-key-findings-report.pdf> [Accessed 17.10.18].
- NURSING & MIDWIFERY COUNCIL. 2017a. *How to revalidate with the NMC* [Online]. Available: <https://www.nmc.org.uk/globalassets/sitedocuments/revalidation/how-to-revalidate-booklet.pdf> [Accessed 17.10.18].
- NURSING & MIDWIFERY COUNCIL. 2017b. *Revalidation - Reflective discussion* [Online]. Available: <http://revalidation.nmc.org.uk/what-you-need-to-do/reflective-discussion/> [Accessed 17.10.18].
- NURSING & MIDWIFERY COUNCIL. 2017c. *Revalidation - Written reflective accounts* [Online]. Available: <http://revalidation.nmc.org.uk/what-you-need-to-do/written-reflective-accounts/> [Accessed 17.10.18].
- NURSING & MIDWIFERY COUNCIL. 2017d. *Revalidation Resources* [Online]. Available: <http://revalidation.nmc.org.uk/download-resources/> [Accessed 17.10.18].
- NURSING & MIDWIFERY COUNCIL. 2018. *Revalidation quarterly data reports* [Online]. Available: <https://www.nmc.org.uk/about-us/reports-and-accounts/revalidation-reports/> [Accessed 17.10.18].
- NURSING AND MIDWIFERY COUNCIL. 2018. *Guidance sheet - examples of CPD activities* [Online]. Available: <https://www.nmc.org.uk/globalassets/sitedocuments/revalidation/examples-of-cpd-activities-guidance-sheet.pdf> [Accessed 17.10.18].
- OREST, M. R. & EYLER, S. 2018. Redesigning the Peer Audit Process to Enhance Clinical Dialogue. *The American Journal of Occupational Therapy*, 72, 1-8.
- OVEREEM, K., WOLLERSHEIM, H., DRIESSEN, E., LOMBARTS, K., VAN DE VEN, G., GROL, R. & ARAH, O. 2009. Doctors' perceptions of why 360-degree feedback does (not) work: a qualitative study. *Medical Education*, 43, 874-882.
- OVEREEM, K., WOLLERSHEIM, H. C., ARAH, O. A., CRUIJSBERG, J. K., GROL, R. P. T. M. & LOMBARTS, K. M. J. M. H. 2012. Factors predicting doctors' reporting of performance change in response to multisource feedback. *Bmc Medical Education*, 12.
- PERRY, A., WOODLAND, L. & BRUNERO, S. 2015. eSimulation: A novel approach to enhancing cultural competence within a health care organisation. *Nurse Education in Practice*, 15, 218-224.

PEZZOLESI, C., GHALEB, M., KOSTRZEWSKI, A. & DHILLON, S. 2013. Is Mindful Reflective Practice the way forward to reduce medication errors? *The International journal of pharmacy practice*, 21, 413-6.

PICKER INSTITUTE EUROPE 2012. Moving beyond measurement. Annual Report 2012/13. Oxford: Picker Institute Europe.

PIMENTA, H. B., CALDEIRA, A. P. & MAMEDE, S. 2014. Effects of 2 Educational Interventions on the Management of Hypertensive Patients in Primary Health Care. *Journal of Continuing Education in the Health Professions*, 34, 243-251.

POWER, A., GRAMMATIKI, A., BATES, I., MC KELLAR, S., JOHNSON, B. J., DIACK, H. L., STEWART, D. & HUDSON, S. A. 2011. Factors affecting the views and attitudes of Scottish pharmacists to continuing professional development. *The International journal of pharmacy practice*, 19, 424-30.

PRESCOTT-CLEMENTS, L., DRIESSEN, E., VAN DER VLEUTEN, C., HAIG, A., MCGILVRAY, L. & BLACK, C. 2015. Evaluation of Potential Supporting Evidence for Continuing Assurance of Practice in Dental Regulation. London: General Dental Council.

RAJPAUL & ACTON 2015. The use of smart technology to deliver efficient and effective pressure-damage education. *British Journal Of Nursing (Mark Allen Publishing)*, 24.

RATKA-KRUEGER, P., WOELBER, J. P., BLANK, J., HOLST, K., HOERMEYER, I. & VOEGELE, E. 2018. MasterOnline Periodontology and Implant Therapy-revisited after seven years: A case study of the structures and outcomes in a blended learning CPD. *European Journal of Dental Education*, 22, E7-E13.

RAYNER, J. 2017. Society spotlight: Professional development centre. *The Law Society Gazette*.

REEVES, S., PERRIER, L., GOLDMAN, J., FREETH, D. & ZWARENSTEIN, M. 2013. Interprofessional education: effects on professional practice and healthcare outcomes (update). *Cochrane Database Syst Rev*, Cd002213.

REGISTERED NURSES' ASSOCIATION OF BRITISH COLUMBIA AND COLLEGE OF REGISTERED NURSES OF BRITISH COLUMBIA 2008. Continuing competence for nurse practitioners. *Nursing BC*, 40, 19-19.

ROTHWELL, R. 2011 SRA widens CPD review. *The Law Society Gazette*, 4.

ROYAL AUSTRALIAN NURSING FEDERATION QUEENSLAND BRANCH UNION OF EMPLOYEES 2015. Reflective exercise: issues for nurses highlighted at the inquest into infection deaths. *The Queensland Nurse*, 34, 36-36.

ROYAL COLLEGE OF ANAESTHETISTS. 2018. *CPD Online Diary* [Online]. Available: <https://www.rcoa.ac.uk/revalidation-cpd/online-cpd> [Accessed 17.10.18].

ROYAL COLLEGE OF OCCUPATIONAL THERAPISTS. 2017. *Career Development Framework: Guiding Principles for Occupational Therapy 2017* [Online]. Available: <https://www.rcot.co.uk/practice-resources/learning-zone/career-development-framework> [Accessed 17.10.18].

ROYAL COLLEGE OF OCCUPATIONAL THERAPISTS. 2018. *Royal College of Occupational Therapists* [Online]. Available: <https://www.rcot.co.uk> [Accessed 17.10.18].

ROYAL PHARMACEUTICAL SOCIETY. 2018. *Revalidation. Everything you need to know* [Online]. Available: <https://www.rpharms.com/professional-development/revalidation> [Accessed 17.10.18].

SAEDON, H., SALLEH, S., BALAKRISHNAN, A., IMRAY, C. H. E. & SAEDON, M. 2012. The role of feedback in improving the effectiveness of workplace based assessments: a systematic review. *Bmc Medical Education*, 12.

SCHWELLNUS, H. & CARNAHAN, H. 2014. Peer-coaching with health care professionals: What is the current status of the literature and what are the key components necessary in peer-coaching? A scoping review. *Medical Teacher*, 36, 38-46.

SHICHTEL, M. 2009. A conceptual description of potential scenarios of e-mentoring in GP specialist training. *Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors*, 20, 360-364.

SHIRLEY, L. 2010. Long past its sell-by date? *New Law Journal*, 22nd October.

SMITH, K. M., NAUMANN, D. N., ANTONY, L. M., MCCOLL, M. A. & AIKEN, A. 2014. Using developmental research to design innovative knowledge translation technology for spinal cord injury in primary care: Actionable Nuggets(TM) on SkillScribe(TM). *Journal of Spinal Cord Medicine*, 37, 582-588.

SOLICITORS REGULATION AUTHORITY. 2015. *Training for tomorrow: assessing competence* [Online]. Available: <https://www.sra.org.uk/sra/consultations/t4t-assessing-competence.page> [Accessed 17.10.18].

SOLICITORS REGULATION AUTHORITY. 2016. *Continuing competence* [Online]. Available: <https://www.sra.org.uk/solicitors/cpd-accreditation.page> [Accessed 17.10.18].

SOUTH STAFFORDSHIRE LOCAL DENTAL COMMITTEE. 2018. *Dental peer review toolkit* [Online]. Available: http://www.southstaffsldc.com/South_Staffs_LDC/Peer_Review.html [Accessed 17.10.18].

THE BRITISH INSTITUTE OF RADIOLOGY. 2018. *Self reflection for CPD* [Online]. Available: <https://www.bir.org.uk/education-and-events/self-reflection-for-cpd/> [Accessed 17.10.18].

THE LOCAL DENTAL NETWORK (LDN) IN SHROPSHIRE AND STAFFORDSHIRE. 2018. *Clinical Peer Review in General Dental Practice* [Online]. Available: http://www.southstaffsldc.com/South_Staffs_LDC/Peer_Review_files/Peer%20review%20policy%20document%20Jan%202018-%20FINAL-2.pdf [Accessed 17.10.18].

TURNER, S., ROSS, M. K. & IBBETSON, R. J. 2012. The impact of General Dental Council registration and continuing professional development on UK dental care professionals: (1) dental nurses. *British Dental Journal*, 213.

UCER, T. C., BOTTICELLI, D., STAVROPOULOS, A. & MATTHEOS, N. 2014. Current trends and status of continuing professional development in implant dentistry in Europe. *European Journal of Dental Education*, 18, 52-59.

WALES CENTRE FOR PHARMACY POSTGRADUATE EDUCATION. 2018. *National Enhanced Services Accreditation (NESA)* [Online]. Available: <https://www.wcppe.org.uk/enhanced-services/> [Accessed 17.10.18].

WALLACE, S. & MAY, S. 2016. Assessing and enhancing quality through outcomes-based continuing professional development (CPD): a review of current practice. *Veterinary Record*, 179, 515-520.

WAREING, A., BUISSINK, C., HARPER, D., OLESEN, M. G., SOTO, M., BRAICO, S., VAN LAER, P., GREMION, I. & RAINFORD, L. 2017. Continuing professional development (CPD) in radiography: A collaborative European meta-ethnography literature review. *Radiography*, 23, S58-S63.

ZHANG, W. & CHENG, Y. L. 2012. Quality assurance in e-learning: PDPP evaluation model and its application. *International Review of Research in Open and Distance Learning*, 13, 66-82.

APPENDICES

Appendix 1: Keywords and Combinations

Keyword 1 (relates to activities)		Keyword 2 (relates to CD)		Keyword 3 (relates to professional group)		Keyword 4 (dental setting) (not used in initial searching)
Peer learning	AND	Continu* professional development OR CPD	AND	Dentist	AND	Independent OR private dental practice
Interactive OR active learning OR hands-on learning		Continu* education OR CE		Dental Professional OR DCP		NHS dental practice
Mentoring OR coaching		Continu* education and training OR CET		Dental hygienist		Corporate dental practice
Reflective practice OR reflection		Lifelong learning OR life-long learning OR LLL		Dental nurse		Hospital dental practice
Face to face OR face-to-face OR F2F				Dental therapist OR Dental hygienist-therapist		Community dental practice OR community dentistry
Digital platform OR e-learning OR elearning				Dental technician OR Clinical Dental Technician		
Qualitative-based CPD				Dental team		
Ownership				Nurse OR Midwife		
Learning from mistakes or failures				Doctor OR GP OR general practitioner OR primary care physician		
Motivation				Healthcare professionals		
Patient feedback				Optometrist		
360° OR multisource feedback				Pharmacist		
Audit				Solicitor OR lawyer OR legal profession		
Appraisal						
Personal development plan OR PDP						
Guidelines OR standards						
Impact on practice OR impact-on-practice						

Appendix 2: Survey Responses

Name	Institution
Ferranti Wong	Queen Mary University of London
Sue Adams	Dental Technologists Association
Nadeem Ahmed	NHS England Chair LDN Shropshire and Staffordshire
Anouska Annan	General Chiropractic Council
Rebecca Craven	University of Manchester
Peter Fine	Eastman Dental Institute
Anthony Griffin	Dental Technologist Association
Winfried Harzer	University of Dresden
Peter Holbrook	Faculty of Odontology, University of Iceland
Lydia Katrova	Medical University of Sofia, Bulgaria
Paul Lyons	Dental Council of Ireland
David McCarter	Northern Ireland Medical & Dental Training Agency
Paulo Melo	Council of European Dentists
Helen Minnery	British Society of Dental Hygiene and Therapy
Corrado Paganelli	University of Brescia
Mary Tallant	Nursing & Midwifery Council
Stephen Porter	University College London
Diane Powles	Royal College of Nursing
Tara Renton	Professor Oral Surgery
Paula Robblee	General Medical Council
Pepe Shirlaw	Guy's & St Thomas' Trust & NHS England
Stephanie Tempest	Royal College of Occupational Therapists
Wendy Thompson	University of Leeds
Stephanie Tubert-Jeannin	Université Clermont Auvergne
Nairn Wilson	Emeritus Professor, King's College London

Appendix 3: Contact with Research Area Experts

Name	Position
Ian Bewes	Wg Commander OC Elementary Flying Training, Cranwell
Collette Bridgeman	Chief Dental Officer, Wales
Paul Brocklehurst	Professor of Health Services Research, Bangor University
Luke Cowpe	Pharmacist
Ken Eaton	Professor – Wg Commander RAF (ret)
Steve Hawkins	Chief Training Pilot of a major UK airline
Sara Hurley	Chief Dental Officer, England
Clare Ledington	British Society for Paediatric Dentistry
June Nunn	Professor, Fellow Emeritus Dental Science, Trinity College Dublin
Pritesh Patel	NHS England
Iano Premier	Professor, Engineering
Rachel Quinlan	Royal Pharmaceutical Society
Lara Stevens	Occupational Therapist
Margie Taylor	Chief Dental Officer, Scotland