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## **Economic Evaluation of CPD Activities for Healthcare Professionals: A Scoping Review.**

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## **Economic Evaluation of CPD Activities for Healthcare Professionals: A Scoping Review.**

### **Abstract**

**CONTEXT:** Continuing Professional Development (CPD) activities for healthcare professionals are central to the optimization of patient safety and person-centred care.

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Although there is some evidence on the economics of healthcare professionals training, very little is known about the costs and benefits of CPD.

**METHODS:** This study aimed to review the research evidence on economic evaluations of CPD activities for healthcare professionals. CINAHL, MEDLINE/PubMed, Scopus, Econlit, and Web of Science databases were used to identify articles published between 2010 and 2021.

**RESULTS:** Of the 6791 titles identified, 119 articles met the inclusion criteria and were included in this scoping review. The majority of articles were partial economic evaluations of CPD programmes (n = 70), half were from the USA. Studies that included multiple professions were most prevalent (n = 54), followed by nurses (n = 34) and doctors (n = 23). Patient outcomes were the most commonly reported outcome (n = 51), followed by change in clinical practice (n = 38), and healthcare professionals' knowledge gain (n = 19).

**CONCLUSIONS:** There is an urgent call for more evidence regarding the economic evaluations of CPD. This is particularly important in view of the rising costs of healthcare globally. The majority of studies included in this review did not provide detailed information on the evaluations and many focused exclusively on the cost of CPD activities rather than outcomes.

**KEYWORDS:**

Continuing professional development; economic evaluation; health professions education

Continuing professional development (CPD) is essential for healthcare professionals to deliver high quality and safe person-centred care, amidst ever-changing health systems across the globe. The World Health Organization (WHO) cited a skilled workforce as the cornerstone of a healthy nation and supported the need to expand transformative, high-quality education and lifelong learning for all healthcare workers.<sup>1</sup> A coordinated approach is needed to determine how CPD programmes and activities can address workforce planning and the recruitment and retention of healthcare workers. This approach supports strategies to confront the current global recruitment and retention crisis of healthcare workers to achieve a quality healthcare system for all people. Evaluation of CPD activities is an essential part of the programme measuring whether and to what extent they improve the delivery of high quality, safe person-centred care. CPD activities should be able to demonstrate the sustainability and efficiency of the program.

While there is limited data on the economic cost of training health professionals <sup>2,3</sup>, very little is known about the economic cost and cost-effectiveness of providing CPD to healthcare professionals.

Economic evaluations can provide useful information to those making decisions about the allocation of limited health care resources. In particular, economic evaluations can be used to identify interventions that are vital to the health service (health professionals, organisations, and patients) and those that provide little benefit given the resources required. The ultimate test of an economic evaluation is whether it leads to better decisions in the presence of uncertainty, and results in the more efficient and effective use of limited healthcare resources.<sup>4</sup> There is an important role for economic evaluations in priority setting in health care decision-making. This includes assessing the cost-effectiveness of CPD activities for healthcare professionals. Consequently, an economic evaluation of CPD activities can be used to maximize the benefits from health care spending in this area and to contain costs and manage the needs of the health service.<sup>5</sup>

Information regarding the economic costs associated with the various educational methods used to deliver CPD programmes informs decisions and choices about CPD activities for healthcare professionals, healthcare organizations as funders and educational institutions that provide CPD. Such knowledge informs the sustainability and efficiency of CPD activities. These are challenging times for healthcare delivery with economic constraints and workforce shortages. Thus, it is essential that sustainable and efficient CPD is a fundamental part of the healthcare service. Despite calls for increased economic accountability in health professional education,<sup>6,7</sup> economic evaluations of CPD remain a challenge with a limited number of published studies in this field.<sup>8,9</sup>

A review of the literature on the cost-effectiveness of CPD in health care found a minimal number of published studies (n = 9).<sup>8</sup> It was concluded that more cost-effectiveness studies were urgently required and that there was a need for greater attention to ensure that methods of evaluation and analysis are reported appropriately. Another recent systematic review focused on methods and reporting quality of cost evaluations in health professions education.<sup>10</sup> Trends over time by sampling research reports at 5-year intervals (2001, 2006, 2011 and 2016) were examined. Seventy-eight studies were included in the final review, which included an evaluation of undergraduate, postgraduate and CPD education. Of these studies, 36 were categorized as relating to CPD, five studies in 2001, nine in 2006, eleven in 2011 and eleven in 2016. Findings from this study would indicate that there has been an increase in published studies in this field since 2002.<sup>8</sup> However, it was found that there were reporting deficiencies and that appropriate methods of evaluation and analysis continue to be lacking.<sup>10</sup>

A preliminary search for existing scoping reviews and systematic reviews on economic evaluation of CPD was conducted, none were found. Therefore, this scoping review aims to collate the body of evidence available on economic evaluations of CPD and identify gaps in knowledge found in the literature to better guide future research.

## **METHODS**

Scoping reviews have become an increasingly popular approach to explore and appraise healthcare research evidence.<sup>11</sup> Especially, if the scope of the research is complex and has not been previously investigated.<sup>12</sup> Scoping reviews allow for quick identification of sources and types of evidence to pinpoint key elements relating to the area of interest.<sup>12</sup> It was suggested that a scoping review was an appropriate tool to address the review questions. The following questions were addressed: What is the scale of research evidence on economic evaluations of CPD activities for healthcare professionals? Which health professions have been included?

What types of economic evaluations were utilized? Answering these core questions will help to map the evidence base and identify areas appropriate for further research or systematic review and inform readers on the current state of research on economic evaluations of CPD activities.

For this scoping review, we used the definition of CPD introduced by the Executive Agency for Health Consumers, 2013 — “*Systematic maintenance, improvement and continuous acquisition and/or reinforcement of the life-long knowledge, skills and competencies of health professionals. It is pivotal to meeting patient, health service delivery and individual professional learning needs. The term acknowledges not only the wide ranging competencies needed to practice high quality care delivery but also the multi-disciplinary context of patient care*”.<sup>13</sup>

### ***Criteria for selection of articles***

Inclusion and exclusion criteria were developed based on the aims of the review and research questions.

#### ***Inclusion criteria***

Studies were included in the review on the following basis:

- (a): year of publication, from 2010 to 2021;
- (b): studies published in the English language only;
- (c): the following healthcare professions were included: (nurses, doctors, allied health professionals, dentists.).
- (d): all CPD activities that included an education or training component.
- (e): economic evaluations included:

1. Full economic evaluation studies - the comparative analysis of alternative courses of action in terms of both costs (resource use) and consequences (outcomes, effects).<sup>14</sup>

Cost-benefit analysis (CBA), cost-effectiveness analysis (CEA), and cost-utility analysis (CUA). They aimed to produce measures of incremental resource use, costs and o cost-effectiveness.

2. Partial economic evaluation studies - without explicit comparisons between alternative interventions in terms of both costs (resource use) and consequences (effects). These included cost analyses, cost-description studies and cost-outcome descriptions.

(f): manuscript type: original research studies published in peer-reviewed journals investigating CPD activities, with or without a comparison between interventions or activities. All research studies were included that met the inclusion criteria, regardless of the study design.

#### *Exclusion criteria*

Students undertaking undergraduate and postgraduate education, e.g., residency training programs, bachelor degree, master degree, post-graduate diploma, or PhD were excluded. Conference abstracts, books, editorials, commentary-style articles and systematic reviews were excluded from the study.

#### *Search strategy*

The scoping review included peer reviewed primary research articles that were retrieved from the following electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), MEDLINE/PubMed, Scopus, Econlit, and Web of Science. Reference lists of reviews found through the electronic search were checked to ensure that relevant articles were included. The team used an iterative process to identify key search terms. The search terms were kept broad, resulting in many irrelevant studies having to be eliminated in the study

selection stage. An academic librarian advised on the most appropriate Medical Subject Headings (MeSH) terms for the search and how to modify them for the different databases. Following MeSH terms were used: health professions (nurse OR doctor OR physician OR physio); economics (costs and cost analysis OR cost- benefit analysis OR cost-effectiveness OR return on investment); continuing education (professional education OR continuing professional development OR professional development OR staff development OR continuing education OR continuing medical education). Based on this exploratory, scoping phase, the search strings for each database were finalized. Articles were retrieved from each database and imported into a reference management software tool (EndNote).

### ***Data extraction***

A data-charting table was used to extract the data from the final selected sources (full-text articles included in the scoping review). The charting of results was an iterative process whereby the data-charting table was continuously updated so additional data could be amended or added. The data-charting table was piloted by two members of the research team (WO, CF). Two or three selected sources were used to trial the data-charting table to ensure all the relevant results were extracted. The following data were extracted from the full text articles to be included in the data-charting table; author(s) names and journal related details; year of publication; title; country; population; educational intervention; study outcomes; outcome categories; economic evaluation details (see Supplementary Appendix 1). The methodological quality of the studies was not appraised as the aim of this scoping review was to provide an overview of the existing evidence on economic evaluations of CPD activities for healthcare professionals.<sup>15</sup>

## RESULTS

### *Selection of sources of evidence*

As a result of the databases search, 6791 research records were found. Subsequently, the duplicates were removed (n = 664) and two authors (WO, CF) independently screened titles, abstracts, and keywords of the remaining articles (n = 6127) to exclude those that did not meet the inclusion criteria. Consequently, 5815 articles were removed, leaving 312 research items to be downloaded as full texts. Disagreements about study eligibility were discussed between the two reviewers until consensus was reached. The reference lists of the included articles were also reviewed for additional papers, 119 articles were included in the final review. The process of study selection was reported using Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart (Figure 1).

### *Characteristics of sources of evidence*

#### *Year/geographical location*

The highest number of studies was for 2011 (n = 18), followed by 2016 (n = 14) and 2013 (n = 13). The lowest number of studies was for 2019 (n = 5), followed by 2014 (n = 6) and 2017, 2018, and 2020 with an equal volume of studies (n = 8). Half of the included studies were from the USA (n= 59), followed by UK (n= 19) and Australia (n = 7), see Table 1. Studies that included multiple professions were most prevalent (n = 54), followed by nurses (n = 34), and doctors (n = 23). Other professions (e.g. midwives and dentists) were represented in the remaining eight studies (Table 2).

#### *Studies' outcomes*

The outcomes of each study (endpoints resulting from CPD activities) were categorised into five main categories: patient outcomes, practice/behaviour change, healthcare professionals' knowledge gain, education related and healthcare professionals' personal health



and safety (Table 3). Patient outcomes were the most commonly reported outcome (n = 51). Within this category, the subcategory 'Improved clinical outcomes' was the most frequently reported (n = 19). Another category of the study outcomes was practice/behaviour change (n = 38) and the highest subcategory was medication management (n = 16). The third, most prevalent category of outcomes was healthcare professionals knowledge gain (n = 19).

### ***Economic evaluations***

#### ***Full Economic Evaluations (FEE)***

Economic evaluations were classified into two main categories: Full economic evaluations (FEE) and partial economic evaluations (PEE), Table 4. Among studies with FEE (n = 50), cost-effectiveness studies (n = 35) were the most prevalent approach to examine the costs and outcomes of CPD activities, followed by studies with cost-benefit (n = 8) and cost-minimization approaches (n = 6). In cost-effectiveness analyses studies, costs are expressed in monetary units, e.g. dollars or euros, whereas benefits are expressed in non-monetary, natural units, e.g. quality-adjusted life years (QALYs) or knowledge gain.<sup>16</sup> A study in Malawi on an orthopaedic clinical officer training programme to improve musculoskeletal care reported the cost-effectiveness of the programme.<sup>17</sup> It was established that the average cost for each hospital was US\$138.75 (95% CI: US\$69.58–207.91) per one disability-adjusted life year (DALY). In a study on reducing glycaemic episodes among patients with type 2 diabetes, it was established that the Diabetes Management Education Program for healthcare staff was cost-effective when compared to standard care. A cost of 43 Australian dollars resulted in one day of glycaemic symptoms avoided.<sup>18</sup>

In cost-benefit analysis studies, both costs and benefits are expressed in monetary units.<sup>16</sup> A study on the safety of patient handling and its impact on medical staff injuries (n = 55 health professionals; USA) reported financial gains obtained after implementing an

educational intervention.<sup>19</sup> It was found there was a cost-benefit of \$3.71 for every dollar invested, expressed in reduced injuries for the duration of 30 months after the training. Correspondingly, a study from Canada on manual handling in long-term care facilities reported financial outcomes of the programme.<sup>20</sup> It was established that the benefits resulting from the training were smaller (748,431 Canadian dollars) when compared with costs (894,000 Canadian dollars). However, that relatively modest, incremental cost resulted in the prevention of additional accidents linked to the manual handling of patients.

#### *Partial Economic Evaluations (PEE)*

Among studies categorized as PEE, the majority applied cost analysis (CAs; n = 69). CA studies are characterised by information provided for costs exclusively, and do not include evidence on financial returns and outcomes.<sup>16</sup> Most often, CA's focus is on cost description, cost-saving, or return on investment. For example, in a study encouraging patient engagement in more healthy behaviours (n = 1827 patients) there was a training cost reported of £1597 per each of the 27 general practices in Wales (CA – cost description).<sup>21</sup> A study on training to prevent bleeding complications (n = 133 continuing medical education recipients; USA) reported that based on the sensitivity analysis, substantial cost savings were estimated for reoperation bleeding, \$2,233,988 (95% confidence interval [CI], \$1,223,901–\$3,648,719).<sup>22</sup> Correspondingly, a recent study from the UK examining clinical librarian support in critical hospital care reported monetary benefits expressed in terms of return on investment.<sup>23</sup> Specifically, the librarian's help in academic writing, information search, referencing, and proofreading resulted in financial gains (for every £1 invested a positive return on investment of £1.18 – £3.03 was obtained).

### *Synthesis of results*

The number of studies per country, professional profiles, study outcomes, and economic evaluation details were divided across three 4-year periods (Table 5). There is a dominance in the volume of research from North America, mainly the USA, however this is less explicit for the 2018-2021 period. With regard professional profile multiple professions are most prevalent, followed by nurses and doctors is stable across all three time periods presented. Regarding the study results, a similar number of articles with improved patient outcomes and changes in practice were found for the 2010-2013 period. For the 2014-2021 period the articles with improved patient outcomes were more frequently identified compared to changes in practice. Regarding the economic characteristics, PEEs are more common compared to FEEs for the 2010-2013 period. A similar trend was noticed for the 2014-2021 period, although the difference in terms of the number of articles is smaller.

### **DISCUSSION**

This review highlights the extent, nature and range of literature since 2010 on economic evaluations of CPD activities for healthcare professionals. A significant finding in this review is the noticeably limited number of studies conducting an economic evaluation of CPD in healthcare professionals education. In addition, there was a decrease rather than an increase in the number of studies between 2010 and 2021. It is unknown if the outbreak of the global Covid-19 pandemic in March 2020 contributed to this decrease.<sup>24</sup> The education of healthcare professionals is an area in which a strategic optimisation of limited resources is of the utmost importance<sup>25</sup>. However, we find that almost without exception there is compelling evidence to suggest an absence of economic evaluation of programmes of education. A variety of potential determinants may have contributed to this modest volume of research. One possible explanation is that many organisations (e.g. universities or healthcare organisations) that do

conduct economic evaluations of their educational activity do this as part of the overall programme evaluation rather than research.<sup>26</sup> Consequently, those conducting the evaluation may not consider publishing their findings. More typically, there are often no mechanisms in educational institutions and healthcare organisations, which require economic evaluations of the educational activities.<sup>25,27</sup> Furthermore, stakeholders involved in the allocation of funding for education may not require economic evaluations to be conducted as part of the programme evaluation to begin with.<sup>28</sup>

### ***Outcomes***

Patient outcomes were the most frequently observed outcome category, followed by changes in practice or behaviour of healthcare professionals. These findings concur with the results from a scoping review on health professionals' performance and patient outcomes.<sup>29</sup> The authors established that patient outcomes and changes in healthcare professionals' behaviour were most frequently identified among 63 knowledge syntheses included in the review. Concerning the economic evaluations of the studies, PEE focusing on the costs of CPD programmes were most commonly noted. Perhaps a higher number of identified articles with PEE compared to FEE is due to a relative 'convenience' of focusing exclusively on costs of CPD rather than linking the costs to the outcomes. These findings correspond with results from the systematic review on cost evaluations in health professions education.<sup>10</sup> Only 16 out of 78 studies included in the review applied FEE. Among studies with FEE, a cost-effectiveness analysis was the most prevalent approach used. CPD activities in healthcare often have an impact on outcomes that are expressed in non-monetary terms, such as reduced mortality, QALYs, or decreased hospital stay.

There are a number of components of economic analysis that make it valuable to the broader education community. Conducting economic evaluations of educational activities can lead to more efficient use of educational resources, that can reduce the costs associated with accomplishing organisational goals e.g., more effective use of information technology. Economic evaluations can expand what can be achieved in the presence of budget constraints and can also ascertain which investments in education may provide the highest return. A fundamental characteristic of economic analysis that makes the work useful to the broader education community is also the expansiveness of the possible research context. Economic analysis may explore educational <sup>30,31,32</sup> and economic consequences, <sup>33,34,35</sup> but also career advancement,<sup>35,36</sup> provision of health services, <sup>37,38,39</sup> and population health.<sup>40,41</sup> Such analysis may also investigate an array of patient outcomes, e.g. medication adherence, morbidity, quality of life, emotional wellbeing <sup>42,36,21</sup> and mortality.<sup>43,44</sup> Thus, diversity of scope in an economic analysis increases the value of such research by contributing to a more complete exploration of the education of healthcare professionals, improving overall understanding in the field.<sup>16</sup>

### ***Strengths and limitations***

An extensive search for articles using five electronic databases and an additional manual search allowed for a broad exploration of knowledge resources. As a result, a relatively high number of included articles were identified which led to a detailed appraisal of the existing evidence. To the best of the authors' knowledge, this is the first scoping review that described the economic impact of CPD programmes across a variety of healthcare professions. Main beneficiaries of the programmes were patients and medical personnel as interventions often led to improved patient outcomes and increased knowledge for healthcare professionals.

Regarding limitations of the included studies, the majority provided incomplete information on educational interventions or training. This lack of details resulted in the inability to differentiate between specific types of interventions and link them with explicit financial outcomes. There is a need to use appropriate methodology to evaluate the economic impact of CPD activities. Studies on economic evaluations of CPD need to capture the key components of the programme including the type of intervention, the healthcare professionals involved, the setting where the intervention occurs, specific details of all the resources used and most importantly a clear identification of the outcomes that the programme hopes to achieve. Finally, the majority of the studies were from countries where English is a primary language. Hence, there may be an over-representation of studies from these countries. The decision to limit the search to research records in English language exclusively was based on the challenge of translating multiple languages and the practical challenges of locating, assessing, relevant non-English studies.

### ***Implications for future research***

The authors of this review emphasize the importance of publishing economic evaluations of educational activities. Such evaluations are important irrespective of whether they are related to undergraduate, postgraduate education, or CPD. Economic evaluations can be applied to estimate 'value for money' across a variety of outcomes resulting from education. Thus, such evaluations may escape some of the narrower designations of traditional CPD research, providing the opportunity to conduct research with an increased scope of context. For example, it is possible to study educational outcomes and learning objectives, but also professional progression, fellowship and residency programmes, financial return, service provision, disease prevention, patient quality of life, morbidity, and mortality<sup>45,46,47,48</sup>. This will result in breadth of perspective deepening research understanding of this field.

It is vital to promote a research culture that fosters the importance of program evaluation in the context of health professions education. Economic evaluations are necessary to define success

in programs under resource constraints,<sup>26</sup> In addition, applying evaluations in the health system demonstrates how best to commit resources in order to maximise educational gains following intervention.<sup>16</sup> A more costly intervention may be superior when compared to a cheaper alternative provided it offers substantially more value. Similarly, a less efficient activity may be recognized as offering better value as long as savings are significant.<sup>16</sup> Per review of best practice in the literature, we provide key recommendations for the appropriate conduct of economic evaluations of CPD to support the process of future evaluation (Box 1.1)<sup>49,50,51</sup>.

While not the main focus of this review, a consideration of these results within the wider academic environment (undergraduate and postgraduate education), may provide a broader context for economic evaluation. In the scholarly setting such evaluations are less common. In a systematic review of economic evaluations of healthcare professions education, it was reported that only three studies in an undergraduate context were evaluated using a FEE compared to two in postgraduate education and eleven for CPD activities<sup>10</sup>. The higher number of identified studies in CPD evaluated by FEE may reflect an assumption that CPD activities more often lead to outcomes in a larger context, e.g., improved service provision, patient outcomes or decreased expenditure on medication. Thus, there may be an expectation that such outcomes are less likely to be a result of undergraduate or postgraduate programmes. However, there is unequivocal evidence indicating that the global cost of healthcare education has risen dramatically during prior decades. It was reported that in the last 60 years, the cost of four years of medical education in the USA increased more than sevenfold.<sup>52</sup> Moreover, the average debt of graduating students (75% of the overall student population) reached 200,000 dollars. As educational costs continue to rise, access is curtailed. There is thus a practical need to increase access to healthcare education while controlling the rising costs. According to a WHO report in 2016,<sup>53</sup> there was a 7 million shortfall regarding staffing needs in healthcare worldwide in 2013 and by 2030 this shortfall is expected to reach 18 million. Economic evaluation may help

to address this issue by supporting the provision of higher education and training for healthcare workers that is demonstrably affordable and effective.

Another concerning observation from the review is the decreasing number of studies conducting economic evaluations of CPD. This is in contrast with the findings from the systematic review on cost evaluations of health professionals' education.<sup>10</sup> A possible explanation for this discrepancy is that the review included research articles published between 2001 and 2016, but only four years were scrutinised by the authors (2001, 2006, 2011, and 2016). Hence, the stability or increase in the volume of studies reported should be treated with caution. Another possible explanation of this difference is that the review included studies with pre and postgraduate education in healthcare and CPD whereas this review focused exclusively on healthcare professionals' CPD activities. Finally, in the conclusion of the review it was emphasized that an overall proportion of studies published in specific years did not increase.<sup>10</sup>

The authors of this review emphasize the need to standardise the methods applied in CPD programmes. It is understood, that such a process of standardisation requires time and researchers should be encouraged to identify experts with skills and knowledge in economic evaluations, particularly regarding the design and implementation of CPD programmes. This standardisation is of importance in times of healthcare expenditure cuts and increasing demand in the prioritised allocation of funds in healthcare spending (e.g. ageing populations, global demographic growth and the emergence of Covid-19). Past research evidence supports that need. It was established that health professions education was characterised by lower levels of economic literacy when compared with the health and biomedical sciences.<sup>10</sup> Specifically, price adjustments in pharmacology, complementary medicine, biomedical sciences, health care multi-national trials, and reproductive medicine were more commonly reported in comparison to health professions education studies. Analogously, a critical review on the cost-effectiveness of CPD in healthcare indicated a lack of consistency of evidence related to



economic evaluations (e.g. cost information or detailed economic analyses).<sup>8</sup> This deficiency limited interpretation of the results and hindered the identification of efficient CPD programmes from which patients could benefit.

### ***Conclusions and recommendations***

A critical insight to emerge from this review is the paucity of studies conducting an economic evaluation of continuing professional development activities and the absence of a uniform methodology where such studies did take place. The majority of studies included in the review conducted partial economic evaluations only. The information on the costs of isolated educational interventions or CPD programmes limits the utility of the findings. This type of evaluation does not allow for the identification of how the cost of the intervention may be mirrored in the financial benefits of CPD activities. One of the ways to address this caveat in knowledge could be to design and introduce research questions that emphasize the importance of cost-benefit or cost-effectiveness of CPD programmes. Moreover, there is a need to develop a standardised framework for reporting the economic impact of CPD programmes and activities. The framework could benefit from implementing knowledge derived from health economics and education economics. The combination of resources from those two areas of research could help to improve and extend the study design of CPD programmes. This would enable accurate assessment and appropriate comparisons pertinent to CPD activities in healthcare. Finally, more research evidence is needed regarding ‘the value for money’ estimates of CPD activities. It is particularly importance due to the rising costs of healthcare globally. A substantial number of studies included in the review did not provide details of the economic evaluations and many reported costs of CPD only.

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## **Declaration of interest statement**

The authors report no conflict of interest

## **Ethics statement**

Ethical approval was not obtained for this study as human subjects were not involved in the scoping review.

Accepted Article

## References

1. Organization, W. H.. High-level commission on health employment and economic growth: Report of the expert group. 2016.
2. Segal, L., Marsh, C., Heyes, R. The real cost of training health professionals in Australia: it costs as much to build a dietician workforce as a dental workforce. *Journal of Health Services Research & Policy*. 2017; 22(2), 91-98.
3. Starck, P. L. The cost of doing business in nursing education. *Journal of Professional Nursing*. 2005; 21(3), 183-190.
4. Johns, B., Baltussen, R., Hutubessy, R. Programme costs in the economic evaluation of health interventions. *Cost Effectiveness and Resource Allocation*. 2003; 1(1), 1-10.
5. Morris, S., Devlin, N., Parkin, D., Spencer, A. Principles of economic evaluation in health care. *Economic Analysis in Health Care (2nd ed.)*. Chichester: John Wiley & Sons. 2012; 232-250.
6. Vimarlund, V., Olve, N.-G. Economic analyses for ICT in elderly healthcare: questions and challenges. *Health Informatics Journal*. 2005; 11(4), 309-321.
7. Tsiachristas, A., Stein, K. V., Evers, S., Rutten-van Mólken, M. Performing economic evaluation of integrated care: highway to hell or stairway to heaven? *International Journal of Integrated Care*. 2016; 16(4), 1-12.
8. Brown, C., Belfield, C., Field, S. Cost effectiveness of continuing professional development in health care: a critical review of the evidence. *BMJ*. 2002; 324(7338), 652-655.
9. Zendejas, B., Wang, A. T., Brydges, R., Hamstra, S. J., Cook, D. A. Cost: the missing outcome in simulation-based medical education research: a systematic review. *Surgery*. 2013; 2153(2), 160-176.

10. Foo, J., Cook, D. A., Walsh, K., Golub, R., Abdalla, M. E., Ilic, D., Maloney, S. Cost evaluations in health professions education: a systematic review of methods and reporting quality. *Medical Education*. 2019; 53(12), 1196-1208.
11. Levac, D., Colquhoun, H., O'Brien, K. K. Scoping studies: advancing the methodology. *Implementation Science*. 2010; 5(1), 1-9.
12. Mays, N., Pope, C., Popay, J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *Journal of Health Services Research & Policy*. 2005; 10(1S), 6-20.
13. Executive Agency for Health Consumers. Study concerning the review and mapping of continuous professional development and lifelong learning for health professionals in the European Union. European Union. Retrieved from European Union. 2013.
14. Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L., Torrance, G. W. Methods for the Economic Evaluation of Health Care Programmes Methods for the Economic Evaluation of Health. *Methods*. 2015.
15. Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., . . . Weeks, L. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Annals of Internal Medicine*. 2018; 169(7), 467-473.
16. Maloney, S., Cook, D., Golub, R., Foo, J., Cleland, J., Rivers, G., . . . Walsh, K. AMEE Guide No. 123—How to read studies of educational costs. *Medical Teacher*. 2019; 41(5), 497-504.
17. Grimes, C. E., Mkandawire, N. C., Billingsley, M. L., Ngulube, C., Cobey, J. C. The cost-effectiveness of orthopaedic clinical officers in Malawi. *Tropical Doctor*. 2014; 44(3), 128-134.
18. Hendrie, D., Miller, T. R., Woodman, R. J., Hoti, K., Hughes, J. Cost-effectiveness of reducing glycaemic episodes through community pharmacy management of patients

with type 2 diabetes mellitus. *The Journal of Primary Prevention*. 2014; 35(6), 439-449.

19. Theis, J. L., Finkelstein, M. J. Long-term effects of safe patient handling program on staff injuries. *Rehabilitation Nursing*. 2014; 39(1), 26-35.

20. Tompa, E., Dolinschi, R., Alamgir, H., Sarnocinska-Hart, A., Guzman, J. A cost-benefit analysis of peer coaching for overhead lift use in the long-term care sector in Canada. *Occupational and Environmental Medicine*. 2016; 73(5), 308-314.

21. Butler, C. C., Simpson, S. A., Hood, K., Cohen, D., Pickles, T., Spanou, C., . . . Alam, M. F. Training practitioners to deliver opportunistic multiple behaviour change counselling in primary care: a cluster randomised trial. *BMJ*. 2013; 346, 1-13.

22. Ravyn, D., Ravyn, V., Lowney, R., Ferraris, V. Estimating health care cost savings from an educational intervention to prevent bleeding-related complications: the outcomes impact analysis model. *Journal of Continuing Education in the Health Professions*. 2014; 34(S1), 41-46.

23. Hartfiel, N., Sadera, G., Treadway, V., Lawrence, C., Tudor Edwards, R. A clinical librarian in a hospital critical care unit may generate a positive return on investment. *Health Information & Libraries Journal*. 2020; (38), 97-112.

24. World Health Organisation. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 [Press release]. Retrieved from <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.

25. Levin, H. M., McEwan, P. J., Belfield, C., Bowden, A. B., & Shand, R. (2017). *Economic evaluation in education: Cost-effectiveness and benefit-cost analysis*. SAGE publications.

26. Foo, J., Cook, D. A., Tolsgaard, M., Rivers, G., Cleland, J., Walsh, K., ... & Maloney, S. (2021). How to conduct cost and value analyses in health professions education: AMEE Guide No. 139. *Medical teacher*, 43(9), 984-998.
27. Schreurs, S., Cleutjens, K., & oude Egbrink, M. G. (2019). Increasing value in research: cost evaluations in health professions education. *Medical Education*, 53(12), 1171.
28. Foo, J., Ilic, D., Rivers, G., Evans, D. J., Walsh, K., Haines, T. P., ... & Maloney, S. (2018). Using cost-analyses to inform health professions education—The economic cost of pre-clinical failure. *Medical Teacher*, 40(12), 1221-1230.
29. Samuel, A., Cervero, R. M., Durning, S. J., Maggio, L. A. Effect of Continuing Professional Development on Health Professionals' Performance and Patient Outcomes: A Scoping Review of Knowledge Syntheses. *Academic Medicine*. 2021, 96(6), 913-923.
30. Knapp, H., Chan, K., Anaya, H. D., & Goetz, M. B. (2011). Interactive internet-based clinical education: an efficient and cost-savings approach to point-of-care test training. *Telemedicine and e-Health*, 17(5), 335-340.
31. Brull, S., Finlayson, S., Kostelec, T., MacDonald, R., & Krenzischek, D. (2017). Using gamification to improve productivity and increase knowledge retention during orientation. *JONA: The Journal of Nursing Administration*, 47(9), 448-453.
32. Hiltunen, A. M., Laurila, R., Silander, K., & Kuosmanen, T. (2019). Cost-Effectiveness of Digital Wound Care Education in a Healthcare Organization. *Studies in Health Technology and Informatics*, 264, 1933-1934.
33. Pomerantz, J. I., Toney, S. D., & Hill, Z. J. (2010). Care coaching: an alternative approach to managing comorbid depression. *Professional case management*, 15(3), 137-142.

34. Pellegrin, K. L., Krenk, L., Oakes, S. J., Ciarleglio, A., Lynn, J., McInnis, T., ... & Miyamura, J. (2017). Reductions in medication-related hospitalizations in older adults with medication management by hospital and community pharmacists: a quasi-experimental study. *Journal of the American Geriatrics Society*, 65(1), 212-219.
35. Hartfiel, N., Sadera, G., Treadway, V., Lawrence, C., & Tudor Edwards, R. (2021). A clinical librarian in a hospital critical care unit may generate a positive return on investment. *Health Information & Libraries Journal*, 38(2), 97-112.
36. Couch, A. G., Foo, J., James, A. M., Maloney, S., & Williams, C. M. (2018). Implementing a podiatry prescribing mentoring program in a public health service: a cost-description study. *Journal of foot and ankle research*, 11(1), 1-8.
37. Beinlich, N., & Meehan, A. (2014). Resource nurse program: a nurse-initiated, evidence-based program to eliminate hospital-acquired pressure ulcers. *Journal of Wound Ostomy & Continence Nursing*, 41(2), 136-141.
38. Amerine, L. B., Chen, S. L., Daniels, R., Key, N., Eckel, S. F., & Savage, S. W. (2015). Impact of an innovative blood factor stewardship program on drug expense and patient care. *American Journal of Health-System Pharmacy*, 72(18), 1579-1584.
39. Yau, C. W., Pizzo, E., Morris, S., Odd, D. E., Winter, C., & Draycott, T. J. (2016). The cost of local, multi-professional obstetric emergencies training. *Acta obstetrica et gynecologica Scandinavica*, 95(10), 1111-1119.
40. Allo, J. A., Cuello, D., Zhang, Y., Reddy, S. K., Azhar, A., & Bruera, E. (2016). Patient home visits: measuring outcomes of a community model for palliative care education. *Journal of palliative medicine*, 19(3), 271-278.
41. Barbosa, E. C., Verhoef, T. I., Morris, S., Solmi, F., Johnson, M., Sohal, A., ... & Feder, G. (2018). Cost-effectiveness of a domestic violence and abuse training and support programme in primary care in the real world: updated modelling based on an

MRC phase IV observational pragmatic implementation study. *BMJ open*, 8(8), e021256.

42. Ballard, C., Corbett, A., Orrell, M., Williams, G., Moniz-Cook, E., Romeo, R., ... & Fossey, J. (2018). Impact of person-centred care training and person-centred activities on quality of life, agitation, and antipsychotic use in people with dementia living in nursing homes: A cluster-randomised controlled trial. *PLoS medicine*, 15(2), e1002500.

43. Jones, S. L., Ashton, C. M., Kiehne, L., Gigliotti, E., Bell-Gordon, C., Disbot, M., ... & Wray, N. P. (2015). Reductions in sepsis mortality and costs after design and implementation of a nurse-based early recognition and response program. *The Joint Commission Journal on Quality and Patient Safety*, 41(11), 483-AP3.

44. Groot-Jensen, S., Kiessling, A., Zethraeus, N., Björnstedt-Bennermo, M., & Henriksson, P. (2016). Cost-effectiveness of case-based training for primary care physicians in evidence-based medicine of patients with coronary heart disease. *European Journal of Preventive Cardiology*, 23(4), 420-427.

45. de Almeida, C. V., & Belim, C. (2020). Health Professionals' Communication Competences Decide Patients' Well-being: Proposal for a Communication Model. In Joy. Emerald Publishing Limited.

46. Eacker, A. (2020). Well-being definition and measures in medical education. *Medical Professionalism Best Practices: Addressing Burnout and Resilience in Our Profession*; Byyny, RL, Byyny, R., Christensen, S., Fish, JD, Eds, 91-103.

47. Leijten, F. R., Hoedemakers, M., Struckmann, V., Kraus, M., Cheraghi-Sohi, S., Zemplényi, A., ... & Rutten-van Mölken, M. P. (2018). Defining good health and care from the perspective of persons with multimorbidity: results from a qualitative study of focus groups in eight European countries. *BMJ open*, 8(8), e021072.



48. Linton, M. J., Dieppe, P., & Medina-Lara, A. (2016). Review of 99 self-report measures for assessing well-being in adults: exploring dimensions of well-being and developments over time. *BMJ open*, 6(7), e010641.
49. Tolsgaard, M. G., & Cook, D. A. (2017). New roles for cost as an outcome: opportunities and challenges. *Medical education*, 51(7), 680-682.
50. Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L., & Torrance, G. W. (2015). *Methods for the economic evaluation of health care programmes*. Oxford university press.
51. Husereau, D., Drummond, M., Augustovski, F., de Bekker-Grob, E., Briggs, A. H., Carswell, C., ... & Staniszewska, S. (2022). Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations. *International Journal of Technology Assessment in Health Care*, 38(1).
52. Greysen, S. R., Chen, C., & Mullan, F. (2011). A history of medical student debt: observations and implications for the future of medical education. *Academic Medicine*, 86(7), 840-845.
53. Darzi, A., & Evans, T. (2016). The global shortage of health workers-an opportunity to transform care.
54. Hollands, F. M., Hanisch-Cerda, B., Levin, H. M., Belfield, C. R., Menon, A., Shand, R., ... & Cheng, H. (2015). *CostOut-the CBCSE cost tool kit*. Center for Benefit-Cost Studies of Education, Teachers College, Columbia University. Retrieved from: [www.cbcsecosttoolkit.org](http://www.cbcsecosttoolkit.org).

Table 1. Country and a number of articles.

<b>Country</b>	<b>Number of articles</b>
<b>Europe</b>	<b>35</b>
United Kingdom	19
France	2
Spain	2
Denmark	1
Finland	1
Germany	1
Italy	1
Kosovo	1
Norway	1
Poland	1
Portugal	1
Serbia	1
Sweden	1
Ireland and UK	1
Multi European (Belgium, England, Netherlands, Poland, Scotland, Spain)	1
<b>North America</b>	<b>64</b>
United States of America	59
Canada	4
Mexico	1
<b>South America</b>	<b>3</b>
Argentina	1

Chile	1
Guatemala	1
<b>Asia</b>	<b>5</b>
Indonesia	1
Japan	1
Saudi Arabia	1
Taiwan	1
Multi Asian (Bangladesh, Pakistan, Sri Lanka)	1
<b>Africa</b>	<b>5</b>
South Africa	2
Malawi	1
Zambia	1
Multi African (Burundi, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe)	1
<b>Australia</b>	<b>7</b>
Australia	6
Australia and UK	1
<b>Total</b>	<b>119</b>

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Table 2. Profession profile.

<b>Profession</b>	<b>N (%)</b>
Multiple professions	54 (45)
Nurses	34 (29)
Doctors	23 (19)
Pharmacists	3 (2)
Midwives	2 (2)
Dentists	1 (1)
Genetic councillors	1 (1)
Podiatrists	1 (1)
Total	119 (100)

Table 3. Categories of the outcomes resulting from CPD activities.

Category	N	%
<b>Patient outcomes</b>	<b>51</b>	<b>43</b>
improved clinical outcomes	19	16
effectiveness of care	9	8
improved life quality	9	8
reduced mortality	5	4
improved mental health and lifestyle changes	5	4
reduction in duration of care	2	1.5
improved patient safety	2	1.5
<b>Practice/behaviour change</b>	<b>38</b>	<b>32</b>
medication management	16	13
equipment usage	8	7
organizational change	5	4
improvements in communication	1	1
infectious disease screening	1	1
<b>Healthcare professionals' knowledge gain</b>	<b>19</b>	<b>16</b>
<b>Education related</b>	<b>7</b>	<b>6</b>

efficiency of learning related to modality	4	3
cost reduction in delivery of education	1	1
evaluation of dental examination	1	1
promoting nursing certification	1	1
<b>Healthcare professionals' personal health and safety</b>	<b>4</b>	<b>3</b>
manual handling	2	1.5
nurses' wellness	1	1
needle stick injury prevention	1	1

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Table 4. Economic evaluation characteristics

<b>Economic evaluation category</b>	<b>N (%)</b>
Cost analysis (PEE)*	70 (59)
Cost-effectiveness analysis (FEE)**	35 (29)
Cost-benefit analysis (FEE)	8 (7)
Cost-minimization analysis (FEE)	6 (5)
Cost utility analysis (FEE)	1 (1)

\* PEE = partial economic analysis; \*\* FEE = full economic evaluation

Table 5. Study characteristics across three 4-year periods.

Study characteristic	years N (%)	years N (%)	years N (%)
	2010-2013	2014-2017	2018-2021
	<b>54 (46)</b>	<b>39 (33)</b>	<b>26 (22)</b>
<b>Region</b>			
USA and Canada	30 (25)	22 (18)	11(9)
Europe	15 (13)	12 (10)	9 (7.5)
Australia	2 (1.5)	1 (1)	3 (2.5)
Africa	2 (1.5)	3 (2.5)	0 (0)
Asia	3 (2.5)	0 (0)	2 (1.5)
Latin America	2 (1.5)	1 (1)	1 (1)
<b>Profession</b>			
Multiple	24 (20)	16 (13)	14 (12)
Nurses	15 (13)	11 (9)	8 (7)
Doctors	12 (10)	8 (7)	3 (2.5)
Other	3 (2.5)	4 (3)	1 (1)
<b>Outcome</b>			
Patient outcomes	22 (18)	18 (15)	14 (12)
Practice/behaviour change	20 (17)	9 (8)	7 (6)
Knowledge gain	7 (6)	8 (7.5)	2 (1.5)
Other	5 (4)	4 (3)	3 (2.5)
<b>Economic evaluation category</b>			
<b>Full economic evaluation</b>	<b>20 (17)</b>	<b>18 (15)</b>	<b>12 (10)</b>
Cost-effectiveness analysis	11 (9)	14 (12)	10 (8)



Cost-benefit analysis	5 (4)	2 (1.5)	1 (1)
Cost-minimisation analysis	4 (3)	1 (1)	1 (1)
Cost-utility analysis	0 (0)	1 (1)	0 (0)
<b>Partial economic evaluation</b>	<b>34 (29)</b>	<b>21 (18)</b>	<b>14 (12)</b>
CA* (cost description)	11 (9)	10 (8)	6 (5)
CA (cost saving)	20 (17)	9 (7.5)	6 (5)
CA (return of investment)	3 (2.5)	1 (1)	2 (1.5)
CA (cost consequence)	0 (0)	1 (1)	0 (0)

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\*CA = cost analysis

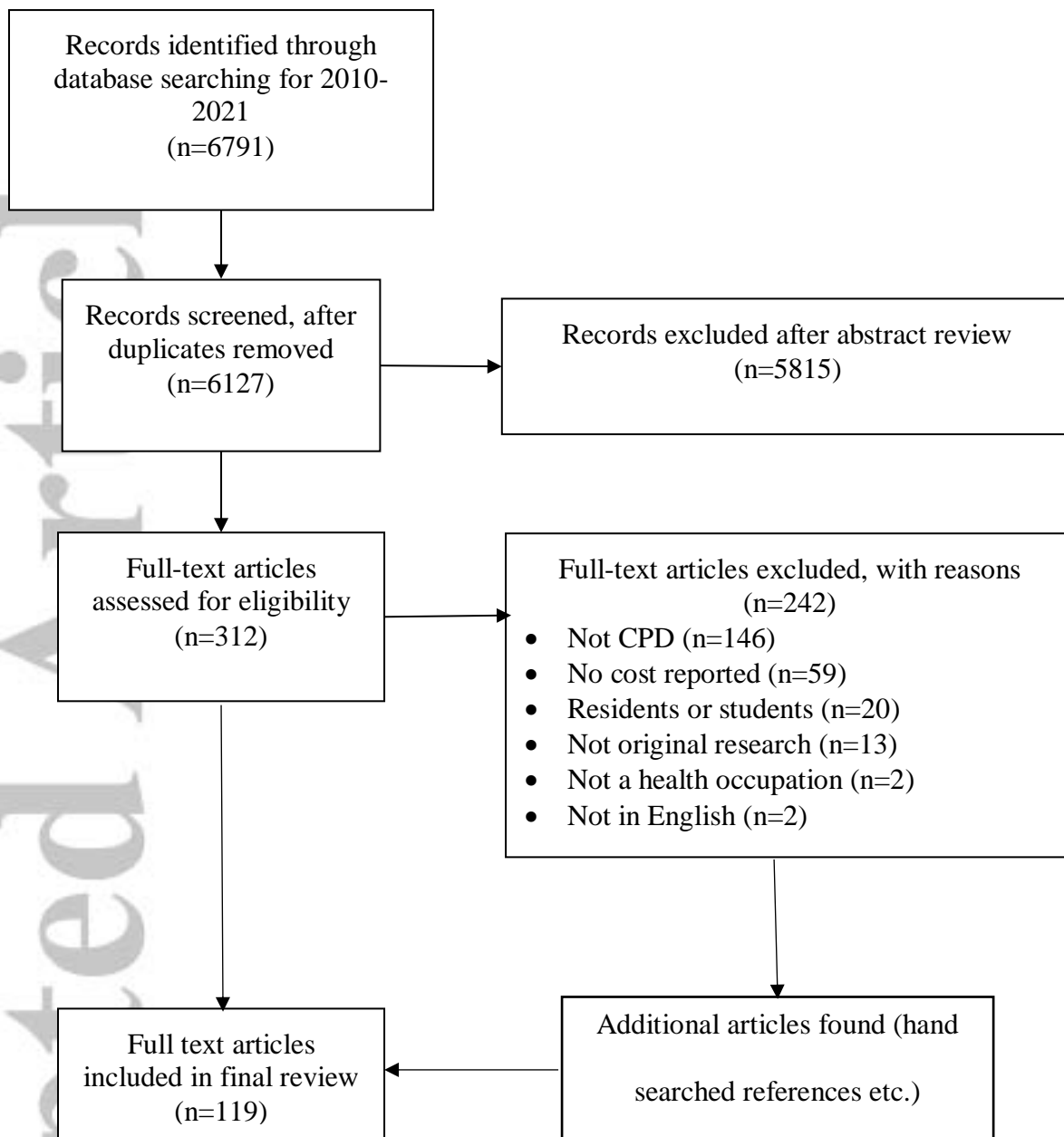


Figure 1. Flow chart demonstrating the study selection process.

### Key Recommendations

- Studies on economic evaluations of CPD need to capture the key components of the programme including:
  - Detailed description of the educational intervention. (Foo et al.2019)
  - Healthcare professionals involved.
  - Setting where the intervention occurs.
  - Specific details of all the resources used. Detailed reporting of all costs involved in the intervention. To facilitate the estimation of costs and cost-effectiveness consider using a tool such as: CostOut ®  
<https://www.cbcsecosttoolkit.org>
  - Clear identification of the outcomes that the programme hopes to achieve.
- Prioritise full economic evaluations over partial economic evaluations (Tolsgaard & Cook, 2017).
- Use a reporting guideline such as the CHEERS 2022 statement which provides guidance on reporting of health economic studies (Husereau, 2022).

**Box 1.1.** Key Recommendations for Best Practice in the Conduct of Economic Evaluations of Health Professional Educational Activities