



**Title of paper:** Online Interprofessional education related to chronic illness for health professionals: a scoping review

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## ABSTRACT

This scoping review focuses on identifying the quantity and quality of research evidence available in relation to online IPE related to Chronic Disease Management (CDM). Recent advances have seen the emergence of information communication technology and digital health<sup>1</sup> solutions that may improve monitoring of and self-management of Chronic Disease (CD). With the growing CD burden globally, and the advancement of information communication technology, digital health solutions may improve CD monitoring and self-management. However, health professionals are slow to utilise this technology in CDM. Online interprofessional education (IPE) has the potential to enhance utilisation of digital health solutions across interprofessional healthcare teams. This review focuses on online IPE and E-Learning strategies used to promote engagement and achievement of learning outcomes between health care professionals in CDM. A systematic search of the literature yielded 3112 papers; 15 studies were included in the review following an independent screening process. The review found very limited research for online IPE related to CD so it is not feasible to comment or draw conclusions in relation to its impact on IP learning, student engagement in education or its impact in practice or on services or health outcomes. Research methodology and online E-Learning strategies varied across studies, highlighting the need for rigorous methodology that includes consistency in online IPE strategies, evaluations and study methods.

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<sup>1</sup> Digital health is an umbrella term encompassing eHealth (including mHealth) and emerging areas such as artificial intelligence, genomics and 'big data'. It is defined as "the use of information and communications technology in support of health and health-related fields (WHO 2019)

## INTRODUCTION

Chronic conditions are persistent conditions, usually for longer than 3 months, which are not curable (Bernell and Howard 2016). Successful management of any chronic condition is dependent on appropriate medical treatment and the ability of patients to self-manage (Ong, Jassal, Porter, Logan, & Miller, 2013; Wagner et al., 2001). Self-management programmes incorporating patient education, empowerment and collaboration have a key role in slowing CD progression, lowering CD related hospitalisation and improving patients' knowledge of their medical condition (Chen et al., 2011; Wu et al., 2009). Since the late 1990s the delivery of health information and education has changed dramatically with the development and integration of information communication technology (ICT) into health services (World Health Organization, 2011, 2016; Bollinger et al., 2013). Using a combination of different ICT solutions, education and self-management can ensure that social and digital health strategies have the potential to limit or possibly prevent a decline in social functioning and reducing demands on families and healthcare systems and providers (McCabe & Timmins, 2016). Digital health solutions are widely recognised as a means of providing innovative and individualised ways of improving care and services to people with CDs. This is evident in the dramatic expansion in the number of health and health-related apps that are available to download onto smartphones. However, with the exception of technology related to medical equipment for monitoring and diagnostics, healthcare has been relatively slow overall to adopt this type of technology and remains on the periphery of the digital technology transformation and their full potential is not yet realised by health systems (Graf, 2013; Kellermann & Jones, 2013).

Murray et al. (2016) suggest that this is because there is not yet a critical mass of evidence or knowledge base that can guide clinical decisions about their use. The World Health

Organization (2016) and the European Commission (2018) also report that health systems currently lack information on benefits of digital health interventions and recommend a cohesive and coordinated approach that will need to include comprehensive training and educational campaigns for improving the digital health literacy of patients, informal carers and healthcare professionals (European Commission, 2018).

Online IPE has the potential to enhance utilisation of digital health solutions across interprofessional healthcare teams by addressing fundamental issues, such as supporting self-management and universal health coverage, that underpin the development and implementation of effective digital health strategies for the management of chronic conditions (Bollinger et al., 2013; Patel et al., 2017). This interprofessional collaboration is essential to the identification of solutions that can be used within the real world of clinical practice (WHO 2011, 2016). IPE occurs when “two or more professions learn with, from, and about each other to improve collaboration and the quality of care” (Barr, 2002). Although it is well understood that E-Learning is an effective way of providing sustainable and scalable interprofessional education (IPE). E-learning is described as any educational intervention delivered electronically via the Internet (Vaona et al., 2018). However, it is not widely used in healthcare education, either at undergraduate or postgraduate level (Djukic et al., 2015; Evans, Ward, & Reeves, 2018). Possible reasons for this may be that professional regulatory bodies for various health professions also require specific educational requirements and standards that inadvertently obstruct the alignment of schedules and timetabling for synchronous tutorials and group work. Other evidence suggests that barriers specific to E-learning include low levels of technological literacy, reduced social contact and lack of one-

to-one support for both individual learning and technology failure (Clarke et al 2016; Button et al 2014).

IPE focus and strategies for developing good collaborative skills are important because research evidence demonstrates that interprofessional teams that work collaboratively will experience less conflict and increased job satisfaction with the overall effect of enhanced recruitment and retention of staff for employers (Reeves et al., 2017; Zwarenstein, Goldman, & Reeves, 2009). Therefore, as online IPE becomes more prevalent in the future, barriers to need to be addressed. E-learning can potentially provide positive learning experiences by using innovative online strategies that promote collaboration and are supportive, flexible and accessible for students working across all aspects of healthcare (Reeves, Fletcher, McLoughlin, Yim, & Patel, 2017). Although current research evidence supports IPE in terms of it being as effective as blended or face-to-face learning, it is insufficient to comment definitively on the benefit of IPE and its effects on patient outcomes, care delivery and collaborative working (Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013).

Nonetheless online learning may provide a practical alternative when classroom learning is inhibited by a lack of capacity, accessibility and flexibility, and positive IPE experiences can potentially, impact on how healthcare professions work together in practice (Berwick, Nolan, & Whittington, 2008). Facilitating digital health communication, for example professional social networks and continuing education, are key aspects to a high standard of service delivery. Its potential may extend even further to the successful implementation of health policy by contributing to the reduction or minimising of health costs by facilitating optimal productivity of healthcare providers (Bollinger et al., 2013). Further research is required to increase both the quantity and quality of evidence that examines the effectiveness of IPE

interventions compared to separate, profession-specific interventions, qualitative strands examining processes relating to IPE, and practice changes and cost-benefit analyses.

The aim of this scoping review is two-fold: (a) to determine the research evidence available on online IPE related to CDM and (b) evaluate the impact of online IPE strategies across healthcare professions in terms of the student experience, degree and interprofessional engagement and achievement of learning outcomes.

## METHODS

To explore the IPE evidence in relation to CDM, a scoping review using a systematic search of the relevant literature was conducted. This type of review provides an assessment on the scope, size, nature and extent of available research literature on the use and impact of online IPE (Grant & Booth, 2009). A scoping review shares many features of a systematic review in attempting to be systematic and replicable including a systematic approach to designing and implementing the literature search strategy (Arksey & O'Malley, 2005). By its nature it does not include a systematic approach to quality assessment; but, it does describe the quantity and quality of the research including study design, study sample, intervention strategies and key findings using tabular and narrative commentary (Grant & Booth, 2009). A scoping review is also useful because it identifies the breadth and depth of evidence currently available on a particular topic that is relatively new (Levac, Colquhoun, & O'Brien, 2010).

Our scoping review is aimed at answering the following research questions: 'what is the research evidence available on online IPE related to CDM and what is the impact of online IPE strategies across healthcare professions in terms of the student experience, degree of engagement and the impact of online learning strategies for IPE, and achievement of learning outcomes'.



The review's inclusion criteria were studies with a primary focus on online IPE and E-Learning strategies used to promote student engagement and achievement of learning outcomes in CDM. Studies that included multiple learning strategies including online learning but did not extrapolate its findings specifically to online IPE were excluded.

#### Search Strategy and Study Selection

A search of the following electronic databases was undertaken using various combinations of indexing terms and key search terms (elearning, Interprofessional, digital health), with the assistance of a librarian (GS): MEDLINE, CINAHL, PsycINFO, Embase, Scopus, and ERIC. In the planning stage of the review, the search strategy attempted to only include results that explicitly mentioned chronic disease management in the relevant fields (title, abstract, controlled vocabulary). However, this proved extremely limiting, and hence was not included in the final search strategy; instead, it formed part of the inclusion/exclusion criteria to allow more discretion in terminology and choice. No limits as to date or language were imposed (see online supplement). In addition, a number of pertinent journals were also searched (see online supplement). These combined searches resulted in 3735 papers. After duplicates were removed, the remaining 3111 papers were uploaded to the Covidence website ([www.covidence.org](http://www.covidence.org)) for screening. One additional paper was sourced through a manual search of journal reference lists.

For Stage 1 of the screening process, reviewers in groups of two independently assessed each title and abstract against inclusion and exclusion criteria to identify potentially relevant items (CMcC & JV; MMcC & KP; SF & CMcC; NW & CMcC) and any discrepancies were resolved by discussion and consensus within the team. For Stage 2 screening, the full texts of 60 papers were obtained and assessed independently by two reviewers (CMcC & JV) and any discrepancies were resolved by discussion and consensus with a third reviewer (MMcC). After

Stage 1 and 2 screening 3097 papers were excluded. In total 15 papers were included in the scoping review (Figure 1).

**Insert figure 1 here**

#### Data Extraction

Data extraction was completed by two reviewers (CMcC & JV) independent of each other and any discrepancies were resolved by discussion and consensus with a third reviewer (MMcC).

The data extraction form was developed by 2 members of the review team (CMcC and MMcC) and tailored to suit the needs of the topic and studies included in the review.

The data extracted for each study included: (table 1)

- Study aims/objectives.
- Study design and methods (data collection/analysis, participants).
- Duration of the e-learning
- Method of E-Learning and technologies.
- Types of interaction.
- Assessment of learning.
- Findings.

**Insert table 1 here**

#### Analysis and Framework

Thematic analysis of the included studies was conducted independently by two reviewers (CMcC and MMcC). In addition, an extended version of Kirkpatrick's Education Outcomes model was used to assess the impact of the evidence of online IPE related to CDM (Freeth, Hammick, Koppel, Reeves, and Barr 2002) and Barr, Koppel, Reeves, Hammick, and Freeth (2005). This model provided a framework for applying the findings to six core dimensions of

online IPE. This application facilitated a *'holistic and comprehensive evaluation to better inform future policy and development'* (Freeth et al., 2002, p. 13). The principles underpinning this model are not hierarchical and at each level it can become more challenging to collect trustworthy data related to the educational intervention (table 2).

Insert Table 2 here

## RESULTS

Analysis and interpretation of extracted data includes an outline of the selected studies in relation to module focus, module aims, IPE strategies, evaluation methods and assessment (Table 1). Fifteen studies were included: eight from the United States (US); six from Canada; and one from the United Kingdom (UK). Altogether three studies were abstracts from conference proceedings (Knoefel & Herman, 2015; Nugent, Gonzalez-Fernandez, Kozachik, Nesbit, & Hogans, 2018; Oh et al., 2017) and as a result study details are limited; however, they were included as they were relevant to the review topic. Various healthcare professionals are represented in the review including medicine (10 studies), nursing (13 studies), physiotherapy (three studies), occupational therapy (eight studies), dieticians (two studies) and paramedics (one study). Ten studies included undergraduate students and five studies included graduates.

The majority of these used a quasi-experimental design and gathered data using online questionnaires, interviews and/or analysis of individual and/or IP online activity/engagement. All studies used a convenience sampling technique, with the exception of three studies (Dow et al., 2016; Holmes et al., 2013; Oh et al., 2017), and the sample sizes varied ranging from six (Lempicki & Holland, 2018) to 522 participants (Dow et al., 2016).

The aim of this scoping review was to determine the research evidence available on online IPE related to CDM and evaluate the impact of online IPE strategies across healthcare

professions in terms of the student experience, degree and interprofessional engagement and achievement of learning outcomes. The result of the literature search demonstrates that there is very limited evidence available on this topic. The CDM focus in the selected studies included diabetes (two studies), gerontology (four studies) and complex cases (2 studies). The authors do not describe what they mean by 'complex case' but it is assumed that it relates to CDM. This review identified that evaluating the impact of online IPE strategies focused mainly on online IP engagement equally with the achievement of learning outcomes. Ten studies reported that learning outcomes were achieved and ten studies also focused on online IP engagement.

Analysis revealed the nature of online IP engagement comprised 3 main issues;

1. Online IP collaboration and communication.
2. Experiences using technology.
3. Leadership Roles

#### 1. Online IP Collaboration and Communication

Enhancing IP collaboration and communication in learning using clinical scenarios and problem solving approaches emerged as a key focus of the included studies. Atack, Parker, Rocchi, Maher, and Dryden (2009) conducted online surveys that included open-ended questions and their findings showed increased awareness of the importance of collaborating effectively with other professionals to ensure optimal disaster management with 41.6% reporting increased readiness for IPL ( $p=0.009$ ). Similarly the study by Brock and Smith (2007) which focused on the peer assessment aspect of IPE found that online learning positively facilitated IP discussion and students reported feeling more confident doing this online than face-to-face and during the module. Studies by Carbonaro et al. (2008) and King, Taylor, Satzinger, Carbonaro, and Greidanus (2008) also reported the positive impact of online

learning on supporting and enhancing IP collaboration and communication by gaining a greater understanding of team processes and also recognise the value of their own contribution to decision-making processes. However, Carbonaro et al. (2008) and King, Taylor, Satzinger, Carbonaro, and Greidanus (2008) also caution that for asynchronous (not simultaneous or concurrent in time) discussion boards to be effective there is a need for considerable monitoring by trained faculty teaching staff. Students in these studies reported that establishing IP team skills online was more difficult if online moderator support and guidance was absent or limited. Similarly a study by Lempicki and Holland (2018) also reported that although students (undergraduate year 1) scored well in terms of improving IP communication and reported a positive E-Learning experience, they generally did not want to complete another online IPE module as they preferred face-to-face learning. These findings should be interpreted cautiously due to the relatively small sample size and highlight the need for further large-scale research relating to student perceptions, response to and learning needs in relation to online IPE needs.

Dietetics students who participated in the Earland, Gilchrist, McFarland, and Harrison (2011) study reported that online IPE had a positive impact on their awareness of IP issues (70%), other professional roles (70%), the value of other professional roles (80%), and the importance of support from other professions (70%). Interestingly, 55% of these students reported that online IPE was more effective than clinical placements in helping to develop IP collaborative working skills for practice. In contrast, the study by Macneill, Telner, Sparaggis-Agaliotis, and Hanna (2014) reported that student views or skills in IP collaboration had not improved following completion of an IPE module. However, analysis of online engagement and outputs in this study indicate that IP collaboration produced patient cases that were more

plausible, contained richer content, and managed social considerations better than the cases submitted by individual students. These findings differ to Oh et al. (2017) who found a significant change towards collaborative IP team value ( $p=.006$ ) but this did not translate into greater interprofessional team efficiency. In these two studies, the difference in student views when comparing IPE to their course work related to either the professions involved or alternatively, that online IPE is an effective medium for learning collaborative and team skills but this may not be appreciated or valued by different disciplines and therefore, these benefits may not extend to clinical practice. This view is supported by Dow et al's (2016) study which demonstrated that the level of knowledge acquisition varied depending on the students' profession, with medical students achieving the highest scores followed by nursing, pharmacy and then social workers.

The benefits of online IPE is further highlighted by Pittenger, Westberg, Rowan, and Schweiss (2013) who reported that 58% of students did not support the use of social networking tools, for example 'Ning', as a component of online IP learning as they felt IP learning should be face-to-face; yet, 77% of all students reported that they developed better IP skills using Ning in conjunction with Moodle. King et al. (2010) support this. They found that online IP ePBL facilitated novel approaches to communication and collaboration which included students addressing technical difficulties. In contrast, Atack et al. (2009) reported students felt more confident when IP discussion and collaborative decision-making were online rather than face-to-face. Carbonaro et al. (2008) also acknowledge this and suggests that even though students achieved the learning objective of improved IP collaboration and communication/teamwork skills, a limitation of the online environment is that it does not reflect communication issues for 'real life' situations and clinical practice.

Jakubec et al's (2014) study reported that participants who completed all online modules were clear about the relevance of the course for their career development and noted that those who did not complete the course were not frontline workers and were unclear from the outset as to its relevance for their workplace. In addition qualitative data from this study indicates that participants who did not complete online modules felt unsupported by their organisation.

## 2. Experiences using Technology

This relates to student descriptions of their experiences with using technology for online learning and its impact on their engagement with the course/module. In the Attack et al. (2009) study there was a 46% attrition rate in student participation, attributed to either a lack of prior experience with using E-Learning technology or, to a lesser degree, technical problems. However, in contrast Earland et al. (2011) reported that although 40% of students were not satisfied with the timing of the online module activity for module 1, satisfaction improved to 55% in module 3. Similarly, technical issues in module 1 were reflected in a satisfaction rate of 55% for access and when resolved the satisfaction rate improved to 90% by module 3. Technical difficulties seemed more prevalent with synchronous online collaboration but these were generally resolved quickly so did not consistently impact negatively on the attrition rate or students' experience. This indicates that it is essential that the technology interface is user-friendly, reliable and relevant in order to incentivise and maintain student engagement and learning.

In addition to this, Dow et al. (2016) recommend that students need to be assessed for prior online IP learning, particularly in relation to communication, collaboration and leadership, as this may adversely impact on their level of engagement as individuals and team members.

Macneill et al. (2014), Carbonaro et al. (2008) and Earland et al. (2011) conclude that a trained facilitator with good technical support is essential in online IPE in order to monitor and guide behaviour within the online IPE learners. King et al. (2008; 2010) recommend that prior to formally commencing an online IPE module, students need 'practice' sessions to establish and resolve technological issues – this would allow students to focus on the purpose of the module rather than lose interest and motivation because the system does not work. King et al. (2010) also recommend some face-to-face contact sessions prior to commencing online IPE sessions.

### 3. Leadership

Demonstrating leadership and working as a member of a team emerged as a key aspect of IPL even though it was not the main focus of the studies in this review. The Dow et al. (2016) study which included undergraduate students reported higher IP team scores than individual scores for course work which correlated with collaborative activity such as number of online message board posts/replies/views. Teams that scored highly demonstrated greater levels of team engagement and collaboration even when some team members were not as active online as others. This suggests that team leadership is important and appears to emerge naturally. This is supported by the Holmes et al. (2013) study, which also found that the most successful online IP teams had higher levels of engagement with each other and IP teams that scored lower had fewer posts and reported more technical problems.

While the development of leadership skills was the focus of the Holmes et al. (2013) study, Jakubec, Parboosingh, and Colvin (2014) found that six particular participants positively influenced the quality of online IP interaction by being enthusiastic, posting regularly and sharing experiences and references. King et al. (2008) found that while not all team members valued the online leadership role, they felt that it was important that all students have the



opportunity to experience it. Leadership emerged as an important transferable skill in the findings by both Macneill et al. (2014) and Holmes et al. (2013), who reported that student leadership was important for achieving course objectives in online IPE. Leadership roles were taken by all disciplines equally and centred on organising dialogue threads for course work, scheduling virtual team meetings, rotating leadership and being supportive. Online IP teams with this type of leadership scored higher than those who did not (Holmes et al., 2013). Fostering leadership skills and actions in IP online learning may also limit the need for moderation during asynchronous or synchronous tutorials.

#### Methodological Issues

This section highlights methodological issues related to how the research on IPE online learning was conducted. Many of the studies captured self-reported data, generally had small sample sizes although this varied with 1 larger study included and used convenience sampling with voluntary participation. The majority of studies were evaluative with only two using pre- and post-intervention design (Attack et al., 2009; Pittenger et al., 2013). Of those studies that conducted online surveys (n=9), all used validated questionnaires with the exception of Knoefel and Herman (2015). Focus groups, open-ended questions and observation data were used by eight studies. All studies reported positive findings relating to students' experiences of online IPE and three studies included negative findings also.

#### Kirkpatrick's' Educational Outcomes Model for Online/IPI - Reported Outcomes

When analysing outcomes as reported across the included studies using Kirkpatrick's Education Outcomes model we found a total of 30 reported outcomes (Table 2). These outcomes were associated with individual changes primarily at Levels 1, 2a and 2b. Eleven of the included studies reported level 1, positive reactions (Brock et al. 2007; Carbonaro et al. 2008; King et al 2008; Attack et al. 2009; King et al 2010; Erland et al. 2011; Holmes et al 2014; Jakubec et al 2014 Pittinger et al 2013; Knoefel *et al.* 2015; Limpicki et al. 2018). At

level 2a, nine studies reported changes in participants attitude towards learning collaboratively with other disciplines (King et al 2008; Carbonaro et al. 2008; Atack et al 2009; King et al 2010; Erland et al. 2011; Holmes et al. 2013; Pittinger et al 2013; McNeill et al 2014; Limpicki et al. 2018). A total of 7 studies reported positive outcomes at level 2b which relates gaining knowledge (Carbonaro et al. 2008; King et al. 2008; Atack et al 2009; King et al. 2010 McNeil et al 2014; Knoefel and Herman 2015; Dow et al. 2016). Education outcomes at level 3 which focus on the transfer of IPL to practice were reported by 2 studies (Atack et al. 2009; Jakubec et al 2014). Only 1 study reported positive outcomes related to level 4a Organisation changes (Jakubec et al 2014) and 4b Benefits for patients (Atack et al 2009).

**Insert table 2 here**

## DISCUSSION

A number of key issues were identified by this scoping review that should be considered when planning and developing online IPE. This review highlights not only the lack of research related to online IPE generally but also research evaluating the impact of teaching strategies for online IPE related to chronic illness. Diabetes, Older person/Age related dementia and complex cases were the CDs addressed by the studies in this review. Therefore, it is not possible to comment or draw conclusions in relation to its potential impact in terms of IP learning, IP collaboration in education or practice, or its impact on services or health outcomes. In addition to the lack of research on this topic, the wide variations in research methodologies, sample sizes, description of the elearning intervention suggest that more rigorous research is required. A systematic review by Lawn et al (2017) was conducted to identify effective e-learning instructional designs and formats for teaching the depth of skills needed to work with patients with chronic and complex care needs. Although this review did not focus on IPE, they

came to a similar conclusion in relation to the need for more creative approaches to elearning and rigorous research. Clearly, this topic needs considerable research to build a body of evidence that can inform online IPE, education strategies and health policy.

This review has highlighted that student preparation and readiness to engage in online IPE is essential in terms of technical skills, support and guidance prior to participation in online IPE. This is also highlighted by Daniel (2016) and Bates (2015) who discuss that without sufficient elearning literacy, motivation and desire to engage with online learning, students can be dissatisfied with the experience. They suggest that traditional methods of learning such as rote learning also militate against a seamless access and engagement with collaborative online learning. Detailed course requirements and access to relevant materials, in conjunction with seamless access to technology that is reliable and intuitive, are essential to sustain motivation not just from an individual learning perspective but also to successfully facilitate collaborative IPE.

It could be argued from this review that in terms of meeting course learning objectives, there is little difference between online, blended or face-to-face approaches but that the presence of a moderator/lecturer/tutor is important in all approaches. A survey of 3<sup>rd</sup> level undergraduate students support this view with a large majority confirming positive experiences of elearning but said that an educator is essential in order to stimulate critical thinking/discussion and collaboration (O Donnell & Sharp 2012). This is a positive outcome and suggests that the benefit of online IPE may be its accessibility, flexibility and to some degree its ability to facilitate IP communication in a non-hierarchical way that is respectful of professional roles and keeps the patient at the centre of the learning focus. However, inconsistencies in online IPE strategies and evaluative processes in the studies highlights the issue of heterogeneity (Reeves et al., 2017).

Overall, the Kirkpatrick Education Outcomes framework highlights that online IPE was a positive experience (Level 1) with evidence of improved and evolving perceptions and attitudes towards IP collaboration (Level 2a) and the development of increased knowledge and IP communication and collaborative skills (Level 2b). Two studies reported positive outcomes in relation to improved changes to their clinical practice as a result of completing online IPE (Level 3), however, it should be noted that these are self-reports and impact was not measured in any of the included studies. Only one study examined organisational changes (Level 4a) which were at departmental level only and not introduced throughout the organisation. No study reported outcomes for level 4b which relates to the benefit of online IPE for patients in terms of improved care or health outcomes. A review by Reeves et al (2017) illustrates a similar trend with evaluation of online learning focusing mainly on positive learning experiences, knowledge and skill acquisition and behaviour change. The lack of knowledge about the impact of online IPE on organisational functioning and development and also its impact on patients suggests that future research on this topic needs to include steps to gather this type of data. Lawn et al (2017) also made this point and recommend that online learning needs creative ways to facilitate interactivity, reflection, and evaluation of its impact and application to practice related to CDM.

This scoping review provides the opportunity for more 'specific' analysis of the multiple issues highlighted. It could be regarded as limited due to the inclusion of three abstract-only studies; however, they met the inclusion criteria and were included due to the lack of evidence generally on the topic.

## CONCLUSION AND IMPLICATIONS

This review highlights the very limited research on the topic of online IPE related to chronic illness and is an issue that educators and clinicians need to address in order to provide positive online learning experiences that foster IP communication and collaboration in education that extends to clinical practice also. Participants' positive reports about their experiences of online learning and evidence related to consistently meeting learning outcomes are encouraging and suggest that online IPE is feasible and beneficial in terms of widening access, enhancing flexibility and supporting collaborative learning among healthcare professionals. However, this review raises a number of issues that need to be considered for future research. These include the need for consistency in online IPE strategies, evaluations and study methods. While randomised control trials may not be appropriate, larger sample studies that include measures of impact and economic benefit need to be conducted.

## DECLARATION OF INTEREST

The Authors report no conflicts of interest.

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