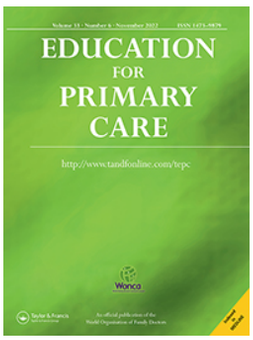

Education for Primary Care

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tepc20

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To cite this article: Bernadeta Bridgwood, Kate Woolley & Aaron Poppleton (2022): A scoping review of international virtual knowledge exchanges for healthcare professionals, Education for Primary Care, DOI: 10.1080/14739879.2022.2147025

To link to this article: https://doi.org/10.1080/14739879.2022.2147025

EDUCATION FOR PRIMARY CARE
https://doi.org/10.1080/14739879.2022.2147025

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A scoping review of international virtual knowledge exchanges for healthcare professionals

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ABSTRACT

International knowledge exchanges within healthcare have historically been a popular method to provide exposure to practice in other national and international healthcare settings. As the COVID-19 pandemic forced many countries into lockdowns, knowledge exchanges in healthcare were forced into a period of suspension. This provided an opportunity to consider alternative methods of delivery. This scoping review explores virtual knowledge exchanges in healthcare professional education, including their format and related outcomes. Thirty-four virtual knowledge exchanges were identified. These demonstrated viability and subjective participant satisfaction. Virtual methods removed barriers of time, distance and finance associated with traditional exchanges, while still facilitating engagement with other international healthcare colleagues. However these exchanges were heterogeneous in their aims, structure and theoretical underpinnings. An understanding of educational outcomes and their measurement was not always obvious. Applying an overlay of robust pedagogical theory would strengthen and provide structure to the clearly well valued activity of international exchange.

ARTICLE HISTORY
Received 10 May 2022
Revised 30 June 2022
Accepted 9 November 2022

KEYWORDS
Virtual knowledge exchange; postgraduate education

Background

The Covid-19 pandemic had forced a period of suspension of activity across healthcare and health professional education. Here we focus on international knowledge exchanges which are a very popular method to learn about primary care within another national context within a supportive environment, with learning objectives focused towards professional and personal aims. Exchanges usually consist of a GP/trainee GP visiting another country to observe clinical practice with the aim to engage in mutual knowledge exchange. Knowledge exchange is a process in which the implicit knowledge is expressed and shared in a manner that is aimed to enhance the knowledge of exchange participants (Fiedler et al., 2021). The COVID-19 pandemic halted free movement between countries, preventing this type of experience being possible. Furthermore, face-to-face exchanges bestow considerable strains on time, service-provision and finances for both exchangee and host, particularly for exchanges from low and middle-income countries. Moreover, there is a rarity of funding including bursaries available for such activities.

As we emerge in a post-COVID-19 era, we consider whether a virtual type of knowledge exchange may be a feasible option. For the purposes of this study, a scoping review is defined as a type of heterogeneous synthesis that aimed to map the literature on this subject as it has not been previously reviewed. As a relatively new, though increasingly common approach for mapping broad topics, it was utilised to provide an opportunity to identify key concepts and sources of evidence to inform current practice in virtual exchanges. Here we examined the extent, range and nature of virtual exchange activity to establish the evidence base and direct a future framework for virtual knowledge exchanges.

Methods

Research question

This review addresses the question, 'To what extent has virtual knowledge exchange (VKE) in healthcare professional education been reported in the literature to date, including their format and outcomes?' A systematic scoping review was employed to 'synthesise and analyse a range of research to provide greater conceptual clarity' on virtual knowledge exchanges in healthcare training [1]. We undertook a step-wise review process informed by accepted scoping guidance [2–4], over five key stages: (i) identifying the research question, (ii) identifying

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/14739879.2022.2147025.

relevant studies, (iii) study selection, (iv) charting the data and (v) collating, summarising and reporting the results.

Identifying relevant studies

Search terms were identified from MeSH terms relating to three categories: 1) education, 2) healthcare roles and 3) virtual media OvidMedline, Embase, EmCare, CINAHL, ERIC, OpenGrey research databases and grey literature was searched on 4 November 2020. The date range was 2000 to present, recognising the advancement of internet technology. Results were supplemented by hand searches of publication reference lists. Search terms and strategy were collaboratively developed with a clinical librarian (CP) in line with the PRESS checklist (Peer Review of Electronic Search Strategies).

Inclusion criteria

The scoping approach allowed inclusivity, flexibility and iterative development of the review. As we aimed to identify the broad scope of studies related to this topic, we pursued a broad inclusion criteria where studies were included if they considered any type of fully or partially remote healthcare exchange or experience with the aim of improving knowledge and/or skills. The study needed to demonstrate bi-directional knowledge exchange, where users had the ability to remotely interact with a colleague from a different organisation. The reviewers engaged in regular discussion as to the acceptability of studies for inclusion. Flexibility, within the scope of the above, was applied to incorporate a wide range of studies focused on virtual exchanges. Non-English language publications and those solely using secondary data were excluded, after reference list screening for relevant primary literature.

Study selection

Identified publications were imported into EndNote X8, with automatic and manual removal of duplicates. A subset (n = 100) of titles and abstracts were screened by the study authors independently with discussion to ensure consensus in relevance to the research question, with equal allocation of remaining publications between authors. Relevant articles underwent full-text screening to ensure relevance and fulfilment of inclusion criteria. Uncertainties were discussed, with all three authors reviewing the full-text paper.

Charting data

A data extraction table was developed covering publication, virtual knowledge exchange, and critical appraisal information.The table was independently trialled on a subset of publications by each author. Subsequent team discussion informed revision to ensure completeness and accuracy. Publications were equally allocated between study authors for data extraction, with dual extraction and discussion of a subset (10%) to ensure consistency.

Collating, summarising and reporting results

Extracted data was uploaded to NVivo version 12 [5]. Descriptive data including date, geographic location, participant types, duration, and medium of exchange from each study were collated and combined to provide an overview of formats and designs identified. Extracted data were re-read, coded and analysed using thematic analysis. Thematic analysis was employed to identify the emerging themes which were reviewed and refined through discussion amongst the authors.

Results

This scoping review identified 34 articles from 24 countries across 5 continents (Figure 1). Below we present the range of exchange formats and outcomes. provides a summary table of all included studies.

What exchange formats have been reported?

Our findings indicate that VKEs have been reported in a wide variety of different formats. Aspects of the format considered included the: VKE objectives (reported in Table 1), methods of delivery (Table 2), exchange

Table 1. Virtual knowledge exchange objectives.

Community building	Creating a learning community
	Developing international (academic) collaborations
	Social interaction
Enhancing knowledge	Cross-cultural
	Health service
	Specific conditions
Enhancing skills	Communication skills
	Problem solving
	Use of technology
Understanding or providing care	Community outreach
	Care provision

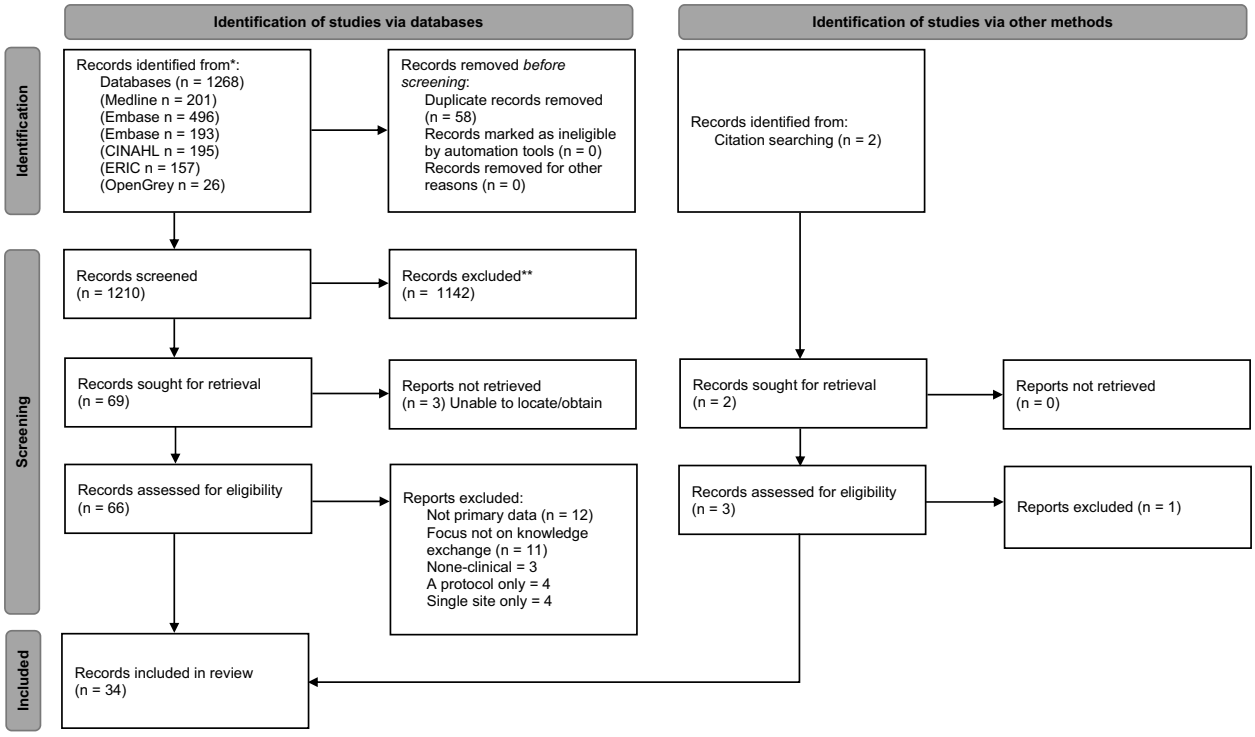

Figure 1. PRISMA diagram of search strategy [6].

Table 2. Virtual knowledge exchange delivery methods.

Exchange delivery methods	Number of exchanges using delivery method
Video conference	16
Virtual Learning Environment	7
Email Online forum Social media	4
Blog/wiki	3
Academic collaboration Webinar	2
Adobe connect Asynchronous voice communication Membership Website TV vCoP	1

learning activities (Table 3), and other logistical aspects of the exchange (Table 4).

Virtual knowledge exchange objectives

A wide range of objectives and associated activities were identified within a VKE. Objectives could broadly be grouped into: Community building, Enhancing knowledge, Enhancing skills, and understanding or providing care (Table 1).

Factors influencing objectives and their development included a number of challenges, such as a limited duration, language barriers for organisers and/or participants, not knowing or having differing participant learning needs, and a requirement to standardise the exchange objectives between different national or international institutions. Several publications described the outcomes as being designed around an ontological or theoretical underpinning, structured curricula or academic requirement for a project or assessment. One publication explicitly described a desire for the exchange to be organic i.e. participant led in its objectives and development. Several publications did not clearly state objectives (n = 13).

Exchange delivery methods

Reflections on exchange delivery raised considerations including time zone differences; language barriers; technological functionality and reliability; matching of course topics; appropriate group size and choice of learning activity to optimise participant interaction. In three studies, concerns about privacy and confidentiality were reported, and this is another important consideration in format choice.

Table 3. Virtual knowledge exchange learning activities.

Learning outcomes		Teaching strategy	Virtual exchange learning activities
Knowledge ↕ **Skills**	***Transmit / Inform***	Lecture Reading Tutorial Researching	*Assessment* *E-learning* *Self-directed learning* *Seminar workshop (streamed classroom)* *Language training* *Newsletter* *Online repository* *Personal reflection* *Write a report* *Interviews with experts* *Promotion of events (conferences/webinars)*
	Engage	Discussion Question & Answer Peer Teaching & Learning Web-based Teaching	*Cultural learning* *Group discussion (Case, Topic, Balint)* *Discussion forum* *Sharing experiences* - *Email exchange, Photo diary, voice recording, Blog)* - *Question & answer* *Social learning:* - *Webchat* - *Relationship social* - *Social media*
	Practice	Seminar Class Presentation Field Trip	*Orientation* *Presentation* *Seminar – clinical skills*
	Application	Laboratory Demonstration Games Problem solving Case Study Group work	*Academic collaborations* *Clinical care (telemedicine, supporting routine work)* *Group task* *Hybrid physical placement* *Roleplay* *Virtual simulation*

Virtual knowledge exchange learning activities

A broad range of virtual knowledge exchange activities were identified and have been mapped onto Higgs and Mccarthy's strategies to support the achievement of learning outcomes [7] (Table 3). A number of exchange activities sought to build participant knowledge through transmission of information e.g e-learning and 'streamed classroom', and participant engagement e.g. group discussion and sharing of experiences. Some exchange activities were more practice focussed or applied, including clinical skills, simulation, and telemedicine.

Exchange logistics

All other logistical and organisational aspects of the VKEs reported are summarised in Table 4. It is noted that 25 of the 34 papers focused on group and not individual exchanges.

What outcomes were reported by the exchanges?

There was no standardised exchange experience, hence we considered benefits or harms resulting from the exchange at the level of the participant, the host, the clinical service or the patient.

Studies were commonly cited as a method to improve VKE quality in future programmes. Other outcomes included the quality of experiential learning, degree of knowledge improvement, levels of social interaction, and participant satisfaction and were heterogeneously reported. Quantitative information sources used in evaluations included numerical data on participation levels, satisfaction and knowledge questionnaires, usually likert

Table 4. Exchange organisation logistics.

Method of organisation						
Self		Programme			Not specified	
2		28			4	
Individual vs Group exchange						
Individual		Group		Both	Not specified	
4		25		2	3	
Funding associated?						
Yes		No			Not specified	
7		15			12	
Learning objectives set						
Yes		No			Not specified	
21		2			11	
Exchange duration						
<24h	1-7d	1-4 weeks	1-12 months	>1 year	1 module	Not specified
2	4	2	10	3	2	11

scales or website metrics. Qualitative analysis was used to incorporate data from participant reflective reports, written communications as part of the exchange and collaborative group outputs such as blogs or presentations. A number of studies included participant focus groups or interviews in their evaluation.

Exchange benefits

Participants valued the ability to connect and collaborate with other health professionals within a mutually supportive forum. Participants identified the opportunity to discuss and share their experiences of healthcare, practice and best practice. This evoked self-reflection on individual practice, educational theory and learning about alternative methods of practice which allowed growth and development as current/future healthcare providers.

Exchange interaction promoted a community of practice and inclusivity within participants, diminishing the barrier of distance. Participating instilled the concept of representing an individual country where each member was able to equally participate. A contribution which was valued and strengthened the connection with the group and with their own sense of worth within their profession (Figure 2).

What issues were reported by the exchanges?

Negative outcomes were also reported, and those planning future VKEs should be mindful of these and take measures to avoid them. Negative outcomes had the potential to affect both the participant and the host, and also patients.

A large number of studies raised concerns around the efficacy of learning through VKE. Reasons for this ranged from time constraints, to information overload, disparate participant goals, and lack of applicability from one setting to another. Studies highlighted the fact that VKEs ought to be considered as a useful adjunct to, rather than a replacement for more formalised clinical supervision and training. Where exchanges were relied upon as a sole source of clinical advice, there was concern about the potential for detriment to patient care. Although a commonly intended outcome was to promote cultural competency, in one case this was insufficiently supported in the exchange model and participants reported ethnocentricity. In some cases participants experienced anxiety around contributing, or became fatigued. In several studies, participants did not contribute at all, which caused frustration for other exchangees (Figure 3).

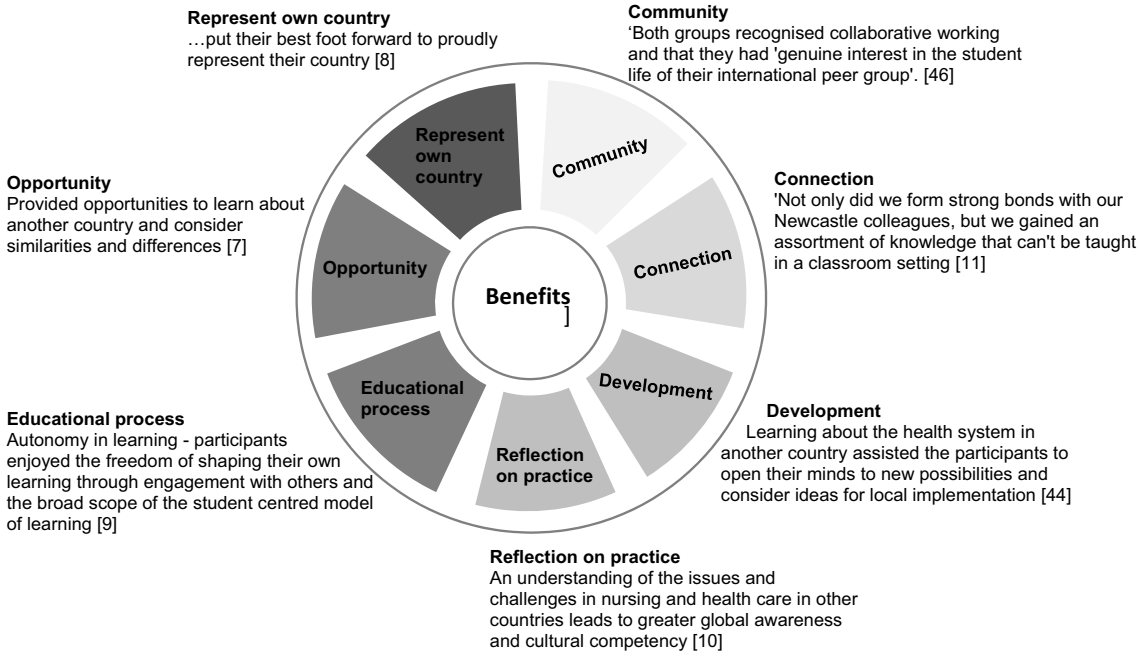

Figure 2. Summary of reported exchange benefits.

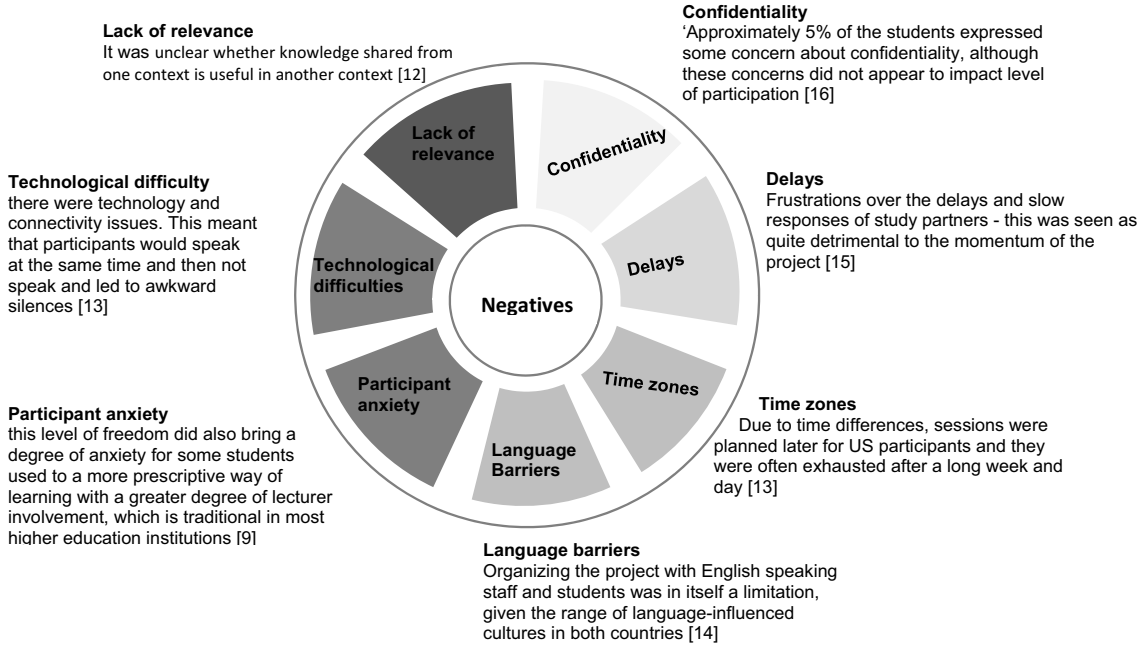

Figure 3. Summary of reported exchange issues.

Discussion

This scoping review identified and reviewed the extent to which VKEs in health professional education are reported in published literature. The number of VKEs identified, in addition to their range of aims, components, and delivery in differing national and cultural contexts demonstrates the proof of concept within healthcare. Direct comparison of VKEs highlighted areas requiring further conceptual development, in addition to considerations to improve their delivery and evaluation within healthcare education.

Practical aspects of virtual knowledge exchanges

VKEs are a viable medical education tool, irrespective of the COVID-19 pandemic and associated travel

restrictions. We identified unique strengths, opportunities and limitations of VKEs, including the ability for health professionals to connect, share and discuss their experiences of healthcare and variations in clinical (best) practice. Community or social learning was a strong component of VKEs, promoting self-reflection and personal development as a current/future healthcare provider.

O'Dowd [8] noted VKEs create an inclusive community of practice, removing barriers of distance, time and finance associated with face to face exchanges, while promoting development of 'soft skills', intercultural and digital competences. Beyond inclusion, we noted that VKEs can instil empowerment within participants, promote independent and collaborative learning skills, and inspire local health system development. Participants often felt they represented an individual country and profession. In keeping with Social Exchange Theory, sharing of valued healthcare expertise by participants often increased the group connection, personal confidence, perceived respect and professionalism within VKEs [9].

All bar one VKE took place within or between high income countries. The exception, a VKE partnership between Scotland and Malawi, identified the need for novel and organic approaches, including technology provision [10]. VKEs provide an option for empowerment and capacity building within postgraduate primary care education in low and middle income countries (LMICs). This is of particular importance given the travel and meeting restrictions experienced during the COVID-19 pandemic. Achievement using equitable and participatory approaches requires further consideration and fits with decolonising the medical curriculum.

Challenges of VKEs included: perceived lack of relevance, technological difficulties, participant anxiety, confidentiality, delayed participant response, and differences in time and language (Figure 3). We wonder whether challenges may also have existed in identifying and accommodating differing or unclear participant learning needs within an online group context. Identification of these challenges is an important first step in applying and adapting strategies in virtual team building literature [11] to achieve best practice in primary care VKEs.

The structure of VKEs ranged from organic to formal. Organic initiatives had participant-led objectives and development. The border between social and clinical interests was often blurred. Examples included social media virtual communities of practice and relational partnerships between individuals. Formal VKEs were institution-led, with an ontological underpinning, learning curricula, clear structure and roles, senior facilitation and/or academic assessment. In each instance, both parties came together with a personal objective, utilising social learning theory to support knowledge transfer and skill development.

Clarification of definitions and terminology

The included studies and associated VKEs were heterogeneous in their objectives, formats, and evaluation. Clarification of VKEs key principles and terminology would facilitate cross-discipline academic collaboration between practitioners, researchers and educationalists [12]. This would advance theory and the development of best practice recommendations. We categorised VKE objectives as: community building, enhancing knowledge, enhancing skills, and understanding or providing care (Table 1). Clear learning objectives allow identification of corresponding learning methodologies and appropriate evaluation of a VKE's outcomes. Evaluation was often unstructured, limited or subjective, focussing on enjoyment and perceived impact rather than objectively measurable benefits. Considering how VKEs promote gains in soft or attitudinal skills, often attributed to the 'hidden curriculum', may require a longitudinal approach [13]. This will be important in defining the place of VKEs within the clinical learning portfolio, particularly when compared with face to face exchanges.

VKEs have been described as typically combining robust partnerships, innovative institutional policies and innovative pedagogies [14]. We noted equivalent components in studies with undergraduate students. We noted postgraduate VKEs also included robust (relational) partnerships and use of innovative pedagogies. Institutional policies were however substituted with a mutually agreeable purpose and boundaries in some instances, emphasising social and hidden curriculum learning. Trainees and educators in general practice, a postgraduate discipline, have described global health and intercultural competency as important [15], yet report limited knowledge and confidence in these areas. GP trainees view VKEs positively and desire to participate [16]. We are not aware of any guidance or tools to support delivery or evaluation of VKEs within healthcare. Development of such a resource to improve quality, evaluation and comparability of VKEs, in addition to supporting customisation to specific healthcare disciplines, including primary care, is worthy of further consideration.

Limitations of the review

Utilising a scoping review provides a descriptive overview without critically appraising individual studies. As this was a scoping review, no there was no formal synthesis of data. Here any risk of bias is not known.

The review may have missed some relevant studies due to the database selection, time constraints and quality of available evidence. Although 34 papers were included, a substantial proportion were editorials, letters or reflections on experiences, with relatively few high quality research studies. Most VKEs considered related to nursing students rather than family doctors. The VKEs reported were often undertaken in groups, bidirectional and simultaneous and were sometimes not time limited. Care should therefore be taken when considering findings in relation to other types of exchange. Reports often focused on an exchange objective rather than the exposure experienced or outcomes identified. Analyses were often subjective without any consideration to measurable comparative outcomes/objective assessment.

Conclusions/implications for further research/ top tips

VKEs are a viable and popular method to facilitate connectivity between health professionals with the aim to engage in mutual organisational, process and cultural learning. High quality exchanges have relationships, organisational support, structure/theory to be able to evaluate and benchmark against. There is a need for a framework to enable maximal benefit of a VKEs including robust pedagogies and appropriate objective outcome measures. Future research aims to explore individual VKEs and LMICs applicability and develop a framework specifically for use in health practice.

Acknowledgments

Mrs Coral Pepper (CP) coral.pepper@uhl-tr.nhs.uk (clinical librarian)

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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