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The role of information technology in improving human resource shortage for health: The case of the Pacific Open Learning Health Network.

The role Information Technology in improving Human resource shortage for Health: The case of the Pacific Open Learning Health Network.

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Abstract

Purpose: The purpose of this paper is to discuss innovative ways of addressing Human Resources for Health (HRH) shortage in the Pacific, supported by a review of the literature and the Pacific Open Learning Health Net (POLHN), a program created in response to the Pacific's HRH concern.

Design/Methodology/Approach: A systematic search was conducted of English literature between 1990 and 2012. A number of key words, singly and/or in combination, were used to search for articles on ProQuest and PubMed. Original articles were identified and reference lists scrutinised to obtain additional literature. Due to the paucity of information, only narrative review was conducted and themes emerging from the literature identified and critically reviewed.

Findings: There is a worldwide HRH shortage and a need to improve the skills of the health workforce to respond to changing population health needs. Continuing education (CE) through use of information technology (IT) is a means to strengthen HRH. POLHN is one example of an initiative to improve health worker skills and motivation.

Technological change is increasingly common place in society. To make sense of these changes, practitioners can look for common themes in successful technological innovations of interactivity; information access, creation, or sharing; communication; and simplicity.

To ensure effective governance CE and IT are used to strengthen HRH, there is a need to incorporate qualitative as well as quantitative measures, to prioritise the creation of quality, relevant, and appropriate resources, and to facilitate access and active participation by health workers.

Originality/values: The paper highlights the complexity of HRH shortage as a global problem, which demands multiple initiatives to respond to the shortage in the pursuit of skilled, equitable and just delivery of health services and distribution of health service providers. One initiative that has worked elsewhere is professional development of health professionals through the provision of continuing education (CE) using information technology (IT). Online learning offers a pathway to address HRH shortage

and overcomes challenges posed by distance, limited infrastructure, and in small remote communities. POLHN contributes to improved skills and knowledge among health professionals who can, as a result, deliver better health services in a region as geographically dispersed and isolated as the Pacific.
Key words: human resources, public health, health services professional education, continuing education, information technology, Pacific, open learning, network,

Introduction

The HRH shortage is a significant global concern posing a serious challenge to equitable healthcare delivery. It is well acknowledged that HRH quality essentially impacts on health system performance (Kanchanachitra *et al.*, 2011). Appropriate structures for professional and personal support and for quality management processes for members of the health workforce are essential in any health system. It has been established that continuing education, interactive training and professional development geared towards priority health conditions and needs of the local population improves health professionals' competency and motivation (Hongoro and Normand, 2006; Henderson and Tulloch, 2008; World Health Organization [WHO] 2006; Mathauer and Imhoff, 2006). Implementing lifelong learning strategies is necessary and can be achieved at low cost, and has been identified to have a moderate effect on health professionals' performance (WHO, 2006). Continuing education and training are understood to be important drivers that enable workers to cope with job requirements and take on more challenging tasks thereby contributing to job satisfaction and improved healthcare delivery (Willis-Shattuck *et al.*, 2008; Mathauer and Imhoff, 2006). Furthermore, continuing education facilitates better workforce responsiveness towards the specific health needs of rural and remote populations and other disadvantaged groups (WHO, 2006).

Global evidence informs the current changing population health trends characterised by rising burden of non-communicable diseases including diabetes, heart disease, malignancies and hypertension (Walley and Wright, 2010; Phillips and Verhasselt, 1994).

Additionally, in a number of countries, communicable diseases such as dengue fever, Lymphatic Filariasis, food-borne diseases, HIV and tuberculosis are also prevalent (WHO, 2011, Lanham, and Mwanri, 2013), indicating the need for more specialised HRH to address these disease trends and challenges. The Pacific workforce must be prepared to manage these challenges competently.

POLHN and the Pacific

POLHN is an initiative created in response to the human resources for health shortage and skills misalignment in the Pacific. The POLHN project was established in 2003 through partnership between Pacific Ministries of Health and the World Health Organization, in response to a recognized lack of access to CE for health professionals across the region. Since its inception, POLHN has grown into a network of thirty-eight computer labs, in hospitals and health centres across twelve Pacific island countries. Through a central website, POLHN offers access to self-paced online/desktop courses, as well as sponsorship for health professionals to participate in online postgraduate and diploma programs (www.polhn.org).

By providing access to online courses, POLHN encourages health professionals to use computers, thereby contributing to computer literacy in the region. This mode of delivery also minimizes the time health professionals spend away from the communities they serve, in comparison to attending international conferences or training. Additionally, the close proximity of learning environment and workplace provides a greater chance of participants transferring the knowledge they acquire to their practical work settings. Finally, for low resourced and remote locations, online materials can be easily updated to ensure access to up to date information. Such materials are also environmentally responsible, limiting printing and transport costs (*POLHN Coordinators Manual*, 2012).
Unpublished report by Hezel and colleagues indicate that POLHN project has been assessed twice by external evaluators but a thorough consideration of the project cost per student and project impact has not yet taken place. This should be a priority for the project in order to determine POLHN's effectiveness and sustainability. Particularly given cost is a key concern in relation to initiatives that use information technology in

low-income countries (Wootton and Bonnardot, 2010). Additionally, the absence of data on impact and cost-effectiveness should be weighed in relation to any consideration of the project's activities.

POLHN aims to strengthen HRH in the Pacific and, accordingly, improve health services, by providing local health professionals with access to continuing education (CE) and information technology (IT) through online and hybrid learning. This paper reviews relevant literature and analyses POLHN's activities within the context of relevant regional development in the Pacific.

Methods

A systematic search of literature in English was conducted using ProQuest and the National Library of Medicine's (PubMed) databases between 1990 and 2012. Keywords used included: Human resources for health (HRH): human resource [*], health, public health, health professional [*], brain drain, health care worker [*], AND Continuing education (CE): continuing education, continuing medical education, study, professional development, accreditation, registration, OR Information technology (IT): technology, information technolog [*]. computer [*], telemedicine, telehealth, online learning, e-learning, digital divide, internet, and satellite. All titles and/or abstracts were screened to identify original publications. The search was extended by scrutinizing the references of selected articles and only articles for which the full text and abstract was available were considered. Due to the paucity of information, only studies relevant to the three search areas including (i) Human Resources for Health (HRH), (ii) Information technology (IT), and (iii) Continue Education (CE) were included. This search was complemented by a manual search of POLHN's archives.

Findings

The summary of two areas identified from literature and POLHN's archives is discussed below under two main themes: (i) innovation including technology and its relevance in health professionals' continuing education and practice, and (ii) governance of continuing education in relation to human resources and IT, including management and coordination concerns related to quality assurance, participation and control, and access to resources.

Innovation: Incorporating new technologies

The potential role of IT in strengthening HRH is significant. The contemporary information age is characterised by rapid technological developments that routinely affect social change. Research into the potential applications of innovative technologies has advocated their use in streamlining processes, enhancing communications, education and health promotion. However, as computer literacy, IT awareness and comfort levels vary, particularly among health professionals in the Pacific, some of the potential uses of innovative technologies may be beyond the current capacity of users. A further consideration is the potential cost of implementing innovative technologies effectively, particularly if adequate explanation, user training and testing must accompany implementation. While innovative new technologies may stimulate discussion and progressive ideas, practical considerations in relation to planning, implementation, cost, effective monitoring, and evaluation are necessary to address concerns of viability and sustainability.

Social Media

An example of recent innovative IT development is social media. Social media in this paper refers to websites that support the creation and sharing of user-generated content (Sani *et al.*, 2011). User-generated content refers to information created by people who do not typically fit within the term 'professional'. In the twentieth century, information was packaged by professionals and delivered to users. In the twenty-first century this transmission has become increasingly conversational, user driven, and participatory (George, 2011). The over-arching framework for online collaboration and information sharing is known as Web 2.0. Web 2.0 refers to the evolution of the Internet as a platform

that revolves around the creation of networks which get bigger and better as more people use them (Musser and O'Reilly, 2006).

Studies focusing on the role of social media in public health have looked at contemporary examples of social media, such as YouTube, Facebook, Twitter, and mobile phone applications (Jaffar, 2012; Hyden and Cohall, 2011; Camporesi, 2011). There has been an explosive growth in the use of the Internet as a social networking tool. Several studies argue that the information sharing and conversation encouraged by these websites can be used to strengthen health professional-patient communication, communication between health professionals, access to health information by professionals and patients, and the CE of professionals and patients (Sani *et al.*, 2011). To date it appears that these resources are underutilised by health organisations but could prove useful and effective if regulated and monitored.

Several Ministries of Health across the Pacific, responding in similar ways to organizations internationally have restricted employee access to social media websites due to productivity concerns and apprehensions about information sharing. Some organisations however, including the Ministry of Health in Fiji have started using social media to raise awareness on mental health issues. Similarly POLHN has been engaging with social media since 2009. The project started using Facebook to promote courses and share health information and Youtube as part of its advocacy and marketing (*POLHN facebook; POLHN Interview (Luganville)*). The project plans to implement a dedicated social media strategy to increase student enrolments, maintain student engagement, and facilitate donor and partner interest. Coker (2011) argues that granting freedom to browse provides employees with an opportunity to refresh and revitalise their thoughts, and the feeling that they have a certain amount of freedom or independence in the workplace. Internationally, several universities and organizations have successfully integrated social media, in marketing and communications (Murphy, 2012) and increasingly students are using University social media pages as a community forum (Macquarie University, 2012).

Social media is a recent innovation that has attracted much discussion. With increasing speed, technologies change, evolve, become normalised, and entrenched in everyday life. This indicates the importance of understanding technological advances in terms of social change, and merits a thorough consideration and subsequent embrace of IT in public health and the provision of health services.

Telehealth

In addition to social media, telehealth is another example of IT advances useful for improving HRH. Telehealth is a broad term describing the use of technologies to improve remote health services through a number of means, including telemedicine, distance education, email, and cell phone use. Telemedicine refers to the clinical use of information and technology to improve the health status of patients (Wootton and Bonnardot, 2010). Simulation involves replicating real life conditions in a learning environment to practice skills (Elliott *et al.*, 2011). Simulations can involve human interaction in the form of role-play activities or human-machine interaction, where the simulation combines elements of role-play and computer processes interacting with a learner. Possible uses of cell phones include facilitating surveillance information collection, service delivery, evidenced-based practice, management of supply systems, and transmission of health messages (Ajay and Prabhakaran, 2011; Zolfo *et al.*, 2010). In Fiji, the Vodafone foundation has recently rolled out the 'mhealth' application that provides subscribers with daily health tips and through a network of twenty volunteer doctors responding to text messages, subscribers can text their symptoms to receive brief medical advice (Vodafone foundation, 2012).

Discussion

The above examples of technological innovation share several commonalities that can guide engagement with new technologies. Firstly, interactivity appears to be a key element in recent technologies. Interactivity refers to the two-way flow of information between people, or people and things, such as machines or electronic devices. A second inference is that recent technological developments have been concerned with information access, creation, and/or sharing. Thirdly, technologies have often sought to

facilitate communication. Finally, many technologies are intended to streamline or increase the effectiveness of processes. Accordingly, we can approach new technologies by recognising recurring values of interactivity; information access, creation, and sharing; communication; and simplicity.

Within the field of technological development, health professionals have identified their preferences for control, credibility, and relevancy of content and context (Young *et al.*, 2011; Eng *et al.*, 1998). In the user driven environment of Web 2.0 control is possible and requires active engagement by users, including users voicing their concerns and wants. Similarly, in relation to relevancy, as technological developments encourage user generated content, and greater user participation, it is open to users, for example health systems, to ensure that technologies are relevant to them. In relation to credibility, innovative resources are often criticised as quickly and poorly developed and delivered, thereby alienating users (Royall and Lyon, 2011). However, the rapid and continually evolving nature of technological development means that innovative resources are likely to be constantly unfinished or improving. For example, consider that cell phones, in the past five years, have evolved from devices for verbal communication, to also facilitate visual communication, as well as information storage and retrieval in a variety of forms.

Governance of education and technology

Several studies have raised concerns in relation to the management and coordination of IT and CE (Dooley and Umble, 2004; Miller *et al.*, 2008). While frameworks for CE are established in several Pacific Island Countries and developing in others, questions as to how CE should be obtained, what requirements actually mean, and what impact CE has and should have, have been raised in academic and workplace discussions.

Quantity and quality

According to unpublished report by the Board of Health Services in Fiji, In the Pacific, as in other areas internationally, CE frameworks are based on “hour counting” measures. Arguably, such quantitative measures of CE participation capture only part of the purpose of CE, namely that training should happen regularly. Quantitative measures fail to

capture whether skills and knowledge have been built upon, and whether this development has resulted in a strengthened health system. In light of this concern, Miller et al (2008) have called for a transition to qualitative recognition of performance, competence, and knowledge development among participants.

CE should be a means of encouraging health professionals to exercise higher order skills such as critical analysis and evaluation and to participate in health system strengthening activities such as skills transfer or improved performance. A recent European conference on Universities and CE similarly noted that all measures of CE are quantitative, perhaps because such measures are easier to track (Report on E3M Policy Seminar, 2011). It was further reflected during discussion, that the use of 'measures' as a dominant organising concept, marginalises the value of qualitative indicators.

Quality is also a concern in relation to the growing number of available CE resources. POLHN for example, in 2003, piloted eight CE courses developed in-house. In 2012, through partnerships with third-party providers, the project offers access to over 1000 courses. In this development, the project has evolved in two ways. First, POLHN has transitioned from course provider to gateway, filter, or broker of online courses. Secondly, the average length of courses has been reduced from around 20 hours per course to 1-3 hours. The shorter courses suit CE requirements and enhance participant motivation as they can receive certificates more regularly. However, the possibility of users assembling several tens of certificates brings into question what value, beyond CE credits, these certificates and courses hold. Marinopoulos et al (2007) have suggested that further research is needed to determine what CE techniques and media are most effective in improving clinical outcomes. They suggest that while in general CE improves the skills, knowledge, behaviours, attitudes, and clinical outcomes of health professionals, researchers have not calculated with specificity how much CE impacts these outcomes.

The growing number of online resources, and a frequent lack of quality assurance and meaningful accreditation, mean that governance is a priority area in online and distance

education programs (Sharma *et al.*, 2011). The corporatisation and commercialisation of many CE resources raises a further concern of bias in learning materials (Pype *et al.*, 2011). Where manufacturers of radiology equipment develop radiology courses and toothpaste companies develop dental courses, CE resources appear to serve dual purposes of marketing and education. Balanced with concerns of bias however, is the possibility that such companies would not risk their reputations by developing unreliable or poor quality resources, and particularly in relation to specialised equipment, as with new technologies, better education may benefit both the company and the client.

Participation and access

Participation and control in relation to CE involves ensuring resources are relevant and appropriate. Participation is a key feature in contemporary public health discourse and involves community consultation and involvement in project development. In terms of participation, a Geneva University project in Africa and parts of South America, the Réseau Afrique Francophone de Télémédecine (RAFT) organization encourages local health professionals in Africa to facilitate short online courses for their peers (Geissbuhler personal communication (2011)). This system ensures course materials are culturally and contextually relevant, while opportunities for interaction with the facilitator through webcasts and email provide some control over the relevance of content. Additionally, the RAFT's approach builds local expertise, as well as computer literacy, and enhances health professional participation and engagement with their health system.

In relation to access to resources, projects such as RAFT and POLHN actively distribute and seek to expand access to resources. Access is another key concept in public health, referring to deeper social processes that influence whether an outcome can occur. For example, while people in the Pacific may have physical access to computers, access also involves being computer literate, an uninterruptible power supply, a safe and secure environment, and supportive relationships across ethnicities, genders, and socio-economic classes (Eng *et al.*, 1998). While precise data on computer ownership is unavailable, anecdotal data suggests many health professionals in the Pacific are limited

to accessing computers at work. Facilitating access involves raising awareness of the availability of resources, educating users in how to use new technologies, and maintaining, updating, and evaluating the effectiveness of resources and how they are delivered (Bagayoko *et al.*, 2011).

One way of increasing access by health professionals, to education and technology, at the structural level is to develop partnerships and collaborate across sectors (Luke *et al.*, 2009). The interrelated areas of IT, CE, and HRH development necessarily involve the development of partnerships and intersectoral collaboration between health, education, and communication professionals (Dentzer, 2008). Malling et al (2010) have noted the role of managerial attitudes toward training and lifelong learning in influencing the educational climate of workplaces, and that often tensions between educational consultants and heads of clinical departments lead to a poor educational climate in health workplaces. This is clear in the Pacific, where notions of lifelong learning, and the idea that we should participate in learning regularly, are relatively recent.

Given that participation in CE is a requirement for health professionals to have their licences renewed and be able to practice, HRH and CE should develop an "integrated vision" to create inclusive work environments (Bierema and Eraut, 2004). Linking education to professional recognition, and encouraging staff at all levels to develop their skills, would likely lead to a more dynamic and stronger workforce. For example, group-training activities can promote teamwork and improve communication, which in turn leads to a healthier work environment. Additionally, a variety of tasks and opportunities for personal and professional growth and independent thinking, may lead to greater job satisfaction.

Discussion

Accordingly, while CE resources and opportunities are increasing, greater attention is needed to ensure resources are founded on quality research, and are relevant and appropriate to the health professionals using them. Additionally, greater diversification of the methods by which people can obtain CE should be explored continually in line with

technological innovations. As health systems move towards people-centred practice, it is important to have an understanding of technologies that are increasingly relevant and utilised by people in their daily lives. Coupled with diversification and quality assurance, CE legislative and policy frameworks should move from using quantitative measures of participation in CE, to incorporate qualitative indicators such as improved practice, skills transfer and teaching, and contributing to research. Effective integration of CE and human resource development strategies would facilitate meaningful up-skilling of staff and provide greater motivation for employees to value lifelong learning.

The Pacific context in terms of information technology, continuing education, and human resources for health

In order to understand the challenges faced in strengthening HRH in the Pacific, as well as the potential roles of CE and IT, it is necessary to have some understanding of the Pacific context generally. The Pacific is a geographically remote region, isolated from telecommunication hubs and receiving less coverage from satellite footprints than other regions. Many Pacific countries are made up of hundreds of small islands, inhabited by small populations with limited transport facilities and infrastructure. Fiji, for example, comprises a population of 854 000 dispersed across over 300 islands, while Tuvalu, the United Nations' smallest member, comprises 11 149 people spread across 9 islands (WHO, 2012). Low population density and limited infrastructure mean the Pacific has limited capacity to negotiate large-scale services and licensing, and inadequate technical support services. The emerging impacts of these barriers are low computer literacy levels of individuals coupled with slower upgrading of computer equipment and Internet connections that widen the global digital divide.

In relation to HRH key challenges for the Pacific include low-income, small island countries with high mobility and active recruitment of trained health professionals by high-income countries. HRH production capacity is also limited and the geographic distribution of health workers is unequal. Finally there is a need to enhance the quality of health professions education programs, and to build evidence to inform policy (Nodora,

2013).

In terms of CE, policy frameworks in the Pacific vary. In the Northern Pacific, clinical health professionals are aware of the CE requirements they must meet in order to have their licences renewed. In South Pacific countries such as Fiji, the health sector is planning how to implement legislated CE requirements (*Medical and Dental Practitioner Decree 2010* (Fiji)), where in the Solomon Islands and Vanuatu no legislative requirements presently exist for CE. Across the Pacific, CE frameworks replicate systems in other regions, based on quantitative "hour counting" (Miller *et al.*, 2008). Such systems require health professionals to prove on an annual or biannual basis that they have participated in a certain number of hours of training activities in order to have their practising licences renewed. Generally, professional councils have statutory power to determine the number of hours required and what training activities will be approved (*Medical and Dental Practitioner Decree 2010* (Fiji) s 6(2)(i)). In Palau for example, this responsibility falls with the Health Professions Admissions Board. The Board's current requirements for licence renewal are 30 hours every year for allied health workers (including nurses), and 50 hours per year for physicians (Chen *et al.*, 2007).

Due to the pressures of current and anticipated CE requirements, some hospitals have started regular continuing medical education (CME) sessions. Also, in the Solomon Islands, nurses at the National Referral Hospital gather on a weekly basis to listen to presentations on key health issues. In Palau, the Ministry of Health encourages staff who have participated in overseas conferences or training to share the knowledge they have gained by conducting CME presentations for their peers. In each of these examples, dedication by key clinical and human resources staff is integral to ensuring presentations take place.

Studies suggest CE programs that promote international placements and partnerships contribute to the 'brain drain' from low-income countries in that participants either seek permanent emigration in their host country or are unable to transfer the skills they have gained in well-resourced environments to a low resource context (Mitton *et al.*, 2011).

Such placements have also been criticised as providing training that is less culturally relevant than if a health professional studies within the community where they practise (Abdul Rahim and Mwanri, 2012; Yamout *et al*, 2011). Encouraging information sharing via CME is one way to increase the effectiveness of overseas programs. Similarly to POLHN, the cost effectiveness of such initiatives needs to be evaluated. In terms of online CE, POLHN is the leading provider in the Pacific, recording over 1200 admissions to short online courses, and 250 diploma and postgraduate sponsorship admissions in 2012.

The 'brain drain' of health professionals from the Asia and Pacific regions is anecdotally accepted as a major issue in HRH. However, data is lacking to determine the extent and impact of migration on the health workforce. Another growing and anticipated problem is mandatory retirement ages combined with inadequate training facilities and insufficient new recruits to replace retiring staff (Abdul Rahim and Mwanri, 2012; Pak and Tukuitonga, 2006).

Studies have suggested health professionals migrate for reasons, which are consistent internationally, and that they tend to migrate from low to high-income countries because of complementary 'push' and 'pull' factors (Pak and Tukuitonga, 2006). Push factors in low-income countries, including poor working conditions, inadequate infrastructure, and low salaries combine with the pull of active recruitment and migration assistance from high-income countries. Pak and Tukuitonga note however, that in the Pacific such migration is generally accompanied by high remittances, which are substantial in Pacific island economies, and sometimes exceed both direct foreign investment and donor assistance (Pak and Tukuitonga, 2006).

Conclusion

Continuing education is a key aspect in overcoming the HRH shortage. As the gateway to continuing education in the Pacific, POLHN contributes to improved skills and knowledge among health professionals who can, as a result, deliver better health services. In a region as geographically dispersed and isolated as the Pacific, innovations in

information technology offer a means of overcoming challenges posed by distance, limited infrastructure, and small remote communities. Innovative technologies can be useful in streamlining processes, enhancing communication, education, and health promotion. Recent technologies, such as social media, and telehealth tools, such as simulations and cell phones, share common elements of interactivity; information access, creation, and sharing; communication; and simplicity. As these appear to be recurring values in new technologies, health professionals and policy makers can approach future technologies by looking for these values in order to better understand how technologies might be relevant and useful in practice.

A primary concern in relation to the use of new technologies and the effectiveness of initiatives such as POLHN is the cost involved in their implementation relative to their impact. This is a concern that will need to be addressed in relation to adopting innovative technologies in future. In order to use new technologies in the Pacific, their implementation will need to be accompanied by ongoing training in computer literacy and IT awareness. Accordingly, while innovative new technologies may stimulate discussion and progressive ideas, practical considerations in relation to planning, implementation, cost, and effective monitoring and evaluation are necessary to address concerns of viability and sustainability.

Similarly in relation to CE, the growing number of available resources prompts concerns about quality, accreditation, and impact on clinical or public health practice. Presently, CE frameworks are based on quantitative measures that make it difficult to assess the impact of CE activities. By transitioning to include qualitative indicators of whether CE involves improved practice, skills transfer and teaching, or contributing to research, we will be able to ensure CE is more meaningful, and will encourage the creation of more meaningful and relevant CE activities. A further way to ensure CE is relevant and useful to HRH will be to encourage integration with HR development, to facilitate meaningful up-skilling of staff and provide greater motivation for employees to value lifelong learning.

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