Rural and Remote Health
MEDLINE listed
Impact factor 0.878
The International Electronic Journal of Rural and Remote Health Research, Education, Practice and Policy
ISSN 1445-6354

REVIEW ARTICLE

Successes, challenges and needs regarding rural health medical education in continental Central America: a literature review and narrative synthesis

MC Colon-Gonzalez[1], F El Rayess[2], S Guevara[2], G Anandarajah[2]

[1]*University of Texas, Health Science Center, San Antonio, McAllen, TX, USA*

[2]*Warren Alpert School of Medicine, Brown University, MHRI, Department of Family Medcine, Pawtucket, RI, USA*

Submitted: *8 November 2014;* ***Revised:*** *7 June 2015;* ***Accepted:*** *20 July 2015;* ***Published:*** *25 September 2015*

Colon-Gonzalez MC, El Rayess F, Guevara S, Anandarajah G

Successes, challenges and needs regarding rural health medical education in continental Central America: a literature review and narrative synthesis
Rural and Remote Health **15: 3361. (Online) 2015**

Available: http://www.rrh.org.au

ABSTRACT

Introduction: Central American countries, like many others, face a shortage of rural health physicians. Most medical schools in this region are located in urban areas and focus on tertiary care training rather than on community health or primary care, which are better suited for rural practice. However, many countries require young physicians to do community service in rural communities to address healthcare provider shortages. This study aimed to: (a) synthesize what is known about the current state of medical education preparing physicians for rural practice in this region, and (b) identify common needs, challenges and opportunities for improving medical education in this area.

Methods: A comprehensive literature review was conducted between December 2013 and May 2014. The stepwise, reproducible search process included English and Spanish language resources from both data-based web search engines (PubMed, Web of Science/Web of Knowledge, ERIC and Google Scholar) and the grey literature. Search criteria included MeSH terms: 'medical education', 'rural health', 'primary care', 'community medicine', 'social service', in conjunction with 'Central America', 'Latin America', 'Mexico', 'Guatemala', 'Belize', 'El Salvador', 'Nicaragua', 'Honduras', 'Costa Rica' and 'Panama'. Articles were included in the review if they (1) were published after 1984; (2) focused on medical education for rural health, primary care, community health; and (3) involved the countries of interest. A narrative synthesis of the content of resources meeting inclusion criteria was done using qualitative research methods to identify common themes pertaining to the study goals.

Rural-and-Remote-Health
The International Electronic Journal of Rural and Remote Health Research, Education Practice and Policy

Results: The search revealed 20 resources that met inclusion criteria. Only four of the 20 were research articles; therefore, information about this subject was primarily derived from expert opinion. Thematic analysis revealed the historical existence of several innovative programs that directly address rural medicine training needs, suggesting that expertise is present in this region. However, numerous challenges limit sustainability or expansion of successful programs. Common challenges include: (a) physicians' exposure to rural medicine primarily takes place during social service commitment time, rather than during formal medical training; (b) innovative educational programs are often not sustainable due to financial and leadership challenges; (c) the majority of physician manpower is in urban areas, resulting in few rural physician role models and teachers; and (d) there is insufficient collaboration to establish clinical and educational systems to meet rural health needs. Recurring suggestions for curricular changes include: (a) making primary care training a core component of medical school education; and (b) expanding medical school curricula in cross-cultural communication and social determinants of disease. Suggestions for health system changes include: (a) improving living and working conditions for rural physicians; and (b) establishing partnerships between educational, governmental and non-governmental organizations and rural community leadership, to promote rural health training and systems.

Conclusions: Expertise in rural medicine and training exists in continental Central America. However, there are numerous challenges to improving medical education to meet the needs of rural communities. Overcoming these challenges will require creative solutions, new partnerships, and evaluation and dissemination of successful educational programs. There is a great need for further research on this topic.

Key words: Central America, primary care social service in medicine, rural community medicine, rural medical education.

Introduction

More than one billion people in the world lack access to basic health care[1]. This lack of health care is more pronounced in rural communities and creates a gap between urban and rural indicators of health[1-3]. According to WHO, an insufficient number of adequately trained health workers is an obstacle to achieving Millennium Development Goals (2015)[4]; therefore, the focus of the United Nations Sustainable Developmental Goals is the development of human resources[5]. Some of the factors contributing to the reduced number of rural healthcare professionals are demanding working conditions, substandard medical equipment and facilities, inadequate financial remuneration, and inadequate opportunities for professional growth[6].

Additionally, studies reveal that in some countries, valuable resources are expended by training a mix of specialists that does not adequately respond to community needs, especially in rural areas[7]. Evidence suggests that primary care physicians are uniquely trained to respond to the healthcare needs of underserved populations who live in rural and remote areas worldwide[8-10]. However, many countries lack the robust primary care infrastructure and workforce needed to meet the health needs of their rural population[11]. The response of many middle- and low-income countries to their rural workforce shortage has been to require their medical trainees to complete a period of social service in rural areas of the country, either in their last year of medical school or upon graduation[6]. However, since many do not stay after completing service, this provides only a temporary solution[12].

The continental Central American region of the world lies between the isthmuses of Tehuantepec (in Mexico) and Panama[13,14]. Five of the eight countries in this region fall below the density of 25 physicians per 10 000 habitants recommended by WHO[15,16] with a great disparity in the distribution between urban and rural areas[17]. Central America has 95 medical schools, a population of 145 million, and 229 407 physicians, with a physician density of 15.8 per 10 000 inhabitants[18]. It has been previously suggested that

medical care in this geographical area must combine primary care and community interventions, using a team approach, in order to provide optimal care[19]. A major barrier in many of the countries in continental Central America is that most medical schools train their students to become specialists rather than primary care practitioners[20,21]. To respond to community needs, a few of the countries in this region have created teams composed of a variety of health professionals[22]. However, in order to improve the health of rural populations, interventions for prevention, and management of acute and chronic diseases are still needed[23]. Observations made by medical anthropologist Moira Wood document that the reality in most rural areas is that this healthcare team often lacks a physician[24].

The medical literature[4,25,26] suggests educational strategies to retain health professionals in rural areas, including: (a) enrolling students from rural backgrounds and with experience working with underserved communities; (b) locating medical schools and residencies in rural areas, decentralized from urban academic medical centers; (c) training future physicians in rural settings, with longitudinal rural preceptors; (d) modifying the medical curriculum to cover topics and skills pertinent to rural settings; and (e) creating medical literature specific to rural healthcare providers. Others have suggested that medical education should include early clinical exposure to rural areas[27], as some students decide early in their careers the location of future practice[12]. These suggestions for enhancing the medical curriculum provide students with the skills and knowledge to practice in rural areas, thus enhancing their confidence to practice in rural communities in the future[4,28]. Specific skills needed for rural practice mentioned in the literature include healthcare management, leadership, cross-cultural communication, procedural skills and emergency care[12,29] .

Currently, there are no studies that specifically address the question: How does the medical education system in continental Central America prepare physicians for the practice of rural medicine? The goal of this study was to (a) understand the current state of medical education preparing physicians for rural practice in this region of the world and (b) identify common needs, challenges and opportunities for improvements in rural health training in continental Central America.

Methods

A rigorous narrative literature review was conducted[30]. This involved a comprehensive literature search[31], using a reproducible stepwise process, to identify all relevant literature. A narrative synthesis, using qualitative methods was then done to extract relevant information and themes from the identified articles.

Search methods

Multiple methods were used to search for articles, reports or conference proceedings that addressed the study objectives. First, PubMed, Web of Science/Web of Knowledge, ERIC and Google Scholar databases were searched from December 2013 to May 2014. Relevant English and Spanish language articles were identified using the medical subject heading (MeSH) terms 'medical education', 'rural health', 'primary care', 'community medicine', and 'social service' in conjunction with any of the following: 'Central America', 'Latin America', 'Mexico', 'Guatemala', 'Belize', 'El Salvador', 'Nicaragua', 'Costa Rica', 'Honduras' and 'Panama'. In order for the search to be as comprehensive as possible, the term 'social service' was included in the literature search because in many countries in this region of the world training regarding rural health is incorporated into required social service commitment time. This search yielded 36 articles. The titles and abstracts of these 36 articles were reviewed by one member of the research team. Literature met inclusion criteria if it was: (1) published after 1984; (2) concerned medical education for primary care, community health or rural health; and (3) pertained to one or more of the eight countries in continental Central America being studied. Sixteen journal articles were identified by this method.

Second, the search was expanded to include grey literature[32] found through internet search engines (Google and Pan American Health Organization Regional Health Observatory resource page). The same MeSH terms used for the database search were used as key words to search the grey literature. Examples included non-governmental organizational reports, conference proceedings, and newspaper articles, which were directly related to the research question and would provide more in-depth knowledge of the topic. It has been suggested that grey literature can be the primary source of evidence for some topics and should be included in literature reviews[31]. Grey literature searching revealed five additional resources.

A third method to identify relevant sources was a careful review of the reference list from the sources identified through the first two methods. These sources were reviewed by one member of the research team and included or excluded on the basis of the same criteria as above. This search produced six additional references.

All sources identified through this stepwise process were independently reviewed in more detail for relevance to the study question by three members of the research team. Seven articles were excluded after this review since they did not meet relevance criteria: (1) medical education for practice in rural settings; and/or (2) medical education for primary care and/or community medicine.

Analysis methods

The 20 remaining articles were categorized into source type. Only four sources were research studies (three retrospective studies and one focus group study). Given the paucity of research studies on this subject, all 20 relevant resources were included in the analysis. A narrative analysis methodology, using qualitative research techniques to extract common content and themes, was chosen as the most appropriate analysis approach for this study[33]. This approach has been used by others to synthesize information from a wide variety of sources, when research studies are lacking[34,35].

The specific analysis method employed was a thematic analysis using an inductive approach[36]. This entailed three members of the research team (all bilingual in Spanish and English) independently extracting meaningful content and themes from each article. The researchers then met as a group periodically to identify common themes and subthemes found in the literature sources. Rounds of meetings continued until there was agreement among all researchers regarding major themes and subthemes.

Results

General findings

Twenty articles were analysed in depth[37-56]. There is a significant paucity of research related to medical education preparing physicians for rural practice in continental Central America. Additionally, few articles described in depth or evaluated specific rural medicine educational initiatives in this geographical territory. Therefore, data were extracted primarily from expert opinion articles. Table 1 summarizes these articles and sources of data[37-56]. The 20 articles included six historical reviews[44,49-51,54,56], five descriptive reports from non-governmental organizations[37,40,45,48,55], three retrospective studies[41,46,47], two expert opinions extracted from conference proceedings[38,53], one focus group study[39], one thesis[42], one observational narrative[52] and one news report[43]. Articles ranged in publication date from 1987 to 2012.

Overview of themes and subthemes from qualitative analysis

Qualitative analysis of the content of the 20 articles revealed several themes and subthemes (Tables 2–4) related to the structure and content of medical education specific to rural health in continental Central America. Some successful educational programs were described. However, there appear to be many common challenges faced by countries in this region, prompting several authors to propose suggestions for improvements in rural medicine education for physicians and medical students.

Table 1: Summary of the systematic literature search results[37-56]

Year	Author	Source	Type of publication	Region
2012	Bhatt S (ref. 37)	*Journal of Global Health Perspective*	Descriptive report	Guatemala
2012	Borrell RM; Kauffman R (ref. 38)	Pan American Health Organization	Conference proceeding: expert opinion	Nicaragua
2012	Borrell RM (ref. 39)	Pan American Health Organization	Focus group study	Nicaragua Guatemala
2011	Borrell RM; Goude C; Kauffman R (ref. 40)	Pan American Health Organization	Organization descriptive report	Costa Rica El Salvador Honduras Mexico
2010	Martinez F (ref. 41)	*Revista Pan Americana de Salud Publica*	Retrospective study	Mexico
2009	De Gracia F (ref. 42)	American College of Physicians-Central America Chapter	Thesis	Panama
2009	Palma C (ref. 43)	*El Periódico de Guatemala*	Newspaper article	Guatemala
2008	Pinzon C (ref. 44)	*Acta Medica Colombiana*	Historical review	Latin America
2006	Pulido P, Cravioto A, Pereda A et al (ref. 45)	*Medical Teacher*	Descriptive report	Latin America
2004	López-Barcena J, González De Cossío Ortiz M, Velasco-Martínez M (ref. 46)	*Revista de la Facultad de Medicina Universidad Nacional Autónoma de Méjico*	Restrospective study	Mexico
2000	Sancho H, Mata S (ref. 47)	*Acta Medica Costarricense*	Retrospective study	Costa Rica
1996	Pulido P (ref. 48)	*Education for Health*	Descriptive report	Latin America
1993	Herrera G, Carrino G, Herrera L (ref. 49)	Josiah Macy Jr Foundation	Confrence proceeding: historical review	Costa Rica Guatemala Mexico Panama Nicaragua
1992	Gavagan T, Buitrago MC (ref. 50)	*Family Medicine*	Historical review	Nicaragua
1990	Frenk-Mora J, Cecilia-Robledo V, Gustavo-Lopez N et al (ref. 51)	*Salud Publica de Mexico*	Historical review	Mexico
1990	Westreich L (ref. 52)	*Minnesota Medicine*	Observational narrative	Guatemala
1989	Pulido P (ref. 53)	*Academic Medicine*	Conference proceeding: expert opinion	Latin America
1989	Slater R (ref. 54)	*American Journal of Public Health*	Historical review	Nicaragua
1988	Haze F (ref. 55)	*Journal of Rural Health*	Descriptive report	Mexico
1987	Braveman P, Mora F (ref. 56)	*American Journal of Public Health*	Historical review	Costa Rica Nicaragua Mexico

Table 2: Successes in rural medicine education in continental Central America

Themes	Subthemes
Successful medical school and postgraduate curricula have existed.	• Regional expertise exists. • Successful partnerships have been built in the past. • Many innovative programs have ended due to various challenges. • Most programs are not described or evaluated in sufficient detail to be easily disseminated.
Social service may increase manpower in rural areas and physician awareness of rural health needs.	• Evidence for increased physician awareness is limited, but promising as an opportunity for enhanced learning. • It is unclear how much physician behavior is changed as a result of time spent completing social service obligation.

Table 3: Challenges related to medical education for rural practice in continental Central America

Themes	Subthemes
The majority of a physician's exposure to rural medicine takes place during the social service commitment time and not as part of formal medical training.	• During social service commitment time, young physicians do not have access to mentors or a continued relationship with an educational institution. • Usually the focus has been on service and productivity rather than on education. • Compared to postgraduate education, social service commitment is not regulated or accredited as an academic program. • Low salaries, lack of training in population health and limited to no training in teaching have resulted in few experienced physicians who can serve as community preceptors in rural areas.
Financial and leadership sustainability challenges prevent the continuation of successful innovative educational interventions that promote community medicine.	• Leadership sustainability – a consequence of poor succession planning has been the disappearance of innovative programs due to lack of new leadership to continue programs. • Financial sustainability – partnerships and programs originally created through grant funding are at high risk of ending unless sustainable funding mechanisms are identified.
Uneven distribution of physicians results in few providers in rural areas and too many in urban areas.	• The social service commitment is a temporary answer to meet the health needs of rural communities. • Efforts need to be made to retain physicians in rural practice once they complete their rural service. Suggestions include improved living conditions and improved resources to provide medical care.
A health system based on primary care in rural areas has been identified as important. However, there is insufficient support to establish both clinical and educational systems to meet rural health needs.	• Coordination between universities and ministries of health is needed to develop programs that respond to rural community needs. • Some of the rural health posts should be transformed into 'educational centers', thus making rural medicine an academic endeavor. • Interdisciplinary teams are needed in order to provide better care in the rural areas. Medical education should prepare physicians to lead and practice as part of an interdisciplinary team.

Table 4: Core content necessary to improve rural medicine education in continental Central America

Theme	Subthemes
Primary care should be an essential component of medical education.	• Medical education at tertiary care training sites does not provide students with the knowledge and skills needed to practice in rural areas. • Students should be taught how to perform community health assessments and how to involve community members when developing solutions to community-based problems • Medical education needs to focus more on preventive medicine, rather than only on acute and chronic care.
The medical school curriculum needs to prepare students to practice in cross-cultural contexts and address socioeconomic issues effecting health.	• There is need for training in the social determinants of health. • In some rural areas, the population speaks an indigenous language that is often not spoken by the medical students or physicians providing their care. • Mismatch in the health literacy of the physician and patient creates false expectations in care. • There is a need for cultural sensitivity and knowledge of the indigenous folklore and tradition.

Successful rural medicine educational programs (Table 2)

Theme 1. Successful medical school and postgraduate curricula exist: Historically, there have been several successful educational programs in this region. One example is the pilot program Programa de Servicio a la Comunidad in rural Guatemala[49]. This unique program was an innovative collaboration between Universidad San Carlos, the Ministry of Public Health and international organizations. Students and faculty worked in multidisciplinary teams, in a learning and working program, for 6–12 months. Students

collaborated with community leaders to perform research and develop health programs, were supervised individually once a week, and had both formal and informal teaching sessions. Another example is Programa San Ramon in partnership with Universidad Central de America in Costa Rica[56], which provided both rural patient care and medical education. This program exposed students to rural hospital and community-based care; thus training students in the social determinants of health in both environments.

There have also been successful postgraduate training programs. One example is the 'medicina integral' postgraduate training program during the mid-1980s in Nicaragua[54]. This three-year program prepared graduates for primary care and was created because of the government's concern that the country had too many specialists concentrated in urban areas. Another example is the postgraduate program in Family Medicine at Universidad Nacional Autonoma de Mejico[55]. In this program, trainees spent four months in agricultural villages in Tlaxcala working in clinical care and community projects, with weekly supervision from the academic institution and local preceptors.

These examples demonstrate both the benefits of rural medicine education and the presence of local expertise in rural medical education in continental Central America. Unfortunately, some of these programs no longer exist due to numerous challenges, including sustainability of funding and leadership. Additionally, most successful curricula have not been described or evaluated in sufficient detail to be readily disseminated.

Theme 2. Social service may increase manpower in rural areas and physician awareness of rural health needs: A retrospective study from Mexico[46] revealed that the collaboration between the Ministry of Health and the Ministry of Education has been successful at assigning young physicians to serve in rural areas during their social service commitment time. In some countries, such as Mexico[49] and Costa Rica[49], there is some evidence suggesting that social service time may result in indirect education and sensitization of the physicians to the impact of the psychosocial factors on health and disease[49]. Physicians completing their rural social service commitment are exposed to the same psychosocial and ecological environmental conditions as their patients, helping them learn about non-biological factors that affect illness[49]. However, more robust research is needed to better understand the degree of impact of this exposure and whether this changes physician behavior.

Challenges to rural medicine education in continental Central America (Table 3)

Theme 1. The majority of physicians' exposure to rural medicine takes place during the social service commitment time and not as part of formal medical training: Medical students in continental Central America appear to have little formal training in rural medicine. In most of these countries[41], young physicians are required to engage in social service commitment time, either just before or after receiving their medical degree. Social service commitment in this region started in Mexico in response to healthcare provider shortages in rural areas[49]. This often represents students' only experience caring for people in rural areas[45]. In most cases, young physicians are not adequately supervised during this period of social service rural practice[41]. This lack of supervision and formal rural health curriculum has created a gap in the knowledge and mastery of skills needed to practice in rural areas. A study done in Mexico[41] between 2006 and 2008 revealed that young graduates doing social services did not have the knowledge to provide high-quality medical care in rural communities. An example of required knowledge differences can be seen in Panama, where in urban communities the top causes of death are chronic diseases, whereas in the rural areas mortality is due to infectious disease, malnutrition and violence[42]. Another example is the high maternal mortality rate in rural Guatemala compared to in urban areas, creating a greater need for skilled birth attendants in rural communities[37].

The lack of supervision and adequate payment during their social service time has been associated with a negative

experience for many medical graduates[49]. As a consequence, few physicians stay in rural areas after completing their service and the cyclical problem of physician shortage in rural continental Central America has persisted. Thus, it has been argued that social service commitment is not the answer to the needs of the population in rural areas, as it has not facilitated the recruitment of permanent healthcare providers[49]. Some have argued[49] that social service should be transformed into an academic program. This transformation could provide graduates with mentors and continued medical education while in isolated practice. One of the countries that supervises their young social service physicians is Panama[49]. Learner outcomes, through monthly evaluations, are taken into consideration when the graduates apply for postgraduate training programs, which is motivation for better performance[49].

Another significant challenge is the lack of faculty to sustain educational programs in rural areas. For example, in one medical school in Mexico[56] students spent their fifth year in a rural setting in preparation for their social service commitment. This innovative program was not sustainable, as rural professors needed multiple jobs in order to earn an adequate income. It has been argued that purposeful incentives, beyond salaries, are needed for physicians to continue to practice and teach in these underserved areas[48], such as better training and working conditions[56].

Theme 2. Financial and leadership sustainability challenges prevent the continuation of successful innovative educational interventions that promote community medicine: In Guatemala[56], successful community medicine educational programs disappeared due to lack of adequate collaboration between the government and medical institutions. In the past, organizations such as Pan American Health Organization (PAHO)[56], Rockefeller Foundation, Kellogg Foundation[56] and the Josiah Macy Jr Foundation[49] have provided financial support to promote community-orientated primary care and to evaluate the social service commitment programs. Grants provided temporary funding to establish programs to serve communities. However, due to lack of plans for long-term financing, these programs were not sustainable[56]. Another identified challenge is the lack of trained leaders to continue established programs as older physicians and faculty retire[56]. Thus, both financial and leadership sustainability are essential for any new rural medicine educational program.

Theme 3. Uneven distribution of physicians results in few providers in rural areas and too many in urban areas: After the social service commitment time, most physicians assigned to rural and remote communities do not continue to practice in these areas. While most countries in this region have an adequate number of total physicians for the population, there is a much higher concentration of human resources in urban areas[45,54]. In Costa Rica, there are insufficient social service positions in rural areas for young medical graduates, so the majority are assigned to urban centers[47]. In rural Panama, there is a population density of 2852 inhabitants per physician, compared to 510 inhabitants per physician in urban areas[42]. To address this uneven distribution, Panama requires their graduates to serve one year in rural areas[42] as part of their two years social service commitment. It has been argued that these short-term assignments do not provide the community with long-term physician–patient relationships that are essential for trust building and long-term health outcomes[37]. One possible solution for the shortage of rural physicians as teachers is to place equal value and recognition on community preceptors as on academic instructors[38].

Theme 4. A health system based on primary care in rural areas has been identified as important. However, there is insufficient collaboration to establish and sustain clinical and educational systems to meet rural health needs: Although governmental, non-governmental and educational institutions have all worked independently to improve health for rural communities, there appears to be a need for improved communication between these various sectors. In Mexico, for example, the graduates from a community-based training program were unable to obtain jobs after completion[56], since the health system was not oriented towards community primary care. In other countries, such as Nicaragua and Costa

Rica[56], similarly trained graduates have been employed in administrative positions. As a result, the needs of rural communities are still not met[48]. Consequently, some authors have argued that medical education goals should be redefined to respond to the health needs of the community and align with national health policies[44,48]. They suggest that governmental institutions and community stakeholders should have input into curriculum redesign efforts[38]. One possible solution is the transformation of the infrastructure of existing health posts into community educational centers[48], creating a partnership between government and educational institutions[45].

Another identified need in continental Central America is the creation of primary care teams that include physicians and other healthcare providers. In some countries, doctors are considered too expensive; therefore, health posts are staffed by nurses, community health workers and traditional healers[56]. For example, in rural Guatemala, health posts may be staffed only by a nurse or medical student[37]. In Costa Rica, very few medical graduates going into the social service program are exposed to rural EBAIS (primary care teams composed of physician, nurse and technician)[47]. This lack of exposure to physician role models in rural practice results in one of the critical challenges identified in this region – that social service programs actually promote specialization rather than primary care rural practice[48].

Common suggestions for core curricular content needed to improve rural medicine education (Table 4)

Theme 1. Primary care should be an essential component of medical education: In many of the countries in this region, clinical medical education takes place in tertiary care centers that do not provide sufficient exposure to primary care, primary prevention and community medicine. This work environment also does not provide learners with a rich exposure to the social determinants of health[44,52]. In the era of 'beyond Flexner' it has been suggested that a shift to the 'critical paradigm' will bring about curricular reform with a greater focus on health prevention and primary care with teaching centers located in the community[44,51].

Some of the countries in continental Central America have started to redesign their medical curriculum. For example, in Nicaragua, Universidad de Leon uses problem-based learning to expose students to the difficulties in the community[38]. These students are also exposed to primary care in rural communities through medical brigades[38] and 12 weeks of community medicine, coordinated with the Ministry of Health and community health posts[39]. Another example is Guatemala's Rafael Landivar Medical School[39],where students are exposed to primary and community medicine early in their education.

The ability to perform community health assessments is another skill identified as critically necessary for work in this region. Medical graduates need to be able to help solve community health problems while simultaneously involving community members as key stakeholders and integral members of the team. Many have called this the integration of primary care and public health[38]. This integration requires the teaching of core topics related to poverty and the health consequences of marginality[49], which will enable medical graduates to be more successful in their leadership roles during their social service commitment time. It has also been argued that governmental health facilities, where physicians fulfill their social service commitment, such as Caja Costarriquense de Seguro Social in Costa Rica and the Ministry of Health (MINSA) in Nicaragua, could contribute to the social mission and knowledge of medical schools by sharing this knowledge[49], creating a relationship of mutual benefit.

Theme 2. The medical school curriculum needs to prepare students to practice in cross-cultural contexts and address socioeconomic issues affecting health: Language is a major obstacle to providing high-quality care in some rural communities. Native populations sometimes speak dialects requiring translation. In countries such as Panama[42] and Guatemala[37], the indigenous population often do not seek health care, as providers do not speak their language and professional translation is not available. It has

also been observed that this creates a disparity in the level of health literacy between the patient and physician. To increase health-seeking behaviors, barriers in language and health literacy have been identified as still needing attention by the health system in Guatemala[37].

Another barrier to healthcare-seeking behavior is the lack of provider cultural awareness. In Guatemala, poverty in rural areas creates cultural disparities[52] that affect the level of trust that patients feel towards physicians[37]. Additionally, some indigenous populations avoid medical care because physicians lack knowledge of their culture and beliefs. One example is that Mayan communities expect to accompany their family members during labor and delivery[37]. When this does not happen, families lose their faith in the quality of the health care provided. Since many of the young medical graduates assigned to rural posts come from significantly different socioeconomic backgrounds than their rural patients, they often lack knowledge of the variety and complexity of their patients' social challenges and of their cultural and healing beliefs. Without adequate preparation during medical training, these interactions can often result in the perpetuation of lack of trust between rural populations and the physicians assigned to serve them.

Discussion

The comprehensive literature search undertaken in this study revealed few research reports that addressed the goals of the study. However, it did reveal several robust articles and reports that shed light on the current state of rural medicine training in continental Central America. Qualitative analysis of the content of these articles revealed several themes related to successes, challenges and opportunities for improving rural health and rural medicine education in these countries. Limitations to this study are that resources analysed were restricted to articles readily identified via research and/or internet search engines. Since few research studies were available on this subject, results of this study reflect finding primarily from expert opinion. However, given the notable paucity of research on this subject, this review may be a valuable starting place for researches and educators interested in this subject.

The challenges to medical education for rural health practice identified in this study are similar to those faced by rural communities throughout the world[57,58]. They include a shortage of rural health workforce and resources, insufficient dedicated training in rural health topics during medical school, and lack of adequate supervision of young physicians during their social services commitment time in rural and remote communities. Expert opinion from a variety of sources suggests that improving the quality of training needed to meet the needs of rural, underserved communities in continental Central America will require a multidimensional approach, including teamwork between educational institutions, governmental and non-governmental organizations, and community stakeholders. Results of this literature review and reports from other regions of the world suggest several possible approaches for improving rural medicine education in continental Central America.

First, medical schools could develop curricula designed to recruit and retain physicians to serve in rural areas, emphasizing primary care and early exposure to the rural health system. Some suggest that extended and early exposure to rural experience has a strong association to long-term rural service[59]. An example of a successful program, close to continental Central America is Programa de Internado Rural Interdisciplinario in Chile[60]. This program, created by Universidad de La Frontera and the local government, responds to the unique health needs of this zone by blending primary care, public health and traditional medicine[60]. In Australia[61], South Africa[62] and the USA[63], medical schools have developed immersion curricula in rural and community medicine that provide students with knowledge and skills comparable to that of students trained at urban and tertiary medical centers, thus enhancing their confidence in their skills and decision-making capacity. Additionally, faculty development has been identified as a priority, as this will foster development of leaders for the next generation of healthcare providers. Several authors suggest that through organizations such as World

Organization of Family Doctors (WONCA) and Society of Teachers of Family Medicine (STFM), successful rural health curricula can be shared and then adapted to continental Central America[64]. Additionally, PAHO has developed El Observatorio Regional de Recursos Humanos, a web space to share human development resources in the Americas[65]. PAHO has also created unique virtual training programs, which specifically improves skills of healthcare providers working with indigenous populations[66].

Second, partnerships between governmental authorities, educational institutions and rural communities could strengthen the health system in rural areas and tailor educational programs for rural health practice, consequently decreasing the healthcare gap between rural and urban communities. Creating partnerships of satellite clinics, which allow for rural postgraduate training in primary care, might be a solution for some countries. There is strong evidence suggesting that programs in postgraduate training, focusing on primary care and community health[67,68], with local preceptors as supervisors, can reduce the mismatch between healthcare providers choosing to practice in rural areas versus urban areas, when compared to compulsory social service[69,70]. Involving the community in strategic remodelling of the health system and medical education may empower rural community members, as they become stakeholders in improving the local health system[71]. Satellite community clinics might also take a load off tertiary medical centers, and allow students to work with other health professionals, such as community health workers[72].

Finally, topics related to professionalism and cultural and language competency could be strengthened in the medical curriculum. A focus group study that included rural communities from Honduras, Costa Rica and Panama found that the most fundamental need for the people is to have a physician in the community who they can trust[73]. An anthropological study done with the indigenous population in Guatemala revealed that health professionals need to develop creative skills to communicate more effectively with their patients and to overcome health literacy disparities[74]. The patient–physician relationship is particularly important for the indigenous population in continental Central America since their health problems are substantially affected by their sociocultural context[75].

Conclusions

There is a long history of efforts in continental Central America to address the health needs of rural communities through healthcare programs and medical educational interventions, with a clear wealth of regional expertise in these subjects. However, there still remain substantial challenges to creating and sustaining medical educational programs that prepare physicians for rural practice and encourage physicians to choose careers in rural communities. Solutions require innovative partnerships between educational, governmental and non-governmental organizations and the rural communities being served. Additionally, there is a great need for further research on this topic, including evaluation and dissemination of successful educational programs[76]. This sharing of best practices is essential for improvement in health outcomes in rural communities and for the training of physicians to serve these communities.

Acknowledgements

The authors would like to thank Nicolla Palloti, Medical Librarian at Memorial Hospital of Rhode Island for her help in conducting the literature search.

References

1. Wollard RF. From the villages to the globe: the social accountability of rural health practitioners. In: AB Chater, J Rourke, ID Couper, RP Strasser, S Reid (Eds). *WONCA rural medical education guidebook*. Bangrak: WONCA Working Group on Rural Practice, 1-13. (Online) 2014. Available: http://www.globalfamilydoctor.com/groups/WorkingParties/RuralPractice/ruralguidebook.aspx (Accessed 4 July 2014).

2. Kidd M (Ed). Delivery trends affecting health service delivery. In: *The contribution of family medicine to improving health systems*. 2nd edn. London: Radcliffe Publishing, 2013; 25-28.

3. World Bank. *World development report 1993: investing in health, Vol 1*. New York, NY: Oxford University Press. (Online) 1993. Available: http://elibrary.worldbank.org/doi/abs/10.1596/0-1952-0890-0 (Accessed 7 Dec 2013).

4. World Health Organization. *Increasing access to health workers in remote and rural areas through improved retention: global policy recommendations*. France: WHO, 2010.

5. United Nations. *Realizing the future we want for all: key recommendations from the report of the UN System Task Team on the post-2015 UN development agenda*. New York, NY: UN 2012.

6. Lehmann U, Dieleman M, Martineau T. Staffing remote rural areas in middle- and low-income countries: a literature review of attraction and retention. *BMC Health Services Research* **8:** 19. (Online) 2008. Available: http://www.biomedcentral.com/1472-6369/8/19 (Accessed 15 July 2014).

7. Kidd M (Ed). Challenges to optimal health services delivery. In: *The contribution of family medicine to improving health systems.* 2nd edn. London: Radcliffe Publishing; 2013. 29-30.

8. Starfield B. Is primary care essential? *Lancet* 1994; **344:** 1129-1133.

9. World Health Organization. *Primary health care*. (Online) 2014. Available: http://www.who.int/topics/primary_health_care/en/ (Accessed 22 August 2014).

10. Rosenblatt RA. Commentary: do medical schools have a responsibility to train physicians to meet the needs of the public? The case of persistent rural physician shortages. *Academic Medicine* 2010; **85(4):** 572-574.

11. Inem V. The challenges of health systems in developing countries. In: AB Chater, J Rourke, ID Couper, RP Strasser, S Reid (Eds). *WONCA rural medical education guidebook*. Bangrak: WONCA Working Group on Rural Practice; 1-6. (Online) 2014. Available: http://www.globalfamilydoctor.com/groups/WorkingParties/RuralPractice/ruralguidebook.aspx (Accessed 23 August 2014).

12. Robinson M, Slaney GM. Choice or chance! The influence of decentralised training on GP retention in the Bogong region of Victoria and New South Wales. *Rural and Remote Health* **13(2):** 2231. (Online) 2013. Available: www.rrh.org.au (Accessed 15 July 2014).

13. Schleusener D. Where and what is Mesoamerica? *The complete Mesoamerica … and more*. Weblog. (Online) 2011. Available: http:// tcmam.wordpress.com/2011/07/30/where-and-what-is-mesoamerica (Accessed 23 August 2014).

14. Definition and More from the Free Merriam-Webster Dictionary [Internet]. *Central America*. Available: http://www.merriam-webster.com/dictionary/central america (Accessed 23 August 2014).

15. Fraser B. Human resources for health in the Americas. *Lancet* 2007; **369:** 179-180.

16. Pan American Health Organization. *Density map health manpower per 10 thousand inhabitants*. (Online). Available: http://dev.observatoriorh.org/?q=node/242 (Accessed 27 Jul 2014).

17. Pan American Health Organization. *Most countries in the Americas have sufficient health personnel but face challenges in distribution, migration and training*. (Online) 2013. Available: http://www.paho.org/hq/index.php?option=com_content&view=article&id=9146:most-countries-in-the-americas-have-sufficient-health-personnel-but-face-challenges-in-distribution-migration-and-training&Itemid=1926&lang=en (Accessed 28 July 2014).

18. Boulet J, Bede C, Mckinley D, Norcini J. An overview of the world's medical schools. *Medical Teacher* 2007; **29:** 20-26.

19. Ventres WB. The emergence of primary care in Latin America: reflections from the field. *Journal of the American Boardof Family Medicine* 2013; **26(2):** 183-186.

20. Ramirez B, Berry DE. Introduction to Special Issue Rural Primary Health Care in Latin America. *Journal of Rural Health* 1988; **4(1):** 5-11.

21. Puschel K, Rojas P, Erazo A, Thompson B, Lopez J, Barros J. Social accountability of medical schools and academic primary care training in Latin America: principles but not practice. *Family Practice* 2014; **31(4):** 399-408.

22. Fernández-Ortega MA, Arias-Castillo L, Brandt-Toro C, Irigoyen-Coria A, Roo-Prato JB. Hacia el fortalecimiento de la Medicina Familiar y la Atención Primaria en los sistemas de salud: IV Cumbre Iberoamericana de Medicina Familiar. Asunción Paraguay. *ArchivosenMedicina Familiar* 2012; **14(4):** 93-112.

23. Nisly JL. Re: The emergence of primary care in Latin America: reflections from the field. *Journal of the American Board of Family Medicine* 2013; **26(5):** 612.

24. Wood M. *'El ano del humo': Nicaragua health care in context*. Project report. St. Ollaf College; 2013.

25. Norris TE. Establishing a rural curriculum from an urban academic medical center. First. In: AB Chater, J Rourke, ID Couper, RP Strasser, S Reid (Eds). *WONCA rural medical education guidebook*. Bangrak: WONCA Working Group on Rural Practice; 1-9. (Online) 2014. Available: http://www.globalfamilydoctor.com/groups/WorkingParties/RuralPractice/ruralguidebook.aspx (Accessed 4 July 2014).

26. Grobler L, Marais BJ, Mabunda SA,Marindi PA, Reuter H, Volmink J. Interventions for increasing the proportion of health professionals practising in rural and other underserved areas. *Cochrane Database of Systematic Review* 1; Art No.CD005314. doi: 10.1002/14651858.CD005314.pub2. (Online) 2009. Available: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005314.pub2/abstract (Accessed 8 July 2014).

27. Williamson MI, Wilson R, McKechnie R, Ross J. Does the positive influence of an undergraduate rural placement persist into postgraduate years? *Rural and Remote Health* **12:** 2011. (Online) 2012. Available: www.rrh.org.au (Accessed 30 August 2014).

28. Bollinger M. Rural residency programs: my case for a community-based curriculum. *Canadian Family Physician* 2014; **60:** 187-188.

29. Smith J, Hays R. Is rural medicine a separate discipline? *Australian Journal of Rural Health* 2004; **12(2):** 67-72.

30. Green BN, Johnson CD, Adams A. Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. *Journal of Chiropractic Medicine* 2001; **15:** 5-19.

31. Haig A, Dozier M. BEME Guide No 3: systematic searching for evidence in medical education – Part 1: Sources of information. *Medical Teacher* 2003; **25(4):** 352-363.

32. Grey Literature Database. *What is grey literature?* (Online). Available: http://www.greylit.org/about (Accessed 8 July 2014).

33. Popay J, Roberts H, Sowden A, Petticrew M, Arai L, Rodgers M, et al. *Guidance on the conduct of narrative synthesis in systematic reviews.* National Center for Research Methods: Lancaster, UK, 2006.

34. Islam MM, Topp L, Day CA, Dawson A, Conigrave KM. The accessibility, acceptability, health impact and cost implications of primary healthcare outlets that target injecting drug users: a narrative synthesis of literature. *International Journal on Drug Policy* 2012; **23(2):** 94-102.

35. Jeon YH, Glasgow NJ, Merlyn T, Sansoni E. Policy options to improve leadership of middle managers in the Australian residential aged care setting: a narrative synthesis. *BMC Health Services Research* **10:** 190. (Online) 2010. Available: http://www.biomedcentral.com/1472-6963/10/190 (Accessed 8 September 2014).

36. Thomas RD. A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation* 2006; **27(2):** 237-246.

37. Bhatt S. Health care issues facing the Maya people of the Guatemalan Highlands: the current state of care and recommendations for improvement. *Journal of Global Health Perspective* 1 August. (Online) 2012. Available: http://jglobalhealth.org/article/health-care-issues-facing-the-maya-people-of-the-guatemalan-highlands-the-current-state-of-care-and-recommendations-for-improvement-2 (Accessed 13 March 2014).

38. Borrell RM. *Educacion medica hacia la APS renovada y libros de texto*, Conference proceedings, 3–15 December 2012, Buenos Aires, Argentina: Pan American Health Organization. 2012.

39. Borrell RM. *Educación médica?: ¿Hacia dónde ir??* Pan American Health Organization. (Online) 2012. Available: http://observatoriorh.org (Accessed 15 December 2013).

40. Borrell RM, Goude C, Kauffman R. *Residencias médicas en América Latina*. Washington DC: Pan American Health Organization, 2011.

41. Vazquez-Martinez FD. Competencias profesionales de los pasantes de enfermería, medicina y odontología en servicio social en México. *Revista Panamericana de Salud Pública* 2010; **28(3):** 298-304.

42. Gracia F. *Medical education in Panama*. Panama City, Panama: American College of Physicians, Central America Chapter, 2009.

43. Palma C. Dos escuelas de medicina abrirán sus puertas en enero. *El Periódico de Guatemala* 30 October. (Online). Available: https://elperiodico.com.gt/es/ (Accessed 8 June 2014).

44. Eduardo C, Flórez P. Los grandes paradigmas de la educación médica en Latinoamérica. *Acta Medica Colombiana* 2008; **33:** 33-41.

45. Pulido P, Cravioto A, Pereda A, Rondon R, Pereira G. Changes, trends and challenges of medical education in Latin America. *Medical Teacher* 2006; **28(1):** 24-29.

46. Lopez-Bárcena JJ, González-de Cossio Ortiz M, Velasco-Martínez M. Servicio Social de Medicina en México. Factibilidad del cumplimiento académico en el área rural. *Revista Facultad Medica Universidad Nacional Autonoma de Mejico*. 2004; **47(5):** 181-186.

47. Sancho-Ugalde H. Mata-Roldan S. Perspectivas del servicio médico social en Costa Rica. *Acta Medica Costarricense* 2000; **42(2):** 71-75.

48. Pulido P. Medical practice and medical education in Latin America. *Education for Health* 1996; **9(3):** 289-306.

49. Herrera G, Carrino, Herrera L (Eds). *Social and Community Service in Medical Training and Professional Practice*. Conference proceedings, 24–27 March 1993, Washington DC. New York, NY. Josiah Macy Jr Foundation; 1995.

50. Gavagan TF, Buitrago MC. Report on Family Medicine in the Nicaraguan Revolution: Advances and Obstacles 1985–1991. *Family Medicine* 1992; **24:** 66-70.

51. Frenk-Mora J, Robledo-Vera C, Nigenda-Lopez G, Ramirez-Cuadra C, Galvan-Martinez O, Ramirez-Avila J. Políticas de formación y empleo de médicos en Mexico 1917–1988. *Salud Publica de Mexico* 1990; **32(4):** 440-448.

52. Westreich L. Modern , medical training confronts Guatemalan poverty. *Minnesota Medicine* 1990; **73:** 19-22.

53. Pulido P. Strategies for developing innovative programs in international medical education: a viewpoint from Latin America. *Academic Medicine* 1989: **64(1):** S17-S22.

54. Slater RG. Reflections on curative health care in Nicaragua. *American Journal of Public Health* 1989; **79(5):** 646-651.

55. Haze FA. The Need to Train Physicians for Rural Primary Health Care in Latin America?: Some Family Medicine. *Journal of Rural Health* 1988; **4(1):** 13-21.

56. Braveman P, Mora F. Training physicians for Community-Orientated Primary Care in Latin America: model programs in Mexico, Nicaragua and Costa Rica. *American Journal of Public Health* 1, 987; **77, , (4):** 485-490.

57. Leonardia JA, Prytherch H, Ronquillo K, Nodora RG, Ruppel A. Assessment of factors influencing retention in the Philippine National Rural Physician Deployment Program. *BMC Health Services Research* **12(1):** 411. (Online) 2012. Available: http://www.biomedcentral.com/1472-6963/12/411 (Accessed 31 August 2014).

58. Rourke J. How can medical schools contribute to the education, recruitment and retention of rural physicians in their region? *Bulletin of World Health Organization* 2010; **88(5):** 395-396.

59. Clark TR, Freedman SB. Medical graduates becoming rural doctors: rural background versus extended rural placement. *Medical Journal of Australia* 2013; **199:** 779-782.

60. Territorio Chile: Subsecretaria de Desarrollo Regional y Administrativo Gobierno de Chile. *Programa Internado Rural Interdisciplinario PIRI*. (Online). Available: http://www.territoriochile.cl/1516/article-76513.html (Accessed 3 August 2014).

61. Sturmberg JP, Reid AL, Thacker JL, et al. A community based, patient-center, longitudinal medical curriculum. *Rural and Remote Health* **3(2):** 210. (Online) 2003. Available: www.rrh.org.au (Accessed 13 January 2014)

62. Van Schalkwyk SC, Bezuidenhout J, Conradie HH, Fish T, Kok NJ, Van Heerden BH, et al. 'Going rural': driving change through a rural medical education innovation. *Rural and Remote Health* **14:** 2493. (Online) 2014. Available: www.rrh.org.au (Accessed 30 August 2014).

63. Zink T, Halaas GW, Finstad D, Brooks KD. The rural physician associate program: for third-year medical students. *Journal for Rural Health* 2008; **4(4):** 353-359.

64. Knox L, Ceitlin J, Hahn RG. Slow progress: predoctoral education in family medicine in four Latin American countries. *Family Medicine* 2003; **35(8):** 591-595.

65. Pan American Health Organization. *Regional Observatory of Human Resources in Health*. (Online) 2012. Available: http://www.observatoriorh.org (Accessed 6 August 2014).

66. Pan American Health Organization Center of Spanish Cooperation. *Clínica virtual docente busca fortalecer competencias clínicas en áreas indígenas y de difícil acceso*. (Online). 2013. Available: http://www.paho.org/blogs/esp/?p=3808 (Accessed 24 August 2014).

67. Brooks RG, Walsh M, Mardon RE, Lewis M, Clawson A. The roles of nature and nurture in the recruitment and retention of primary care physicians in rural areas: a review of the literature. *Academic Medicine* 2002; **77(8):** 790-798.

68. Curran V, Rourke J. The role of medical education in the recruitment and retention of rural physicians. *Medical Teacher* 2004; **26(3):** 265-272.

69. Frehywot S, Mullan F, Payne PW, Ross H. Compulsory service programmes for recruiting health workers in remote and rural areas: do they work? *Bulletin of World Health Organization* 2010; **88(5):** 364-370.

70. Wilson NW, Couper ID, De Vries E, Reid S, Fish T, Marais BJ. A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. *Rural Remote Health* **9(2):** 1060. (Online) 2009. Available: www.rrh.org.au (Accessed 8 August 2014).

71. Strasser R, Worley P, Hays R, Togno J. Developing social capital: community participation in rural health services. In: *Leaping the Boundary Fence: Using Evidence and Collaboration to Build Healthier Rural Communities The 5th National Rural Health Conference;* 14-17 March 1999; Adelaide, South Australia, 406-412.

72. Talib ZM, Baingana RK, Sagay AS, Van Schalkwyk SC, Mehtsun S, Kiguli-Malwadde E. Investing in community-based education to improve the quality, quantity, and retention of physicians in three African countries. *Education for Health* 2014; **26(2):** 109-114.

73. Leon M. Perceptions of health care quality in Central America. *International Journal for Quality in Health Care* 2010; **15(1):** 67-71.

74. Berry NS. Who's judging the quality of care? Indigenous Maya and the problem of 'not being attended'. *Medical Anthropology* 2008; **27(2):** 164-189.

75. Montenegro RA, Stephens C. Indigenous health in Latin America and the Caribbean. *Lancet* 2006; **367(9525):** 1859-1869.

76. Van Schalkwyk S, Bezuidenhout J, Burch VC, Clarke M, Conradie H, van Heerden B, et al. Developing an educational research framework for evaluating rural training of health professionals: a case for innovation. *Medical Teacher* 2012; **34(12):** 1064-1069.