Increasing Chronic Disease Research Capacity in Guatemala Through a Mentoring Program

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ABSTRACT

OBJECTIVE: The Chronic Disease Research Fellowship Program (RFP) aims to build the research capacity of recent medical graduates to support the development of chronic disease control strategies.

SETTING: Guatemala is undergoing an epidemiologic transition. However, given the way universities and the health care system are structured, it lacks an environment that fosters research careers and generates the required knowledge to implement sound public health policies and clinical strategies. The RFP was implemented at the Cardiovascular Unit of Guatemala.

INTERVENTION: This 4-year Program recruited two one-year fellows and provided funding to define a research topic, write a protocol and implement the research. Strong emphasis is placed on developing skills in knowledge translation and exchange to bridge the “know-do” gap. Close mentoring relationships between the Principal Investigator and former and current fellows are fostered through the Program.

OUTCOMES: The mentoring Program has generated strategic data to support the implementation of sound chronic disease control strategies, mainly related to tobacco control. Results have been presented nationally and internationally. Research training has included principles of biostatistics and epidemiology, and a journal club. The Program is increasingly generating interest among medical graduates to pursue further research training abroad and is building local research capacity. Fellows and research assistants have created a research network in Guatemala and abroad. The main obstacle the Program faces is ensuring long-term sustainability.

CONCLUSIONS: A mentoring program can lead to an increase in research interest and capacity in a low-income country with little research infrastructure.

KEY WORDS: Developing countries; chronic disease; capacity building

La traduction du résumé se trouve à la fin de l'article.

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Since 2002, the Pan American Health Organization (PAHO) recognized that non-communicable diseases (NCD) are the number one cause of premature death and disability in Latin America.¹ To halt the NCD epidemic, low-resource settings (particularly low/middle-income countries, LMIC) need to focus on the most cost-effective evidence-based strategies that have the greatest impact on health outcomes.² However, most of these strategies have been generated in high-income countries and therefore contextual differences hinder their translation and adaptation to LMIC.³ Even though in the last 10 years, LMIC researchers have increased the number of publications relevant to NCD, there is still an urgent need to generate evidence for the local adoption and implementation of NCD interventions.⁴ From an academic standpoint, in Guatemala there are 4 medical schools that are focused on clinical rather than research training. According to the ranking of research productivity of Latin American universities, out of 416 medical schools, the top Guatemalan one is ranked 191st.⁵ Furthermore, the percentage of full-time faculty in medical schools is extremely low (<5% in the public university and 0% in private universities), thus limiting time dedicated to research. After completing medical school, student's satisfaction or career choice is not evaluated by medical schools and the students most choose a traditional clinical residency program in Guatemala (few train abroad). Hence, the opportunity to receive and provide research mentorship is often absent, and when mentorship does happen, it is the result of

serendipity. Therefore, after graduation, students are not exposed to a research career or research mentoring.

Guatemala, a LMIC, is currently undergoing an epidemiological transition; leading causes of mortality are shifting from nutritional deficiencies and infectious diseases to NCD.⁶ Therefore, in 2003 the Ministry of Health established the National Program on NCD and the Integral Commission for the Attention of NCD, recognizing the need for surveillance, research, program planning, screening, and health promotion. Unfortunately, the program has not been adequately funded, mirroring the historical trend of scant research funds. Government and private sector investment in research has remained unchanged (0.03% and 0.05% of the GDP in 2003 and 2009, respectively⁷). In addition, the country lacks the human research capacity to support the Program's decisions. For

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example, in 2009 the National Council on Science and Technology only had 58 registered health care researchers compared to 300 agricultural researchers.⁷ Regarding epidemiologic research, even though it has increased significantly in the last 20 years, it remains at one of the lowest levels in Latin America (2.35, 6.99, and 7.78 articles per million inhabitants in Guatemala, Costa Rica, and Chile, respectively).⁸ Likewise, the NCD research on risk factors (e.g., tobacco, physical activity) and interventions (e.g., smoke-free environments) also remains scant compared to other countries in the region (e.g., Mexico, Argentina).⁴

To fill the NCD research–knowledge gap in Guatemala, therefore, we established a research fellowship program to develop a cadre of young investigators with the skills to conduct and disseminate research to strengthen the country’s research capacity. Recognizing that capacity building needs to be approached systematically and that it encompasses different interconnected components, the program has different levels (e.g., individual, organizational) of influence. In this paper, we describe the Chronic Disease Control Research Fellowship Program and the outcomes for research systemic capacity building.

PARTICIPANTS, SETTING AND INTERVENTION

The Chronic Disease Research Fellowship Program (RFP) was initiated in 2009 with financial support from International Development Research Centre (IDRC)/Research for International Tobacco Control (RITC). This 4-year Program was developed to strengthen, through mentoring, the national research capacity needed to generate policy-relevant evidence leading to NCD control. The program targets recent (within 2 years of graduation) medical or nutrition graduates interested in pursuing a one-year research fellowship. We aim to reach recent graduates as they are in the process of choosing their future career. Through our program, they can experience what it is like to be in the research setting and improve their profile to subsequently apply for further training. Additionally, every effort is made to recruit an equal number of female and male fellows.

Mentorship, the dynamic, reciprocal relationship in a work environment between an advanced career incumbent (mentor) and a beginner (mentee), aimed at promoting the development of both,⁹ is recognized as a catalyst for career, facilitating career selection, advancement, and productivity.¹⁰ Through mentorship, the program aims to increase the research capacity and build a mentorship culture that will then have a multiplier effect. The specific objectives of the Program are to:

- conduct strategic applied health research to support NCD control;
- develop a multidisciplinary team that designs and implements research that can improve the implementation of NCD prevention strategies; and,
- contribute to the origin of a research network within Guatemala and abroad.

The program is based at the Unidad de Cirugia Cardiovascular (Cardiovascular Unit, UNICAR), the largest cardiac centre in Guatemala. In 2004, UNICAR established the Department of Research and Education to oversee, design and implement cardiovascular and other NCD research. The Department does not have any funds allocated from UNICAR.

After recruitment, fellows choose their research topic, which has to be NCD-related and policy-relevant, and dedicate the first

Table 1. Chronic Disease Control Research Fellowship: Criteria for Fellows’ Selection

Academic
1. Academic achievement through their current or previous studies.
2. Quality of their statement of purpose.
3. Interest in chronic disease control (particularly tobacco control) research and public health.
Non-academic
• Strong social commitment.
• Interest in decreasing the rich–poor gap and in community medicine more so than patient-centred medicine.
• Commitment to learn, but also to become a mentor in the future.
• Basic proficiency in written and spoken English.
• Ability to collaborate with other researchers and lead a field work. This will be key once the fellow’s project is accepted for implementation.
• Openness to receiving constructive criticism.
• Enthusiasm to learn new things, including non-research-related topics.

2 months for protocol writing under the supervision of their mentor and other identified experts in the field. Each fellow is assigned, in addition to their salary, \$10,000 for protocol implementation and dissemination (e.g., presentations, posters, peer-reviewed articles). To give the fellows an opportunity to network with other NCD researchers and to expand the program network, since 2011 fellows are housed at the Central American and Dominican Republic Institute of Nutrition/Comprehensive Center for the Prevention of Chronic Diseases (INCAP/CIIPEC). CIIPEC hosts several research projects and therefore provides an environment to interact with other researchers.

Monthly journal clubs are organized with the fellows and assistants. Trainees discuss one NCD research and one biostatistics article over dinner. In addition to improving trainees’ ability to critically evaluate the medical literature, this activity aims to strengthen social links both within the group and between group members and others: in this regard, it is opened to former trainees and others who have shown interest in doing research as part of their career.

Program evaluation

Given that the Program does not confer a degree, we are using outcome mapping to evaluate fellows’ progress. Therefore we developed a “Performance Monitoring Framework” (PMF) to document program outcomes. An assistant program coordinator interviews on a regular basis the fellows, the mentor, and a senior program advisor.

OUTCOMES

The Research Fellowship Program

Research Design, Implementation, and Dissemination

The program has been successful in generating and delivering research outputs (e.g., posters, presentations, journal articles) in Guatemala and internationally. Since year 1, the number of applicants has increased steadily, from 2 applicants in 2009 to 24 in 2012 (Figure 1). The same pattern of increasing interest can be seen among research assistants. Thus far, 6 physicians and 4 registered dietitians have participated in the program (mean age 25.7 years, standard deviation 1.7). All fellows have completed the year-long program and most (9/10) remain in contact with the RFP at different levels (e.g., journal club, evaluation, career advice). Topics were initially focused on tobacco as the leading cause of NCDs. However, as of year 3 (2011), other NCD risk factors have been addressed

Figure 1. Chronic Disease Research Fellowship Program 4-year evaluation **Table 2.** NCD Research Fellowship Program Projects and Outputs, Guatemala, 2009-2012

Project	Peer-reviewed Publication	Local Media Dissemination	International Presentation
• Smoking prevalence in rural Guatemala	No	Yes	Yes
• Hospitality industry managers' knowledge and support of the smoke-free law	No	Yes	Yes
• Second-hand smoke exposure in bars and restaurants after the smoking ban	Yes ²⁷	Yes	Yes
• Single cigarette sales	Yes ²⁸	Yes	Yes
• Smoking cessation treatment availability in pharmacies	Yes ²⁹	Yes	Yes
• Bars' and restaurants' compliance with the smoke-free law during the 2010 World Cup	Yes ³⁰	Yes	No
• Knowledge of preventive interventions among internal medicine staff	Yes ³¹	Yes	Yes*
• Midwives' knowledge and use of tobacco	No	Yes	Yes
• Newspapers' coverage of the 2009 smoke-free law	No	No	Yes
• Illegal and legal cigarette packaging characteristics in Guatemala	No	Yes	No
• Primary caregivers' health literacy level and childhood obesity	No	Yes	Yes*

* Oral presentation, the rest are poster presentations.

(Table 2). As one fellow reported, "I have learned many tools to design a public health initiative... and that strategies used in tobacco control can be used in other campaigns."

Results preparation and presentation of research reports have taken place in Guatemala and abroad (Figure 1 and Table 2) and have served as a training experience for the fellows as they take the lead in poster and oral presentations, manuscript writing and media interviews. Furthermore, fellows have successfully managed their budgets and research teams.

Implementation has been successful in several ways, yet challenges remain ahead. Adequate dissemination (e.g., poster/oral presentations, peer-reviewed articles) and the multidisciplinary approach (tobacco, screening, and nutrition interventions) to NCD control are notable successes. In addition, our fellows have managed to increase their understanding of research and knowledge translation and are all pursuing further training in their own fields. Among the challenges encountered is that the local environment does not promote a research culture among recent health care graduates, slowing down their progress in developing appropriate research skills. Another challenge is the time available from the mentor. Having only one men-

tor to coordinate the whole project prevents the Program from accepting more than two fellows per year.

Building a Multidisciplinary Research Network

Regarding the development of a multidisciplinary team, the program has been able to conduct quantitative and qualitative NCD control research (Table 2).

The Fellowship Program is now a recognized research network in Guatemala that includes the UNICAR, the INCAP/CIIPEC, Washington University in St. Louis, and other institutions abroad. As a result of this network, the number of applicants increased significantly over the years (Figure 1, there was no open call for applications in year 1). Regarding the low application level in years 2 and 3, as one of the fellows reported, it likely reflects "the novelty of the research fellowship and mentorship concepts, which are largely unfamiliar to Guatemalan medical students".

In addition to conducting research, this network has been successful in building research capacity through mentoring and additional research methods training for the fellows as well as for others in the network. As described by one of the fellows,

“The program is a dynamic peer to peer relationship in which the roles vary depending in the situations...the peer is the mentor or the mentee...the coexistence of both types of relationships is generating a complete learning process throughout the RFP.”

Fellows have had the opportunity to collaborate with international experts, including Ana Navas-Acien, MD, PhD (Johns Hopkins Bloomberg School of Public Health), Frank Chaloupka, PhD (University of Illinois, Chicago), Karen Hudmon, Dr.PH (Purdue University), and James Thrasher, PhD (University of South Carolina). These collaborations have allowed the fellows to improve their protocols and manuscript writing skills, and to further expand their career options by networking with others in the field. At Washington University in St. Louis, fellows have received feedback on their protocols from various fields. Graham Colditz, MD, DrPH and Lauren Arnold, PhD, have provided useful critique on project design and Peter Benson, PhD, on qualitative methods. Thus, in building a multidisciplinary network, the Program now offers different perspectives and methodological approaches to NCD research.

Regarding the journal club, from the PMF, this mechanism appears by all accounts to have been an especially effective means of extending the value of the mentoring approach and consolidating development of capacity and commitment to public policy-oriented research. Coming together informally has allowed students moving beyond the “technical aspects learned during the discussion of the articles... to get to know the individual members”, as well as the Director, as colleagues. A further unplanned benefit of the club, and one important to note with respect to sustaining and widening the base of prospective participation in the Program, has been the success of including research assistants. Interacting as peers with fellows has enabled them to develop their own awareness of, and interest in, tobacco control, NCD and public health policy research.

The program network has also served as a platform to write 7 additional NCD research grants (4 have received funding, 1 is pending decision, and 2 have not been funded). From a mentoring perspective, the Program has been successful in positioning our fellows in current clinical or research careers. Two fellows are currently in the process of applying to a research-oriented internal medicine residency program in the US, one is doing the first year of a dermatology residency in Guatemala, one is in his last year of medical school, and one is working as a research assistant in a nutrition project in Guatemala. Furthermore, three research assistants from our Program have also been mentored in their own research projects and careers. This has led to two additional peer-reviewed publications and one poster presentation. One of the research assistants has been accepted to a non-degree research position at the Department of Nutrition, Harvard School of Public Health. As for the Principal Investigator, he has gained national and international recognition both as an NCD researcher and as a mentor.

Program evaluation

According to the PMF, the RFP has been innovative in adopting mentoring as an approach to flexible teaching and learning to serve the specific development goals of the Program. In applying the basic principles of adult learning, the mentoring arrangement used in the RFP appears to have been appropriate. The mentoring approach has allowed fellows, and research assistants, to be “where

Table 3. Chronic Disease Research Fellowship Program: Progress Towards Outcomes, 2009-2012

Long-term outcomes
<ul style="list-style-type: none">• Fellows increasingly engaged in networks and collaborations on tobacco control and chronic disease control with researchers in Guatemala and abroad.• Building presence for tobacco control in Guatemala through media interviews, engagement with legislator, and establishing collaborative partnerships.• Fellows beginning to take the initiative in acting as mentors to more junior peers, maintaining post-graduation contact with the RFP and supporting new intakes of fellows and research assistants.
Medium-term outcomes
<ul style="list-style-type: none">• Fellows with increasingly strong research experience and contacts with the wider research community being accepted for oral and poster presentations at international meetings, in part due to endorsement by the RFP director, but also a reflection of the quality of their applications and, in turn, the overall merits of the Program.• The association of the RFP with the INCAP/CIIPEC allows fellows to associate with its research program, provide peer-to-peer technical assistance for projects, share access to data gathering and computerized analysis and use its outreach to promote the RFP research results.
Near-term outcomes
<ul style="list-style-type: none">• Fellows expressing a growing understanding of research principles and processes, and an increased critical capacity to access public health research papers.• Increased effectiveness of mentoring as an approach to developing NCD-oriented public health research professionals, fellows showing increased readiness to engage interactively in a mentor-mentee relationship as part of their fellowship work.

the action is” in terms of having access to sound technical knowledge, research opportunities and means of raising their self-confidence as health care professionals and advocates for NCD research and control. “Work-in-progress” sessions aimed at “sharing successes and challenges of each project”, where they have been open and constructive, are noted as having been especially important for learning about the research process itself and in their own ability to “make the case” for research results and their implications.

Regarding progress towards outcomes, given the newness of the Program and the fact that time is needed to demonstrate an established research identity, objective indicators of sustained institutionalization and major changes in policy and behaviour are relatively few (Table 3). However, after the first funding cycle, the RFP appears to be filling, in part, the NCD research capacity gap in Guatemala.

CONCLUSION

We describe a unique Fellowship program, in a LMIC, that trained recent medical and nutritional sciences graduates to conduct research prior to obtaining further research and clinical training. The RFP addressed the critical need to conduct policy-relevant research to advance the design and implementation of interventions with the potential impact to halt the NCD epidemic in Guatemala.⁴ Within the component elements of systemic capacity building, the program sought to increase the personal capacity to conduct NCD research in Guatemala.^{11,12} The RFP has been successful in recruiting and training 8 young researchers who have acquired the knowledge and skills to design, implement, and disseminate research on NCD control. Furthermore, it has provided the knowledge and skills for a senior mentor to adequately oversee a research fellowship program.

Several unique aspects of the RFP contributed to its success. Similar to a tobacco control research training program implemented in Canada¹³ and to other mentoring programs,¹⁴⁻¹⁶ our program has provided an enriching, collaborative, and supportive environ-

ment for trainees to learn and conduct research through the recruitment of trainees from different backgrounds and the provision of resources for mentoring, networking, and research design, implementation, and dissemination. Like other successful trainings,^{13,14,17,18} a fundamental characteristic of the RFP is its emphasis on theme selection, implementation, and dissemination. These skills are specific to NCD, however, as fellows move forward in their careers, these skills and lessons learned could be transferred to other public health fields.¹³ Furthermore, the Program is also providing training at a critical period and allowing mentees to make research a priority before deciding a future career. These have been shown to foster competence and confidence critical to maintaining interest in research.^{14,19} Regarding the mentor, similar to the case in other programs,^{16,20} given the financial and institutional recognition, he is devoted to working with the mentees and their project in a timely manner. However, the program still faces considerable challenges. Having more than one mentor would benefit the mentees (more to choose from) and the mentor himself (more mentees in the program).^{19,21} Further mentoring training is also required to expand the mentors pool.²² Other outcomes (e.g., retention rate, career satisfaction, independent research career¹⁹) that determine the success of a mentoring program are yet to be evaluated. The program also lacks an academic recognition, in part due to the low priority research has among medical schools. An additional weakness is that the RFP relies on one sole funder. As this presents a challenge to mentoring programs,¹⁴ the RFP should search for additional funders. Governments should play a key role in stimulating the generation of information to reduce the risk of NCD and investing in science and education (at least 1% and 6% of the GDP, respectively).^{23,24} However, the Guatemalan government has not yet taken research seriously, as evidenced in the low percentage of the GDP committed to science and education (0.05% and 3.8%, respectively).⁷ Therefore, so far, it seems that international funding is the only way to build capacity for NCD research.

Program evaluation has also been a fundamental part of the RFP, as with mentoring programs elsewhere.^{16,25} Furthermore, the RFP relies on the functional mentoring. A variation of dyad mentoring (pairing the mentee with a more senior mentor), the functional mentor is paired with the mentee to provide guidance on a specific project and therefore provides a tangible outcome (e.g., publications) amenable to measurement.¹⁶ Even though the number of publications is not enough as an outcome measure,¹⁸ it has increased over the years. As our program has grown, some peer-to-peer mentoring has also emerged. This mentoring, that circumvents the hierarchy of the traditional mentor-mentee dyad, has been shown to benefit more mentees than would be possible in a resource-limited setting with only one mentor, as is the case in Guatemala.¹⁶ Furthermore, having a research mentor has been found to be the most important factor influencing specialty choice by medical students in the US.¹⁹ Therefore, research mentoring in Guatemala might prove to be a way to increase the interest in academic medicine and create a "ripple effect" in mentoring.

In conclusion, as suggested by the Center for Association Leadership,²⁶ a one-year mentoring program is long enough to provide research training and career advice, but not so long that individuals are reluctant to commit. Institutional and financial recognition of the value of mentoring is particularly relevant in a resource-limited setting like Guatemala. The long-term sustain-

ability of the program and its integration into an organizational structure and sustained systems changes remain to be demonstrated in the setting of under-resourced health and educational sectors. Other LMIC might explore mentoring as a tool to increase individual research capacity and to generate data required to halt the NCD epidemic.

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RÉSUMÉ

OBJECTIF : Le programme des Bourses de recherche sur la lutte contre les maladies chroniques (Guatemala) vise à accroître la capacité de recherche des récents diplômés en médecine pour appuyer l'élaboration de stratégies de lutte contre les maladies chroniques.

LIEU : Le Guatemala est en transition sur le plan épidémiologique. Toutefois, étant donné la façon dont les universités et le système de soins de santé sont structurés, il manque au pays un milieu qui favorise les carrières en recherche et qui génère les connaissances requises pour mettre en œuvre des politiques de santé publique et des stratégies cliniques rationnelles. Le programme de bourses de recherche a été instauré à l'Unité cardiovasculaire de Guatemala.

INTERVENTION : Ce programme de quatre ans a recruté deux boursiers pendant un an chacun et leur a fourni du financement pour définir un sujet de recherche, rédiger un protocole et mettre la recherche en œuvre. Le programme insiste beaucoup sur le développement de compétences en application et en échange des connaissances pour combler le fossé entre le « savoir » et le « faire ». Il favorise des liens de mentorat étroits entre le directeur des recherches et les boursiers passés et présents.

RÉSULTATS : Le programme de mentorat a généré des données stratégiques à l'appui de la mise en œuvre de stratégies rationnelles de lutte contre les maladies chroniques, principalement axées sur la lutte antitabac. Les résultats de recherche sont présentés au pays et à l'étranger. La formation en recherche porte sur les principes de biostatistique et d'épidémiologie et inclut un club de revue d'articles. Le programme incite de plus en plus de diplômés en médecine à pousser leur formation en recherche à l'étranger, et il est en train de créer une capacité de recherche locale. Les boursiers et les adjoints à la recherche ont créé un réseau de chercheurs au Guatemala et à l'étranger. Le principal obstacle est d'assurer la viabilité à long terme du programme.

CONCLUSIONS : Un programme de bourses construit sur des bases de mentorat peut mener à une augmentation de l'intérêt pour la recherche et de la capacité de recherche dans un pays à faible revenu possédant peu d'infrastructures de recherche.

MOTS CLÉS : pays en développement; maladie chronique; renforcement des capacités