Review

Establishing a regional network of academic centers to support decision making for new vaccine introduction in Latin America and the Caribbean: The ProVac experience

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A B S T R A C T

Background: The Pan American Health Organization’s ProVac Initiative, designed to strengthen national decision making regarding the introduction of new vaccines, was initiated in 2004. Central to realizing ProVac’s vision of regional capacity building, the ProVac Network of Centers of Excellence (CoEs) was established in 2010 to provide research support to the ProVac Initiative, leveraging existing capacity at Latin American and Caribbean (LAC) universities. We describe the process of establishing the ProVac Network of CoEs and its initial outcomes and challenges.

Methods: A survey was sent to academic, not-for-profit institutions in LAC that had recently published work in the areas of clinical decision sciences and health economic analysis. Centers invited to join the Network were selected by an international committee on the basis of the survey results. Selection criteria included academic productivity in immunization-related work, team size and expertise, successful collaboration with governmental agencies and international organizations, and experience in training and education.

Results: The Network currently includes five academic institutions across LAC.

Conclusions: As the ProVac Initiative expands to other regions of the world with support from immunization and public health partners, the establishment of other regional and global networks of CoEs will be critical. The experience of LAC in creating the current network could benefit the formation of similar structures that support evidence-based decisions regarding new public health interventions.

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1. Introduction

An increasing array of safe and effective vaccines is rapidly emerging for potential global use. Examples include new and previously underutilized vaccines against common causes of invasive bacterial disease and meningitis, such as Streptococcus pneumoniae, Haemophilus influenzae type b (Hib), and Neisseria meningitidis, as well as against rotavirus diarrhea and human papillomavirus (HPV). In addition, new vaccines against typhoid fever, dengue, and malaria, among others, are anticipated in the near future. Many of these vaccines should substantially contribute toward achieving Millennium Development Goal 4, to reduce mortality among children <5 years of age by two thirds between 1990 and 2015 [1]. Many of these vaccines have been recommended for inclusion in national expanded programs of immunization [2–6].

2. PAHO’s ProVac Initiative

Recognizing the need for an evidence base to support decisions regarding the introduction of new vaccines, the ministers of health from countries in the Region passed a resolution during the 2006 Pan American Health Organization (PAHO) Directing Council meeting calling upon Member States to mobilize additional funding to introduce new vaccines. Both rotavirus vaccine (RV) and pneumococcal conjugate vaccine (PCV) were considered priority new vaccines for the Region [7]. In the same resolution, it was requested that PAHO “support country activities to integrate economic studies into the decision-making process for the introduction of new and underutilized vaccines,” as this support was seen as important for the decision-making process. To respond to this request, PAHO accelerated efforts to develop the ProVac Initiative, initiated in 2004 with seed funding from the Global Alliance for Vaccines and Immunization’s (GAVI) Pneumococcal vaccines Accelerated Development and Introduction Plan (PneuADIP) and sustained funding from the Bill and Melinda Gates Foundation.

From its inception, the ProVac Initiative’s primary focus has been to promote and strengthen countries’ technical capacity to generate evidence to inform decisions on new vaccines, with a special emphasis on health economic analyses. This is achieved through the following objectives: (1) to strengthen infrastructure for decision making; (2) to develop tools for economic analyses and provide training to national multidisciplinary teams; (3) to collect data, conduct analyses, and build decision cases according to technical, financial and operational, and societal criteria; (4) to advocate for evidence-based decisions; and (5) to effectively plan for vaccine introduction when evidence supports it [8].

With ProVac’s support, 13 countries in Latin America and the Caribbean (LAC) have conducted or are currently conducting a total of 22 cost-effectiveness studies on the introduction of RV, and/or HPV vaccine. These studies have been conducted by national teams that have led the process of obtaining and evaluating the best available evidence on disease burden, vaccine effectiveness, program costs, and disease costs, among other factors. These data have been used to customize analyses via cost-effectiveness models developed by the ProVac Initiative. ProVac’s objectives and rationale, the approach used to achieve its proposed goals, and lessons learned have been reported in detail elsewhere [8–10].

3. ProVac Network of Centers of Excellence

Central to ProVac’s vision of South–South and South–North technical cooperation, the ProVac Network of Centers of Excellence (CoEs) was established by PAHO in 2010 to leverage the existing capacity in the Region. The Network comprises a regional group of academic institutions with established expertise in supporting public health decision making in LAC.

In this article, we describe the rationale for establishing the ProVac Network of CoEs. We also describe its operations, challenges, main outcomes, and lessons learned so far. We hope the lessons learned will contribute to the development of networks of academic institutions that provide support to public health programs in other regions of the world.

4. Rationale for establishing the ProVac Network of CoEs

The ProVac Network of CoEs was created with the objective of providing technical support to ProVac activities in LAC, leveraging the existing capacity to perform evidence synthesis and economic evaluations related to immunization policy. Through participation in the Network, it was anticipated that these regional academic institutions would be strengthened and better able to provide training and technical support to, and collaborate with, countries in the Region. The interaction between all actors involved in the ProVac Initiative, including PAHO, country teams, ministries of health (MoH), and CoEs, among others, has been highly useful in fast-tracking necessary studies to generate evidence for decision making regarding the introduction of new vaccines (Fig. 1).
5. Structure of the Network

The Network currently includes five academic institutions across LAC (Table 1). Their selection was initiated in 2009, when a survey was sent to eight academic, not-for-profit institutions that had recently published work in the areas of clinical decision sciences and health economic analysis.

Survey results were analyzed by the ProVac technical team, which comprised experts in economic evaluation, epidemiology, and public health. In choosing CoEs, the following criteria were considered: academic productivity in immunization-related work, well-established investigators with track records in relevant fields of investigation, successful collaboration with governmental agencies and international organizations, and experience in training and education on these issues. After this analysis, all six institutions that responded to the survey were invited to join the ProVac Network of CoEs.

In March 2010, the CoEs met for the first time during a regional ProVac training workshop at which the principal investigator and an additional investigator from each CoE acted as workshop facilitator.

Table 1
Projects assigned to the ProVac Network of Centers of Excellence, May 2010.

<table>
<thead>
<tr>
<th>Center of excellence</th>
<th>City and country</th>
<th>Project(s)</th>
</tr>
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| Department of Internal Medicine and Health Technology Assessment Unit, State University of Rio de Janeiro (UERJ) | Rio de Janeiro, Brazil | • Acute otitis media incidence: review of gray literature from LAC and development of a methodology for estimating the incidence of acute otitis media  
• Cost of illness and productivity losses: identification of potential sources of data and development of a methodology for estimating the costs of illness and productivity losses in LAC |
| Department of Preventative Medicine, School of Medicine, University of Sao Paulo (USP) | São Paulo, Brazil | • Health service utilization: development of a methodology for estimating health care service utilization and identification of data sources  
• Revision of cervical cancer prevention strategy cost-effectiveness model: review of and support for the development of a cervical cancer prevention strategy cost-effectiveness model |
| Epidemiology and Public Health Evaluation Group, Epidemiology Unit, Public Health Department, Universidad Nacional de Colombia (UNAL) | Bogotá, Colombia | • Vaccination program costs: development of a tool and a guide for vaccination program costing adapted to the needs of and data availability in the Region |
| Health Economics Research Group, University of Cartagena (UCart) | Cartagena de Indias, Colombia | • Model parameters and drivers: identification of model parameters that are key drivers and for which no national-level estimates are available, or for which data do not vary among countries, along with identification of data to prepopulate the above parameters with data available from the Region |
| Health Economic Evaluations and Technology Assessment, Institute for Clinical Effectiveness and Health Policy (IECS) | Buenos Aires, Argentina | • Long-distance training: development of a proposal for long-distance training  
• Atlas of data in the Region: development of a regional “atlas” to facilitate wide, easy, and public access to epidemiological, cost, and health care use information relevant for cost-effectiveness evaluations  
• Disease burden: development of methods for estimating disease burden |
By matching these areas to identified expertise in each of the CoEs, ProVac staff proposed one to three potential projects to each center. These suggested projects were then discussed individually. As a result, consensus was reached about which project the centers were responsible for completing.

After agreement on assigned projects had been reached with the CoEs (Table 1), a detailed plan of action was drafted by each center, including budget needs. Each project was assigned to two CoEs (one responsible for coordination and one for collaboration) with the goal of strengthening South-to-South collaboration. Plans of action and budget proposals were carefully reviewed by the ProVac team (PAHO technical staff and international technical partners, including faculty from Harvard University, the London School of Hygiene and Tropical Medicine, and the New Jersey Medical School, as well as other experts) and revised as needed. On the basis of these plans, one-year contracts were issued by PAHO for each CoE in which intermediate and final deliverables were specified. The final budget for each contract included funding for human resources (based on seniority and expertise), office supplies, and travel and per diems required for project completion. In the first round of contracts, the total amount of funding for Network projects was approximately $300,000.

7. Network coordination and operation

Network members developed and agreed on an internal operating plan describing the overall structure and details of the implementation of the CoE Network. This plan provided specific information about how each CoE would collaborate and coordinate its activities under the ProVac Initiative to ensure that overall objectives were met efficiently. The plan included a structure for coordinating the Network, a series of guiding principles that dictated how CoEs would work together, and an outline of the roles and responsibilities of CoEs, the ProVac team, and collaborators. It also included details on the organizational structures and project personnel for each of the CoEs. Finally, the plan laid out the framework, mechanisms, and tools to facilitate Network communication and monitoring.

The ProVac team oversees the Network, helping to foster the South–North collaboration envisioned. Administrative and technical monitoring mechanisms were established to allow for close follow-up of project development. CoEs were paid against delivery of intermediate and final products after technical approval by the ProVac team. Technical monitoring of projects was performed by assigned focal point personnel.

7.1. Network coordinator

Crucial to the successful implementation of the ProVac Network of CoEs is the appointment of a network coordinator. Selection of the coordinator for the Network was based on the candidate’s expertise on economic evaluation and involvement in the early stages of the designing the ProVac Initiative at PAHO. This international consultant, unaffiliated with the CoEs, was hired on a full-time basis and had the following roles: (1) coordinating the committee that selects the CoEs to include in the Network; (2) developing the proposal for the structure of the Network; (3) designing and monitoring the Network’s operational plan; (4) coordinating communications between the Network and the ProVac team; (5) reviewing and approving CoE plans of action; (6) negotiating with CoEs on contractual terms; (7) identifying contractual changes that are needed as the project progresses; (8) preventing potential duplication of or gaps in work/activities among groups; (9) supporting the development of the agenda, materials, and reports for Network meetings; (10) monitoring the progress of

facilitators. In May 2010, the PAHO team established general terms of reference for the Network (Box 1) on the basis of input received from countries regarding identified gaps in the decision-making process for new vaccine introduction. These terms of reference guided the development of the specific projects to be assigned to each CoE and accompanying plans of action.

The ProVac Network of CoEs was tasked with providing technical support to ongoing activities of the ProVac Initiative, including strengthening capacity in countries, developing methodological guidelines for performing economic analyses at the national level, and developing, reviewing, or adapting models and tools to support economic analyses and evidence-based decision making. The Network also fosters collaborations among identified CoEs (South–South collaboration) and between CoEs and technical partners and academic institutions outside LAC (South–North collaboration), promoting academic exchange and capacity building. In addition, training of the next generation of technical experts, under the mentorship of CoE investigators, is greatly encouraged.

6. Projects assigned to CoEs

In addition to its main objectives, the ProVac Initiative promotes critical assessments of all factors in the decision-making framework, including technical, logistical and financial, and societal criteria, as described elsewhere [8].

As a result of these assessments, countries identified the following priority issues: lack of information on rotavirus and pneumococcal disease burden in the Region, limited data on the cost of rotavirus and pneumococcal diseases, lack of data regarding the incidence of acute otitis media, challenges in estimating health care service use locally, and underestimation of immunization program costs. Given these priorities, the areas considered for specific project development included the following:

- tools and methods for vaccination program costing;
- tools and methods for budget impact analyses;
- strategies to estimate model parameters for which little or no data are available locally;
- methods for estimating the costs of illness, complications, sequelae, and productivity losses;
- methods to estimate rotavirus and pneumococcal disease burden;
- methods for estimating health care service utilization, given available data sources in the Region;
- impact studies conducted after a vaccine has been introduced.
- continuing education curricula and strategies.

Box 1: Terms of reference for the ProVac Network of Centers of Excellence.

- Conduct specific studies and develop specific products for the ProVac Initiative, considering each center’s expertise
- Provide training through ProVac workshops and distance learning on economic analyses and evidence-based decision making
- Critically review, validate, and pilot selected ProVac models, tools, and materials, providing critical feedback and updates as needed
- Act as technical subject matter experts in selected issues during the implementation of the ProVac Initiative, as needed and requested by LAC countries through PAHO
- Provide technical support to national multidisciplinary teams in all steps of economic evaluations of new vaccines in various LAC countries, including study design, data collection, data cleaning and critical revision, and analysis and interpretation of results

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plans of action; and (11) coordinating the development of a special journal supplement to disseminate the work performed by the Network.

7.2. Focal points

To facilitate overall Network coordination, ProVac team members were assigned as focal points to each project. Focal points were selected from among the PAHO ProVac team and the ProVac team of international collaborators. They were assigned to projects according to their expertise and areas of interest. Focal points were asked to consider, to the extent possible, as part of the working group responsible for each of the projects, together with CoE staff.

Specific roles for focal points were identified, including (1) participating in technical discussions related to project development; (2) facilitating collaboration among centers; (3) providing ongoing technical advisory support to CoEs regarding research methods and their implementation; (4) reviewing draft deliverables and providing feedback to verify that work and products meet agreed-on plans of action, resulting in authorization of payments against deliverables; and (5) working with PAHO’s ProVac team to align activities and products with ProVac’s broader activities and plans. Focal points communicated with CoEs on a regular basis, including conference calls and e-mail exchanges at least once every 2 months.

7.3. Principal investigators

The principal investigator at each CoE was responsible for coordinating the local team of investigators involved in a given project. The contract and the final work and deliverables were the responsibility of the principal investigator. Principal investigators were to participate in all meetings and conference calls with focal points, identifying additional staff from their team to join as needed. Otherwise, the roles of and expectations for principal investigators were similar to those of any principal investigator in terms of executing a funded proposal and carrying out a plan of action.

7.4. Communication

Given the nature of the collaboration, it was critical for all institutions to be committed to clear, transparent communication. This was facilitated by the Network coordinator and tools such as the Network of CoE SharePoint website and regular meeting schedules (in person or through conference calls). The SharePoint website, a mechanism for virtual collaboration, was developed to facilitate communication and exchange of materials among centers.

A conferencing call system was made available by PAHO in which focal points could set up conference calls allowing for free dial-in by CoE and other call participants.

In addition to these virtual communication strategies, Network in-person meetings took place twice a year. The ProVac team, including focal points, two investigators from each CoE, and additional selected PAHO technical staff, participated in these meetings. One biannual meeting was held in Washington, DC, and the other in one of the cities where CoEs are located, rotating among them. Such meetings have proven invaluable in communicating progress, planning next steps, and building team spirit and commitment to effective teamwork.

All reports and deliverables were to be provided in English, allowing for review and constructive comments by all focal points and partner institutions and facilitating publication. Nonetheless, to enhance communication exchanges during face-to-face meetings, trilingual simultaneous translation to and from English, Spanish, and Portuguese was provided. All documents and materials produced by the Network of CoEs are made available in both English and Spanish by PAHO.

8. Initial results and outcomes

Since its establishment, the Network has developed and piloted numerous tools, methodological guides, and training materials to support countries in their efforts to assess existing evidence and generate new evidence on vaccine introduction. These products are summarized in Table 2. CoE teams have provided training through workshops and country activities. Examples include the testing and piloting of tools being developed as part of the projects assigned to CoEs, such as an immunization program costing study conducted in Bolivia.

A series of “how-to” guides based on these products is currently under development and will be made available for use by national multidisciplinary teams. In parallel, academic manuscripts presenting the findings from the projects are being published in this special supplement for a broader global audience.

In addition, the Network of CoEs has been effective in fostering collaborative peer work and academic exchanges, strengthening dialogues, and contributing to bridging the gap between academia and policy makers in LAC. Outcomes of the work of the Network of CoEs are being used by various countries in the Region. Country teams led by ministries of health have conducted economic analyses and are now applying methods proposed by CoEs for estimation of disease burden, costs of illness, and health care service utilization. For example, Bolivia has conducted an Expanded Program on Immunization (EPI) costing evaluation using an EPI costing tool developed by one of the CoEs.

9. Lessons learned

Many challenges need to be addressed to ensure equitable access to new vaccines in developing countries, including development of the capacity to make evidence-based decisions in a resource-constrained environment [9]. National governments in
developing countries succeed in promoting health and preventing disease in a more timely manner when they (1) develop the expertise to make the best technical decisions about immunization programs, (2) take responsibility for paying for and distributing vaccines, (3) ensure capacity development of both human and infrastructure resources in order to provide the best possible services for new vaccine administration, and (4) are supported by strong partnerships with international organizations [9].

CoEs are usually established according to criteria such as excellence in a given research area, the structure and capacity to develop research, and past experience in delivering quality results and products. These criteria were also used in establishing the ProVac Network of CoEs. However, the ProVac Network of CoE was developed to operate differently from other funded centers of excellence. In the latter case, academic research groups regarded as leaders in the field usually receive large multiyear grants to fund a combination of investigator-initiated research and training projects after having developed a work plan in response to a request for research proposal issued by the funding institution. Once the work plan is approved and funding is granted to the CoE, limited technical follow-up occurs until the product is delivered.

In the model we used for establishing the ProVac Network of CoEs, we issued per-product contracts with CoEs, which allowed for much closer follow-up and monitoring of each step of the research process. This ensured that the product delivered was relevant to help answer policy questions on new vaccine introduction in LAC in a more timely fashion. Other lessons learned are listed below.

9.1. Project assignment

Academic investigators frequently develop original research protocols and implement study designs themselves. In the case of the Network of CoEs, CoE project proposals were based on needs identified by other decision makers. The products commissioned were guidelines and tools for use by national country teams, although in many circumstances they were piloted by a CoE. From a purely scientific standpoint, working on these “operational” projects may not be of interest to many investigators. Thus, thorough discussions with CoEs and investigators about the products needed, as well as the CoE investigators’ understanding of the overall ProVac Initiative work and process, are essential to ensure that the investigators are in full agreement with the work commissioned and, ultimately, that the products of the work can be used in building the capacity of country teams and technical staff at ministries of health.

9.2. Team composition

Local teams with adequate technical capacity should already exist at CoEs, and projects should be assigned on the basis of investigators’ previous experience and expertise. In our experience, creating new teams to respond to a specific project request is not efficient and results in unsatisfactory products.

9.3. Close and timely follow-up

Not all CoEs selected to join a network will be able to successfully develop the products included in their contract. Close and periodic monitoring of progress can help to identify and address challenges as they arise and redirect the work as needed. Such situations may include competing demands on investigators’ time, changing professional roles for key investigators, and/or lack of institutional support for participation as a CoE.

9.4. Technical oversight and communication

Close communication and interaction between CoE investigators and the ProVac team are essential. The availability of dedicated staff responsible for technical follow-up and discussions with CoEs, in a timely fashion, as well as a clear definition of their roles is crucial. As academic investigators are usually independent and not commonly accustomed to conducting work with close monitoring and feedback throughout the process, strong communication and interpersonal skills are essential for those assigned the task of technical follow-up.

Finally, it is anticipated that as a project is conducted, investigators will often explore ideas and paths that are different from those originally proposed. This is the core of scientific research and is beneficial for the advancement of science. Nonetheless, when operational research is expected to provide results to be used for decision makers in a given time frame, such exploration may distance the final results and the research product from its original intended use. Here again, the role of close technical follow-up is crucial.

9.5. Transverse collaboration among Network members

Transverse collaboration (South-to-South), as sought by the ProVac Network of CoEs, has not been successfully implemented in the Network’s current iteration. Although each project was assigned to a coordinating and collaborating center, the collaboration requested was not formally included in contracts, and there was no a priori definition of the roles of collaborating CoEs within each project. When funding is made available and request for project proposals are initiated, collaboration should be clearly indicated, including the roles and responsibilities of each party and a budget item to support the collaboration.

However, the Network was effective in fostering academic exchanges between its members. These exchanges took place mainly during regional ProVac workshops and periodic Network meetings. On such occasions, exchanges between junior and senior researchers, and exposure of junior and mid-career researchers to a broader research community, were successfully promoted.

9.6. Timely dissemination of results to appropriate target groups

National teams led by the ministry of health are the primary audience for the products of the CoEs. It is important that such teams have timely access not only to the materials under development but to the CoE’s expertise. To maximize their impact, dissemination of Network results through publication in international peer-reviewed journals as well as national technical manuals and guidelines should be promoted. In addition, regional technical meetings are useful platforms for increasing awareness of online materials that are being made available.

For timely and efficient dissemination of results to technical staff and decision makers at the national level, it is important that regional networks function under the guidance of an organization that has a close technical relationship with national and regional public health decision makers, such as PAHO or other WHO Regional Offices, or under national governments themselves. This will ensure that the Network’s plans respond to real-time needs for evidence. Early interaction between the Network of CoEs and national teams can accelerate the dissemination of their work, with the potential to address current data gap issues.

9.7. Management of the potential for conflicts of interest

Investigators and academic institutions often develop research interests and conduct various projects within a given research
area simultaneously, financed by different sources. Slight overlap in work may occur, and to avoid conflicts of interest, particularly regarding funding from government or international organizations and the pharmaceutical industry, all CoEs should clearly declare any perceived or real conflicts.

10. The way forward

As the focus of country ProVac activities continues to expand and evolve according to needs identified at the national level, additional Network projects will continue to be developed. More direct and active involvement of CoEs in country support activities is planned. Expansion of the Network through incorporation of other centers is important with respect to adding breadth and depth of expertise and involving more countries in the Region.

The ProVac Initiative is expanding to other regions of the world with the support of other immunization and public health partners (Agence de Médecine Préventive, PATH, Sabin Vaccine Institute, World Health Organization, Centers for Disease Control and Prevention). The cornerstone of the Network of CoEs is leveraging existing regional capacity. There will be unique challenges in other regions where relevant technical capacity is limited. However, in other regions, the experiences of the PAHO ProVac Network of CoEs within the Region of the Americas should help with the formation of similar structures to support evidence-based decisions on the introduction of new vaccines.

Conflict of interest

None of the authors report a conflict of interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.vaccine.2013.05.033.

References


