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Research primer

Mentorship and how to conduct research: A research primer for low- and middle-income countries

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ABSTRACT

Development of a successful research program can seem daunting when looked at from the starting line. It will take years if not decades to succeed and become sustainable. It requires local partnerships and mentoring; it mandates the establishment of review boards; it requires national health policies to allow for protected time for research in salaries and for fund granting agencies to be set up; it requires training of researchers and support staff as well as a change in the mindset of clinical staff on the floor. It will almost inevitably require international support of some kind for low- and middle-income country researchers, be it university programs or other academic or private institutions. Success can occur; most likely it will occur by partnering with local research experts outside of emergency medicine in some combination with international networks and mentoring. Perhaps the most critical elements to success are intellectual curiosity and a burning flame of passion – and neither of those carry a financial cost.

African relevance

- Building a research infrastructure is often viewed as a low-level priority as countries and hospitals build systems and patient care models
- Building the infrastructure for research, so that outcomes can be measured, allows for emergency care system evolution and growth.

The International Federation for Emergency Medicine global health research primer

This paper forms part 12 of a series of how to papers, commissioned by the International Federation for Emergency Medicine. It describes mentorship, barriers to research, policy making and collaboration. We have also included additional tips and pitfalls that are relevant to emergency medicine researchers.

Background

Intuition and anecdotal experience in clinical practice can only improve outcomes to a certain level; in many instances, intuition will prove to be wrong: for decades, for example, we were 'certain' that ventilation was essential for resuscitation of a person in cardiac arrest – until research proved us wrong. Measuring outcomes through research allows us to take steps forward in patient care, as does comparison of novel treatment options with existing standards of care. The greater our knowledge base through research, the larger the number of patients who will receive optimal care. One important aspect of research in low- and middle-income countries is research that shows how to adapt expensive treatment options used in high income countries to succeed within more constrained budgets. This requires that research be performed in countries with lower incomes. Care must be taken to not directly apply research from high income countries that may not be applicable in another setting or geographic region.

Building a research infrastructure and starting up original research activity is often viewed as a low-level priority as countries and hospitals build systems and patient care models. It is easy to see how establishing research could even be ignored or considerably delayed in countries where there is a struggle to fund basic system infrastructures for a national emergency care system. Ironically, that research may well be instrumental in defining how that national system should be structured. Although the principles of an emergency care system are universal, the

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actual model for any system of necessity must be based on existing or planned local infrastructures as well as be the right fit for a local culture: every emergency care system will be unique. Data from research will be required to define and build any emergency care system so that it meets the needs of those it serves.

Building the infrastructure for research, so that outcomes can be measured, allows for emergency care system evolution and growth. Once established, collecting data and doing research often identifies 'the next priorities' for health care in the system. As an example: research that demonstrates poor outcomes from prehospital resuscitation due to an inability to arrive on scene in a timely fashion may rightfully delay training for advanced life support until on-scene times can be more in line with optimal outcomes, allowing funding to go towards improving system response times first and advanced life support later. Another example: research into why and when patients present to the emergency system in order to improve access may be a higher priority than optimizing treatment once they arrive.

When starting a new emergency care system, planning the infrastructure and growth of research must be done simultaneously and as an integral part of the entire emergency care system model. International expertise can provide valuable help. This can occur either by going abroad for training or importing expertise. Research expertise can often be found locally. Collaboration with local researchers from other specialties can help develop the emergency medicine research program. When more robust, the program can expand internationally to form a research network. With that growth, only a few will need to be trained in areas such as biostatistics to provide support for the many other researchers. Planning the infrastructure and growth of research at the same time and hand in hand with the planning of the entire emergency care system model, not after, will optimize success.

Conducting research in low- and middle-income countries

Barriers to research development

Levine et al. identified the broad categories of barriers that limit the ability of research development to succeed [1]. These were:

1. The limited availability of research personnel, particularly those with prior research training.
2. Logistic barriers and lack of standardization of data collection.
3. Ethical barriers to conducting research in resource-limited settings, particularly when no local institutional review board is available.
4. Relative lack of funding.
5. Lack of time due to workload.

The article in many cases provides only theoretical solutions, but until funding and regional review boards are established, it will be difficult to take the larger steps forward that the authors recommend. Initial local projects will often be funded solely by 'sweat equity' where motivated people dedicate their time. In many instances such time will take the researcher away from clinical time, or create a situation where income is reduced compared to peers not doing research. Recognition of these imbalances and support from leaders and mentors will be critical to sustain motivation. In the next sections, rather than addressing barriers, which can be seen as a negative approach, we will instead try to emulate the principles of change management and define the steps required to attain an "ideal future state" [2].

Policy making

National health care policies should be evidence based. Policy based on evidence is better accepted. Evidence is only achieved by research. Rigorously obtained information achieves greater acceptance of suggested policies, and this information is best achieved through research [3]. Initially, research evidence may arise from external sources, providing context for local data. Results of surveys, expert opinion and research publications are all integral to policy making. Published review series, such as that seen in the Lancet, can be very influential [3]. Use of such external information is critical in establishing and supporting the policies needed to create a research model for emergency medical care as it grows. Low cost, high impact local evidence that is pertinent to the country will be used to establish agenda items and initial policies. Ultimately, national policies will establish sustainable funding programs for peer-reviewed research.

Clinical trials

It will be necessary to adapt multi-national trials to local regulations, customs and needs. This may deter some companies from selecting a particular venue. Each country's researchers should verify that international recommendations align with local culture, regulations and needs.

Less developed regions of the world carry a greater proportion of disease burden, yet frequently lack the necessary resources to optimize diagnosis and treatment [4]. External funding from clinical trials may help overcome some of those limited resources. It also supports the building of local research infrastructure and staff training that might not otherwise be possible. Lack of infrastructure, resource variability, unfamiliarity with clinical trial regulations, cultural/ethical issues, and other legal constraints around data-sharing can often be overcome through careful planning. Early introduction of clinical trials can provide additional tangible benefits as well: it enables local people to develop outside research contacts and can introduce them to international research networks. The latter may then be able to initiate studies locally that otherwise would not be possible. Most importantly, it increases the odds of local research success and can locally address country specific health issues.

Not all consequences from partnering with pharmaceutical or device companies in clinical trials will be positive. In the past, many trials carried out in LMIC were enabled by exploitation of ignorance, poverty, and poor awareness of human subject rights and safety issues. Authorship from participation in the trials was not declared in some instances. These issues appear to have improved to a large degree, but still exist and should be deplored. Additional considerations:

- Funding sources have their own research priorities, which may not align with those of local parties
  - For example, funding for clinical trials may not prioritize conditions that are seen most frequently in LMICs due to decreased prevalence (and decreased estimated revenue) in high income countries [4]
- Methodology is controlled by external researchers hired by the company funding the research, which can either lead to bias or focus on issues that may not help the local community.
- Local researchers will receive little formal research training beyond learning how to properly collect and register data.

Universities

The largest cohort currently developing academics in emergency medicine worldwide in LMIC are universities, primarily from the USA, Canada, Australia and the UK. University–based teams are inherently energetic and well meaning. Their successes far outweigh their failures. Many university-led projects have resulted in the formation of specialty training programs and the start of national emergency medicine societies. Some have led to the establishment of basic research programs. Equally important is mentorship for clinical development and research. Proximity is not essential for mentorship with social media and the internet. The links established during university projects can allow for ongoing mentorship for many years.

Selection of LMIC sites is at times haphazard, as there is no

international oversight 'umbrella' organization in place to direct institutions to countries or hospitals in need. Such organizations would have a global picture and a 'broad strokes' agenda for development of emergency medical care and research. The World Health Organization (WHO) or the International Federation for Emergency Medicine (IFEM), two possibilities, do not offer this service. Without oversight, it is almost certain there will be inconsistency in the messaging given to developing systems, no matter how conscientious the university team involved. University programs are often localized at one hospital, and rarely integrated into a national health care policy. Impact for that country will be variable and may have significant impact for only a small part of a national health care system. When more than one international group is active in the same country, conflicting messages and mandates can arise, to the detriment of national development.

An example of the problems that can arise without oversight and common goals was recently published as it related to the emergency medicine experience in India [5]. "Despite a broad commitment to expanding specialist training, the network of domestic, diasporic and foreign stakeholders was highly fragmented, resulting in myriad unstandardized postgraduate training programs and duplicative policy agendas. Further, the focus in this time period was largely on training specialists, resulting in more emphasis on a medicalized, tertiary-level form of care". There was little focus on improving emergency medical care and research throughout the country.

The best of intentions will not yield optimal results without close communication and partnerships. The goal is collaboration and development of the local community, not competition amongst the foreigners. With many university projects being grant based, loss of grant funding can result in abrupt termination of support.

Despite limitations, most university-led projects have been beneficial and have created many successes. LMIC countries with an objective of growing academics and research in emergency medicine should consider this approach. To optimize success, future collaboration should follow a more structured and targeted approach by identifying project sites and prioritizing and standardizing the steps to be taken. Hopefully in the near future an international oversight organization will be introduced to optimize even further the projects undertaken through academic organizations.

Local collaboration

Research is never done in isolation. Collaboration and networking are essential to productivity. This is equally true for those starting out as it is for those who are established. In almost every country, medical schools and teaching hospitals have people and academic departments already active in clinical research. Established specialties usually have active research programs. Many schools have faculty with expertise in biostatistics and methodology. As emergency medicine trainees take their first steps into research, pairing with local expertise is encouraged. The advantages are numerous:

- Identifying and working with local expert mentors
- Learning the basic principles of research methodology
- Having access to biostatistical and methodological expertise, often at minimal cost
- Learning how to prepare grant applications
- Learning the steps to successful networking and collaboration
- Being able to participate in research when no funds for personal projects are yet available (i.e. relying on the funding and staffing of others)
- Developing a research track record
- Developing projects that meet local needs.

While working within the constraints of research within another specialty can limit initial research choices, it also allows someone to focus in on a specific area of interest. This can lead over time to an area of expertise. Most universities have more than one group of researchers, so a novice emergency medicine researcher can seek mentorship with an established researcher in an area closest to their own field of interest. It will take years, if not decades, for an emergency medicine program to develop its own sustainable research program. Collaboration with other more advanced researchers is a proven long-term strategy for a nascent emergency medicine researcher. The benefit comes from mentoring, training and local collaboration.

Publishing research and access to local research publications

Research has its greatest impact when conducted and published locally. The outcomes of that research are most relevant to patient care offered in similar circumstances. It is therefore critical that researchers in LMIC can get research accepted by local – relevant – journals. In Africa, for example, that limits many to the African Journal of Emergency Medicine or a national medical society journal. Other (open) journal options are less accessible as they charge fees for reviewing a submitted paper, fees many LMIC researchers cannot afford. Relative cost of access to journal articles outside of institutional libraries is equally problematic. In an article by Bruijns et al., using the purchasing parity index, the corrected cost of a single-unit article access or process (publication) charge for South African, Ghanaian and Tanzanian authors, respectively, was 2.3, 3.5 and 2.8 times higher than the standard rate [6]. Those least able to afford the costs were being charged at the greatest rate.

Mentoring

Mentoring by either local researchers or by international at-distance mentors is critical in developing researchers in any academic emergency medicine program, especially new ones. Objectives and expectations for both mentor and mentee should be agreed to prior to starting a mentoring program realizing that the needs of both parties will change over time. Both mentor and mentee should contribute to the process. Both must benefit. The overarching goal is simple: for both to improve, using personal development to drive wide knowledge gains. With that improvement, the relationship changes to colleague/colleague so it can evolve into both participants mentoring a new set of mentees. Nine core global health research mentoring competencies specific to low- and middle-income countries have been identified [7]:

1. Maintain effective communication.
2. Align expectations with reasonable goals and objectives.
3. Assess and provide skills and knowledge for success.
4. Address diversity.
5. Foster independence.
6. Promote professional development.
7. Promote professional integrity and ethical conduct.
8. Overcome resource limitations.
9. Foster institutional change.

Unlike a research supervisor, a mentor acts as a coach, providing valuable professional insights about career growth and development. They bring an expertise with a supportive and constructive environment without bringing judgment. Mentoring can be extremely effective. More than one mentor should be sought, with each mentor working on one facet of the mentee's growth. As with most things in life, there will be setbacks in designing and conducting research. Having a mentor who listens and provides feedback to you when difficulties arise is invaluable. There are hurdles that you may need to overcome when starting research in a LMIC. When choosing a mentor, it is best to find someone who is interested in your success as a person and helping you to develop your career in research. A mentor with success in mentoring others, obtaining funding, and connections to help you to network with other researchers across institutions will help you to reach your goals.

Navigating local policies, culture, and resources can be challenging and a mentor that understands and can help you with solutions will aid in your success.

Mentors want their mentees to accomplish their goals. They also like respect, commitment, and a good work ethic. Organization, keeping planned meetings or phone calls, and sticking to deadlines demonstrates your dedication. Setting expectations and being clear about the roles each of you play is critical. If you reach a point where you feel stuck and are having trouble moving forward, your mentor should help. It is important to create short and long-term professional goals with your mentor and these should be evaluated at least twice a year.

Summary

Development of a successful research program can seem daunting when looked at from the starting line. It will take years if not decades to succeed and become sustainable. It requires local partnerships and mentoring; it mandates the establishment of review boards; it requires national health policies to allow for protected time for research in salaries and for fund granting agencies to be set up; it requires training of researchers and support staff as well as a change in the mindset of clinical staff on the floor. It will almost inevitably require international support of some kind for LMIC researchers, be it university programs or other academic or private institutions. Success can occur however, as there are many examples of success. Perhaps the most critical elements to success are intellectual curiosity and a burning flame of passion – and neither of those carry a financial cost.

Tips on this topic

- Ensure when seeking a mentor that you choose one who has a past record of mentoring, and who can provide mentoring pertinent to where you work.
- Match research interests with hospital or national requirements, not with personal goals – initial funding will arise when priorities align
- Start with basic questions and research methodology, then grow from there.
- Select locally relevant topics.

Pitfalls to avoid

- Avoid competing interests from different external groups that can lead to inconsistent or even cross-purpose recommendations
- Avoid influence from external funded clinical trials that risks ethical improprieties
- Avoid researchers – local or external – who have their own interests in research ahead of their mentoring priorities.

Author's contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: JD contributed 70%, ES and NJ 10%, TK and RKM 5%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of competing interest

The authors declared no conflicts of interest.

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