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Research Partnerships and Guidance in Academic Global Ophthalmology

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Introduction

The American Academy of Ophthalmology (AAO) Task Force on Academic Global Ophthalmology was convened to catalyze development of AAO guidance and perspectives related to clinical service, education, and research initiatives within the field of *Global Ophthalmology*. The term "Global Ophthalmology" represents an expansive, cross-cutting, yet growing field with initiatives that may range from teaching to clinical service, to research facilitated through in-country partnerships. This article highlights the why, what, and how related to research and investigation in international settings. While much of this article focuses

INTERNATIONAL OPHTHALMOLOGY CLINICS
Volume 63, Number 1, 15–24

on low-income and middle-income countries (LMICs), multiple principles may be appropriate to research in both resource-limited and resource-replete settings (eg, Ministry of Health and Sanitation partnerships; engagement with local stakeholders; ethical and sociocultural assessment before the initiation of a project).

Prior seminal studies in ophthalmology have highlighted the impact of vision science research in LMICs on both vision and systemic health, particularly where leading discoveries have directly led to actions. Examples include seminal work in vitamin A deficiency and mortality,[1] ivermectin for onchocerciasis,[2,3] azithromycin for the management of trachoma,[4] and deployment of manual small incision cataract surgery at scale.[5,6] While these bodies of work represent significant advances in our understanding of the burden and treatment of eye disease in LMICs, many vital research questions remain.

The *Lancet Global Health* Commission on Global Eye Health defined eye health as "maximized vision, ocular health and functional ability, thereby contributing to overall health and wellbeing, social inclusion, and quality of life."[7] The contribution of vision health to individual well-being includes improved educational outcomes, work productivity, and reduced disparities. Moreover, numerous studies have shown an association between vision impairment and an increased mortality risk.[8–10] To improve eye health globally, survey data and robust indicator data are needed, as well as both discovery and implementation science research.[7]

In this article, we synthesize recent literature related to the topic of global vision science research drawing from the experience of other surgical disciplines and public health experts to describe principles of research in LMICs and global settings, learnings from experiences in the field, and unmet needs. Case-based examples highlight some of the principles that may help to facilitate engagement for trainees, ophthalmologists, and health care providers who aim to answer important questions related to global ophthalmic health.

Sociocultural Context and Ethics

Performing culturally competent global vision research demands a clear understanding and appreciation of sociocultural context, local governmental and ethics regulations, and a commitment to local partnerships and engagement. There is no established set of guidelines to direct well-intentioned vision researchers in these pursuits. Rather, culturally competent and ethical global vision research relies on strong local partnerships built on mutual trust.

Sociocultural context includes the set of cultural and linguistic norms that shape how ethical research is to be conducted, how research is perceived locally, and the willingness of individuals to participate in research, among myriad of other factors. The context in which research is

conducted may also shape bias, including social desirability, acquiescence, and observation biases. Thus, an inadequate understanding of context may not only threaten the ethical and cultural competence of global vision research, but also its validity.

Global vision research must include local partners in all stages, from initial needs assessments and project planning to publication. An emphasis on partnership highlights not only the involvement of local researchers, but also the need for equity between colleagues who may hail from the Global South and North. The long history of colonialism and neocolonialism that impacts these partnerships cannot be ignored. There is a growing body of literature that points to inequities in scientific authorship and recognition. Accordingly, issues like authorship should be addressed at the outset of a collaboration and guided by each individual's role in the project, including the contribution of invaluable local knowledge. Local partners are best positioned to devise and conduct research that is contextually competent. Too often, well-intentioned investigators may plan to address research questions with minimal local relevance. In such cases, the burden on participants and any risks may not be justifiable.

It is obligatory to obtain local regulatory approval before commencing global vision research. Foreign ethics review boards are not likely to be familiar with local norms, acceptable practices, or local research priorities. In most cases, foreign researchers should also obtain regulatory approval from their own institution after local approvals are in place. These procedures exist to ensure that the ethics of the research and the collaboration meet institutional and community standards.

Implementation

Implementation of research requires multidisciplinary teams and partnerships between local researchers, key community stakeholders, governing bodies (eg, Ministry of Health), and community members to create effective research groups with a mutual understanding and shared goal to improving the health outcomes of key beneficiaries.[11] Laying the groundwork with strong equitable partnerships is key to successful research initiatives. When developing and designing the study it is important to include local stakeholders and to maintain these relationships along with "shared decision making." Shared decision making upholds the value that everyone on the team has an equal voice despite power disparities, as well as the need for joint consensus[12] when decisions are made. Another key ideal is creating equity among partnerships. This encompasses not only shared decision making, but also a framework that builds capacity, ensures development of local stakeholders, and takes into account inclusive decision making with viewpoints from all.[13] Measuring equity can occur through practices such as capacity building, assessing

tasks within a team, data sharing, practices of dissemination of research, authorship, and funding transparency.[13]

Effective team building and collaboration are paramount for implementing a study, but there are other practical considerations to conducting research. Funding needs to be secured and must be adequate to conduct all phases of the study including capacity building. Flexibility with budgets and approval from all partners is imperative. A research study needs to be approved by local governing institutional review board as noted above. Drafting of protocols should include local stakeholders and key researchers to ensure the protocol and consent fit within the norms of the community. To promote respect, it is important to understand the economic, social, and political climate where research activities take place. This includes challenging locations such as outbreak or conflict zones, as well as an understanding of environmental patterns and optimal timings for meetings and travel for study staff. Other local matters that might impact research include political elections, religious celebrations, and holidays. Logistic considerations include laboratory capacity, equipment, electrical needs, and transportation. Research workflows and training should promote skill transfer, with mutual benefits for all stakeholders and the long-term impact of building capacity and sustainability.[14]

Culture, Language, and Communication

There is enormous diversity of languages around the world, and this has important implications for conducting global health research. Communications within the research team may be made challenging when some members are more facile in either the dominant scientific language (often English or another European language) or the local language. Thus, linguistic challenges may arise for both local and foreign team members. In fact, such issues may exist even among study team members from the same country, since in many places there are regional or local languages and dialects that may be used to communicate with research participants or even between study team members, but that are not universally spoken nationally. The implications of these challenges should be addressed early on to mitigate any impact on scientific rigor, contributions to the project, authorship, comfort, and collegiality.

Language is also an issue that arises when study instruments or protocols are being implemented in a new context and require linguistic translation. To ensure appropriate cultural and linguistic adaptation of surveys, teams should follow best-practices and procedures,[15] including forward translation of instruments, followed by back-translation to the original language to ensure that the intended meanings are retained. In some cases (eg, survey research), cognitive interviewing should then be used to evaluate whether study participants perceive the same intended meaning.

While linguistic translation is a complex undertaking, cultural translation may be even more complex. Culture is highly variable even within a single country and it may be challenging to adapt measures from other contexts. Team members with deep local knowledge are best equipped to provide the relevant insights and guide the process of cultural adaptation. Cognitive interviewing can also be a useful tool to gauge cultural appropriateness. Finally, some quantitative methods may be useful for evaluating validity (eg, construct and content validity of survey measures) in a specific study population.[16]

Capacity Building

Global vision research may pose a distinct set of challenges compared with domestic research, and may encompass both addressing a research question, as well as developing local capacity during the process of operationalizing the research methodologies. Infrastructure growth, equipment procurement, and maintenance may also be required, depending on the scope of the project. The overarching objective of global vision research is to improve the vision and eye health of individuals and populations worldwide. This is ideally accomplished by generating generalizable knowledge on vision and eye health; addressing scientific questions with local relevance; and building local research capacity.

The importance of growing research capacity in locations where there is inadequate infrastructure, knowledge, or resources to conduct vision research cannot be overstated. Fortifying local capacity will not decrease the relevance of global collaborations, however it does aim to enable greater South-South collaboration, equitable relationships between colleagues, and to open doors for researchers, particularly in resource-limited settings. In fact, across all global settings, there is a need to strengthen vision research capacity among groups and institutions that are historically underrepresented in vision research.[17]

Research capacity building can take many forms. Dedicated mentorship is often a necessary component of such efforts. In addition, formal predoctoral and postdoctoral research fellowships provide an opportunity for dedicated aspiring researchers to gain skills in key areas like scientific writing, grantsmanship, study design, and biostatistics. Shorter-term workshops and opportunities to participate in mentored research may provide less intensive and time-consuming opportunities to build some of these skills. Capacity building also involves working with stakeholders to ensure that infrastructure exists locally to conduct research, thus decreasing reliance on foreign entities. For example, laboratory capacity to carry out genotyping and complex assays, as well as data science capacity to construct large databases and carry out complex analyses are key resources for many vision research projects. With appropriate resources and

capacity locally, researchers need not rely on the resources and priorities of external collaborators to undertake the research that they deem important in their own contexts. Some of these key principles are illustrated in the following case study describing the development of a retinopathy of prematurity (ROP) program and the related infrastructural growth.

Case Study: Development of a ROP program in Mongolia

The "third epidemic" of ROP has taken hold in LMICs because of increase in neonatal survival. Studies have demonstrated that screening guidelines established in high-income countries do not adequately encompass at-risk infants in LMICs, where infants that develop ROP have been demonstrated to have greater birth weights and gestational ages.[18] In 2011, in collaboration with ORBIS International, an international group of investigators worked with local partners at the National Center for Maternal and Child Health in Ulaanbaatar, Mongolia to assess the ROP needs in the country. During this initial screening program, several children with high risk for developing severe ROP were identified, in addition to many children who had stage 4 and stage 5 ROP. At that time, screening protocols and treatment of ROP were lacking. Infrastructure development was needed for screening and the clinical care of children at-risk of ROP. This was coupled with the development of data management systems, imaging of the fundus in at-risk infants, and tele-education for local physicians. Following the development of clinical infrastructure, a study in Mongolia was conducted to evaluate screening guidelines utilizing a web-based data management system, which has since been expanded to screening programs in Kathmandu, Nepal, and Coimbatore, India.

Investigation of ROP guidelines in Mongolia was facilitated by a data management system that allowed for data management and remote expert reading. An advantage of this system was that international experts could remotely access the clinical data and images and corroborate ROP diagnoses in challenging cases. As a result of the lessons learned from this screening program, iTeleGEN, which is a web-based platform that integrates data management, tele-education modules, and telemedicine, was developed. Pilot projects in Kathmandu and Nepal in ROP screening were conducted, followed by expansion for its used at Aravind Eye Hospital (Coimbatore, India) for both telemedicine and telescreening of ROP, and has promising utility in the adoption of artificial intelligence-assisted screening programs.[19–22]

The current screening guidelines utilized in Mongolia are gestational age <34 weeks and birth weight <2000 g, which are evidence-based guidelines developed from this screening program. In the Mongolian cohort, 18 infants (9.3%), including 8 with type 1, were outside of US

screening guidelines, demonstrating that guidelines must be specific to the region in which the screening takes place.[23] Local providers, NGOs, and international partners were instrumental in clinical program development and research programs that were scalable to different country settings.

How to get Involved

Participating in international research, teaching, or capacity building can be a vital part of one's career whether in academic medicine or private practice. While many avenues exist for involvement in global initiatives, finding mentorship is one of the most important aspects for successful individual and program development. A mentor may be valuable in providing introductions and collaborations with pre-existing partnerships. The mentor will know how to navigate a new setting that you may be less familiar with and serve as a guide for your participation.

For ophthalmology trainees there are multiple existing learning opportunities. Many residency programs have a global experience built into the residency training program with an increasing number of residency programs with a global track, If this is an aspect of training that one values, it may be ideal to find a program that provides a global research or learning experience. There are also a few ophthalmology residencies that have a global track or curriculum in place with didactics, training, and specific experiences to provide the knowledge to navigate local and global projects, which are described in more detail in this issue of *International Ophthamology Clinics*. There are currently nine year-long academic global ophthalmology fellowship programs. Programs with active fellowship programs include the Emory Eye Center (Emory University), Kellogg Eye Center (University of Michigan), Dean McGee Eye Institute (University of Oklahoma), Stanford University, Wills Eye Center (Wills Eye Hospital), Illinois Eye and Ear Infirmary (University of Illinois), the Moran Eye Center (University of Utah), Seva Foundation, and the Truhlsen Eye Institute (University of Nebraska). These programs offer intensive 1-year training experiences in global ophthalmology that are unique to each institution.

Other places to network are the young ophthalmologist at the AAO as well as the Global Ophthalmology Symposium at the AAO annual meeting. A newly formed meeting, the Global Ophthalmology Summit, brings together key global stakeholders in advocacy, education, and research and will be an opportunity for all to network and engage.

Working with foundations, nongovernmental organizations, or academic institutions whose mission aligns with the work you would like to be a part of or the service you want to provide are other ways to participate.

■ Funding

Funding for global ophthalmology is often challenging and varies depending on the stage of the project, stakeholders involved, and the scope of work involved. For clinical service delivery, self-funded projects may include short-term visits and service delivery (eg, partnering with local care providers for eye screening or surgical services). Work with nongovernment organizations may involve a combination of philanthropy and self-funding. For research projects that evolve into programs, answering specific research questions in partnership with in-country partners may evolve from the pilot phase of funding (eg, pilot grants ranging from $10,000 to $50,000) and require additional funding through federal grants (eg, National Institutes of Health Fogarty International Center and other National Institutes of Health entities), United States Agency for International Development (USAID), and various foundations (eg, Bill and Melinda Gates Foundation).

When considering the program's funding needs, a range of considerations may need to be accounted for, but broad categories include salary support for investigators and staff, travel costs including air and ground transportation, visa fees, housing, equipment and supplies, facility fees, and administrative costs of local regulatory agencies (e.g., Institutional Review Board fees). Depending on the environment where field research is conducted, other country-specific requirements may also exist including fuel costs, patient transportation fees, interpretation support, and local security. During coronavirus disease-2019, additional budget requirements include costs of laboratory testing before inbound and outbound flights, which varied depending on country-specific requirements (implicit in this budget would be additional housing fees should an individual test positive for coronavirus disease-2019 during travel).

■ Conclusion

Through equitable partnerships and collaboration, global vision research has the potential to greatly improve the vision and eye health of people worldwide. In this article we have sought to illustrate some of the key considerations for researchers beginning to undertake collaborations with colleagues from distinct settings. We have also highlighted opportunities to optimize equity in global collaborations, and to ensure that global vision research adheres to the highest standards of ethics and cultural competence.

J.R.E. and J.G.S. equally contributed for this study and shared first authorship.
The authors declare that they have no conflicts of interest to disclose.

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