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Collecting data through a community-based interview.
BHUTAN

Why does research matter?

A working knowledge of research – both how it is done, and how it can be used – is important for everyone involved in direct patient care and the planning & delivery of eye programmes.

Victor H Hu
Assistant Clinical Professor: International Centre for Eye Health, London School of Hygiene & Tropical Medicine and Consultant Ophthalmologist: Mid Cheshire NHS Hospitals, UK.

The mention of 'research' can be off-putting and may seem irrelevant in the busy environment of a clinic or hospital. However, research is central to all aspects of eye care delivery – both inside and outside the clinic.

Whether we are health workers, public health practitioners, managers, policy makers, or editors – all of us 'stand on the shoulders of giants': we rely on the research done by others before us. This can be as simple – and profound – as hand washing between patients; a habit that only became common practice in the 1870s, following the work of the Hungarian physician Ignaz Semmelweis and Scottish surgeon Joseph Lister. Or it can be as complex as making a diagnosis of glaucoma and knowing what treatment to give. All current eye care practice is based on research. Clinical, operational (eye care delivery) and public health practice will continue to be profoundly shaped by new research developments.

What is research?

In its simplest form, research is about investigating the world around us to increase our knowledge, so we can work out how to do things better.

In health care, we use a scientific approach to carry out research; there is a set way of doing things that ensures research is done in a logical way, and that results are published widely, so that other people can scrutinise what has been done. This gives us confidence that the results will be useful in everyday practice.

It is important to critically evaluate research and research findings, including checking that research has been carried out in the proper way, and whether the conclusions that have been made are reasonable and justified. One of the ways in which the scientific community ensures the quality of research is through the process of peer review.

About this issue

The mention of 'research' can be off-putting and may seem irrelevant in the busy environment of a clinic or hospital. However, research is central to all aspects of eye care delivery, both inside and outside the clinic. A working knowledge of research – both how it is done, and how it can be used – is important for everyone involved in direct patient care and the planning & delivery of eye programmes. We hope this issue will inspire you to learn more and perhaps even get involved.

Contents

Before research papers are accepted for publication in a scientific journal, they are reviewed by other researchers (peer reviewed) to check the quality of the research and the validity of the results and conclusions. Even so, the quality of published research can vary.

This is why systematic reviews and meta-analyses are so valuable: they answer important questions by identifying, evaluating, and summarising good quality evidence from a range of published research papers. Often, systematic reviews conclude that there is not enough evidence to answer a question with absolute certainty, or to produce an answer that will be applicable in different countries or health care settings. This is useful, as it gives researchers

Types of health research

Basic science research, such as in molecular genetics or cell biology, fills the gaps in our understanding of disease mechanisms (pathogenesis).

Clinical research addresses how diseases in individuals can present and be diagnosed, and how a condition progresses and can be managed.

Epidemiological research, which is at the population level (as opposed to the individual level), answers questions about the number of people in the population who have a condition, what factors (called exposures) are causing the condition, and how it can be treated or prevented at the population level.

Going beyond epidemiology, there is also **operational and health systems research**, which focuses on how best to deliver health interventions, clinical and rehabilitation services, or behaviour change initiatives.

Other types of research, which are also important for public health, include health economics, social science, and statistical modelling.

Finally, **systematic literature reviews** can be very useful, as they identify and summarise the available evidence on a specific topic.

By Clare Gilbert and GVS Murthy

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guidance about where more research is needed (see article on page 12).

But this can be a challenge for clinicians – how can we make good decisions in the absence of definitive evidence? Clinical experience is very important, but where possible this should be informed by good research – see page 6 for practical tips.

Health care practitioners and managers can also use guidance from professional bodies such as the World Health Organization. The article on page 8 explains the process by which guidelines are developed and shows why we can rely on them.

In conclusion, research is fundamental to the everyday practice of health care professionals, including eye care workers. Research allows us to find out new things and to provide better care for patients. There are many different types of research that can be carried out and these can vary enormously. It is important to ask the right question, as this will determine the type of research that is done (see page 4).

All of us can participate in research: it starts with asking questions and then going to find out the answers. The article on page 9 offers practical suggestions for carrying out small-scale research that is relevant and useful to eye care.

Examples of research questions and how they have been answered

Can povidone iodine prevent endophthalmitis?
In many eye departments, cataract surgery is a frequently preformed operation. One of the most serious complications is infection within the eye (endophthalmitis) which can lead to loss of vision. Several well conducted randomised controlled clinical trials have shown that instilling 0.5% aqueous povidone iodine eye drops, an antiseptic agent, before surgery reduces the risk of this devastating infection, with the first trial undertaken in 1991.[1]

What is the best treatment for primary open-angle glaucoma?
Chronic glaucoma can be a very difficult condition to manage, particularly when patients often only present to eye departments once they have already had significant vision loss. Eye drops which lower intraocular pressure are often prescribed; however, patients may not use the eyedrops because they are expensive, can be difficult to instil, and do not improve their vision. Surgery is an option, but patients can be reluctant to undergo surgery on their only good eye, and there can be postoperative complications. Laser treatment is another option. In a recent study in Tanzania, patients were randomly allocated to Timolol 0.5% eye drops or a form of laser called Selective Laser Trabeculoplasty (SLT).[2] After one year, SLT was found to be superior to drops for high-pressure glaucoma.

Why don't older adults in England have their eyes examined?
Focus group discussions among older adults in England revealed that, despite most participants being eligible for state-funded check-ups, wearing spectacles was associated with the appearance of being frail. They were also afraid of appearing to 'fail' tests, and had concerns about the cost of spectacles.[3]

How cost effective is a diabetic retinopathy screening programme?
An economic evaluation in South Africa compared alternative interventions. Screening using non-mydriatic retinal photographs taken by a technician supervised by an ophthalmic nurse and read by a general medical officer was cost-effective and the savings made allowed the government to fund disability grants for people who went blind.[4]

Acknowledgements
Stephen Gichuhi and Nyawira Mwangi contributed to preliminary work on this article.

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Community Eye Health Journal South Asia, Indian Institute of Public Health, Plot no.1, ANV Arcade, Amar Co-operative Society, Kavuri Hills, Madhapur, Hyderabad - 500033, India.
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The principles of good eye care research

Clare Gilbert
Professor of International Eye Health: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.

GVS Murthy
Director: Indian Institute of Public Health, Hyderabad, India.

Eye health research is important for closing the gaps in our knowledge, but it should be ethical and based on sound scientific principles.

Involving several researchers helps to improve objectivity. INDIA

The purpose of research is to fill the gaps in our knowledge by providing evidence that we can trust and build on. This applies to all areas of research, whether astrophysics, education, housing, or health.

Well-conducted health research provides a solid basis for decision-making in clinical management, planning of health services, and deciding what further studies are needed. In the absence of research evidence, we tend to make decisions based on our own experiences and assumptions or based on what our more senior colleagues say. However, if we want to give our service users the best possible care, it is important to realise that our own experience – and that of our senior colleagues – may be limited, subjective, or even biased.

Making decisions on the basis of sound evidence, whenever possible, is far more effective and ethical.

Unfortunately, most eye health research is undertaken in high-income countries, and the findings may not apply to other settings for a number of reasons – e.g., ethnic differences in disease presentation and treatment. Undertaking local research, which addresses local needs and knowledge gaps, is essential.

Research starts with a question

Regardless of the type of research, a critical first step is to form a research question, which may or may not be based on a hypothesis (defined as a supposition or proposed explanation, made on the basis of limited evidence, as a starting point for further investigation). The question should be clear, specific, and concise. Getting the question right is of critical importance, as the research objectives and methods, as well as the kind of participants to be recruited, depend on the research question.

Gathering data

The data collected in studies can be quantitative, such as the number of people who attend for cataract surgery and their age and sex; or qualitative, such as asking people for their opinions or views on a particular topic.

Sometimes, quantitative and qualitative methods are both helpful. As an example, let's suppose that a high proportion of people identified in outreach with operable cataract do not attend for cataract surgery.

We may assume that the costs of transport and surgery are the main problems. But, despite the offer of free transport and free surgery only half of these people come for surgery. The research question could be: **What are the characteristics of people with operable cataract identified in outreach who do not attend for surgery at the base hospital and why do they not attend?** The aim would be "to describe the characteristics of people with operable cataract identified during outreach who do not access cataract surgery compared with those who do, and to identify the reasons they give for not accessing surgery". The first group of participants would need to be traced, as they did not attend for surgery.

This research question has two parts:

1 **Who are the people who do and do not access surgery?**
2 **Why do some people not access surgery?**

To answer part 1 of the research question above, a questionnaire would need to be designed to collect data on the age, sex, and circumstances of people attending and not attending for cataract surgery. Medical records could be used for patients who do undergo surgery, but routinely collected hospital data may not provide all the information needed. To find out more about who is not coming for surgery, a survey could be done to find out more about both groups of patients, e.g., their marital status, socioeconomic status, place of residence, level of education, the size of their household, the gender of the head of their household, etc. This is a **quantitative study**.

To answer part 2, the same questionnaire could include questions about possible reasons that patients did or did not attend for surgery. There could be a list of possible reasons (decided by the researchers) that participants who did not undergo surgery can respond to with either a 'yes' or 'no', or a list from which they can select one or more options. This approach allows the most important reasons to be determined, as the

data collected are quantitative (i.e., the answers can be counted). The limitation of this approach is that the possible reasons participants can choose from will be limited by the researchers' current understanding of the most likely or common reasons.

A way to find out more is to use **qualitative methods**, e.g., interviewing people who did not come for surgery and asking them open-ended questions. For example, it would be useful to know what they understand about their eye condition and what caused it, as these factors greatly influence how people behave. So a question could be: "Please can you explain what you think is wrong with your eyes?" followed by "What do you think caused your eye problem?" And then, "Please can you tell me why you did not attend the hospital for cataract surgery?" After a reason has been given, the next question can be: "Are there any other reasons?" The advantage of this type of data is that participants can also be asked how they made their decision about the surgery, whether anything or anyone influenced their decision and how, and what might help them to access cataract surgery. What the participants say in the interviews is then carefully analysed to identify the main reasons and solutions, which can inform further action to improve uptake.

It is important to note that quantitative and qualitative study designs require and use different research methods, which influence how many participants are required, how they are selected, and how data are collected and analysed. Quantitative and qualitative studies are not, therefore, interchangeable as they answer different research questions; the best way is to use both, as they complement each other. In this example, researchers could select a smaller group of patients who did not attend and have informal, qualitative discussions with them – either individually or in small groups (known as focus groups) – to discover possible reasons for non-attendance. These reasons can then be used in a quantitative survey, which is quick to administer and can be more easily analysed.

Being objective

When conducting research of any kind, it is important to be objective, which means that you do not start the research with preconceived ideas about what the results might show – an open mind is essential. This means that the data collected, whether quantitative or qualitative, should not be influenced by the researchers at any stage in the research process, i.e., when the study is being designed and planned, or while data are being collected, analysed, and interpreted. These influences can lead to bias, which is defined as any systematic error in the design, conduct, or analysis of a study. For example, bias can occur if study participants are not appropriately selected, and care is not taken in how data are collected from them. There are several ways to avoid or reduce bias in health research, which include, but are not limited to, the following:

- Involve several researchers in the study from the outset and discuss every aspect. Ask experienced, independent researchers for their opinions.
- Carefully design all questionnaires and interview questions so that they are clear and unambiguous, and do not lead participants to respond in a particular way. These should be tested on a small number of participants first (known as pilot testing). The questionnaires or interview questions can be then modified, if necessary, before the main study takes place.
- Carefully select and rigorously train the fieldworkers who will collect the data, and monitor their performance during data collection. Poorly performing field workers may need to be retrained or replaced.
- Carefully select study participants to make sure they represent the group of people with the health condition or problem being investigated (important in quantitative studies) or are likely to reflect a range of perspectives (in qualitative research).
- Always take objective measurements whenever possible: e.g., take images of the retina that are later graded by experts or trained graders, rather than relying on clinical grading.
- Decide exactly how data will be analysed before data collection takes place, and keep to the analysis plan.
- Always report all the key findings of a study, even if they surprise or disappoint you.

"Do not start the research with preconceived ideas about what the results might show – an open mind is essential."

Ethics

As in all research involving people, the ethical implications need to be carefully considered from the start. For example:

- Ensure the study is of high scientific value and researchers have the skills to deliver all aspects of it.
- Take informed consent from all participants to ensure they fully understand the study, the procedures, and possible side effects/harm.
- Take particular care when obtaining consent from vulnerable groups, which include children, the very elderly, the very sick, those with a mental health condition, and individuals in institutions.
- Make participants aware that they are free to leave the study at any time without having to give a reason.
- Protect the anonymity of study participants by asking for their consent to record interviews (if interviewing) and using anonymous quotes.
- Maintain strict confidentiality of all data (text files, databases, images, etc.) by using password-protected computer storage with access restricted to the researchers only.
- Ensure that compensation for participants (if being considered) is not so large as to persuade them to take part against their better judgement, but is enough to cover out-of-pocket costs (e.g., travel).
- Obtain approval from the relevant ethics committee or institutional review boards.
- Always provide services for those with a clinical need for care (the principle of 'no science without service').

Conclusions

Broad-ranging eye health research is required to provide evidence on which to base clinical decisions. Studies must be of a high scientific and ethical standard, and be conducted in a rigorous manner at every stage: from designing the study, through to collecting, analysing, and interpreting the data, and writing up the findings for dissemination. This applies to all studies, regardless of size.

Using research findings in my everyday practice: what is good evidence, where do I look, and how can I use it?

The findings from research studies and best practice guidelines should form the foundation of eye care delivery.

Victor H Hu
Assistant Clinical Professor: International Centre for Eye Health (ICEH) LSHTM, and Consultant Ophthalmologist, Mid Cheshire NHS Hospitals, UK.

Jagadesh C Reddy
Founder and Managing Director: Pristine Eye Hospitals Hyderabad, India.

Dhivya Rauniyar
Senior Optometrist: Pristine Eye Hospitals Hyderabad, India.

Elmien Wolvaardt
Editor-in-Chief: *Community Eye Health Journal*, ICEH, LSHTM, London, UK.

As a health care practitioner, you are not best serving your patients if you make decisions based only on your experience and what you learnt during training – especially if you trained some time ago! Although both these sources of learning are valuable, they are not enough. Modern health practitioners are expected to stay up to date with the latest knowledge relevant to their field and to practice evidence-based medicine.

Evidence-based medicine is about using the best available evidence, combined with your own clinical expertise, to make decisions about a patient's health care that respect their values and expectations. But what is the best available evidence, and how can you find it?

If you consider that thousands of research articles are published in eye care journals every year, and that many of them charge high fees for access, it's no surprise that staying up to date with all the latest research in your field is a challenge for most people.

Instead, you may find yourself looking for evidence to answer a specific question. For example, say that you've heard about the potential of collagen crosslinking to prevent the progression of keratoconus, and you want to know whether to start using it. What is the evidence that it works, and that it is safe?

Levels of evidence

Before you start looking for evidence, it is helpful to remind yourself of the different levels of evidence (see panel). Strong sources of evidence, such as systematic reviews, allow you to be more confident in the decisions you make; however, when such evidence is not available, it is useful to know what other types of evidence to look for.

Finding relevant research

PubMed (**www.pubmed.gov**) is a large, open access (i.e., free of charge), online database which contains many of the medical research studies which are conducted around the world. Because it is free, and comprehensive, it is a useful starting point when looking for studies on a particular topic.

Another good reason for using PubMed, is that the website makes it easy to filter search results in several useful ways.

For example, try typing the keywords "corneal crosslinking keratoconus" into the search box on the PubMed home page. This produces over 1,800 results. It would be very difficult for an individual clinician to go through all of these before deciding whether to start performing crosslinking.

Figure 1 Search results on Pubmed: **www.pubmed.gov**

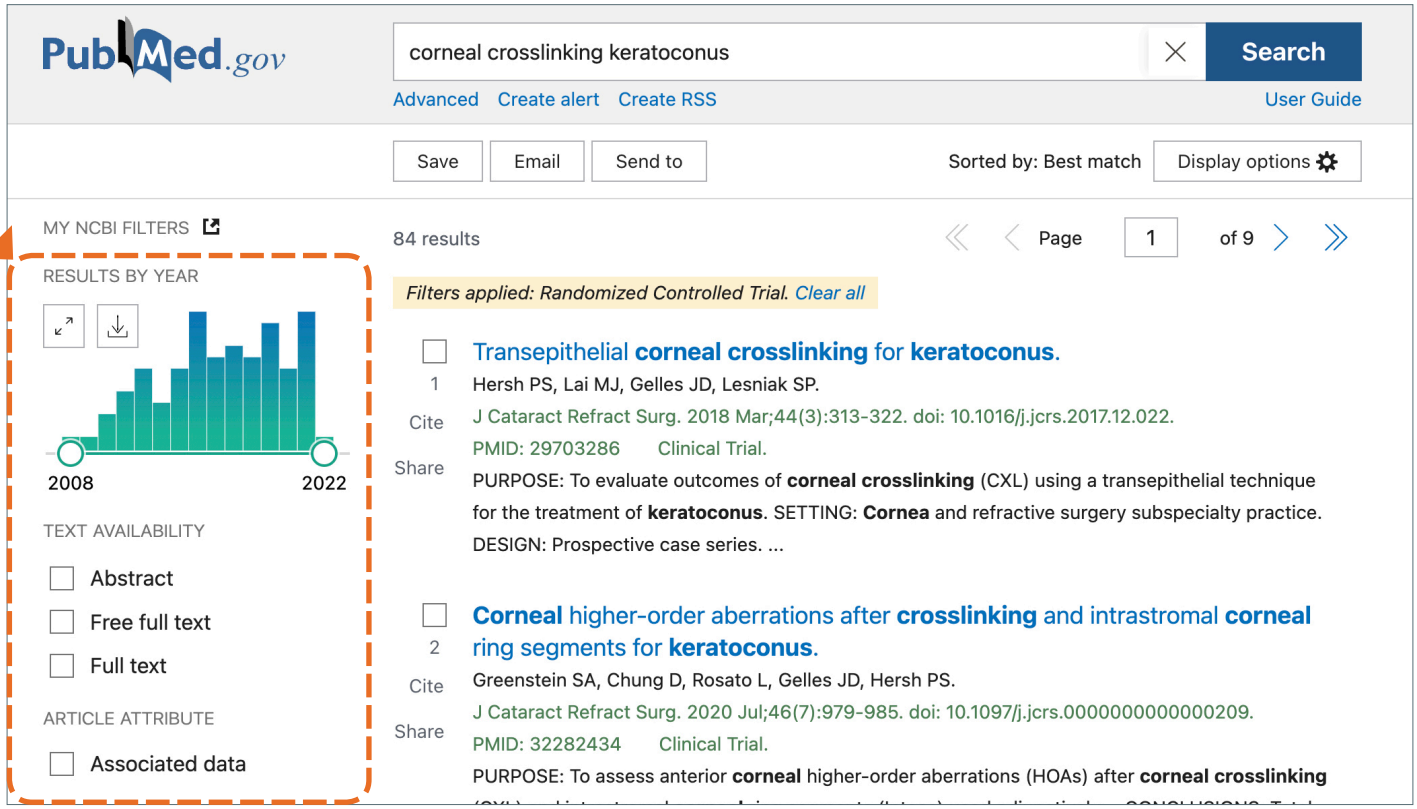
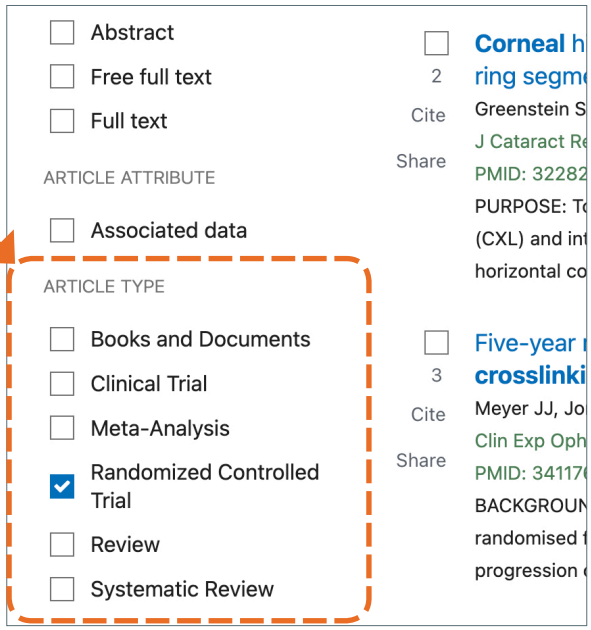


Figure 2 Selecting article type



Did you notice the panel highlighted on the left of the search results in Figure 1? These are options for limiting or 'filtering' the results by year, by the availability of the text, article attributes, article type, and so on.

Referring to the levels of evidence in the panel, and based on how much time we have available, we could decide to limit the PubMed search to randomised controlled trials, which provide a strong level of evidence. To do this, look further down the panel (see Figure 2) and tick the "Randomized Controlled Trial" box under "Article type." This produces only 85 results. If we limit the results to meta-analysis (a statistical analysis of the results produced by several studies) by ticking that box instead, there are just 23 results for us to evaluate and draw conclusions from.

Looking at well conducted systematic reviews and/or meta-analyses can save a lot of time compared to reading individual studies on a particular area. The Cochrane Library provides some of the highest quality and most trusted reviews available and it is always worthwhile to see if they have done a review on a particular topic: visit **www.cochranelibrary.com**.

Good practice guidelines

Despite having access to new online tools such as PubMed, it can still be a challenge to answer all the different questions you face every day by searching for research publications. A practical alternative for busy eye care workers is to use trustworthy, best-evidence clinical practice guidelines.[1] These are drawn up by teams of people with research experience and knowledge of the area being addressed, who have looked through all the research evidence themselves in a systematic manner. They weigh up all the evidence and come to a balanced judgement on the outcome and what it means for clinical practice. Examples of such guidelines include guidelines from the National Institute of Health and Care Excellence (NICE) in the UK,[2] the Preferred Practice Patterns from the American Academy of Ophthalmology,[3] and many others, including disease-specific international societies.

Levels of evidence

The evidence in this list is arranged from strongest to weakest. Note that each level can be of high or low quality and have a high or low risk of bias or confounding.

1. **Systematic review of randomised controlled trials.** Systematic reviews look at all the studies that have been done on a specific health problem, selecting and assessing them using rigorous, standardised methods. It may include a meta-analysis, which is a statistical analysis of the quantitative results of the studies included in the systematic review. **Meta-analyses** can provide a more precise estimate of an effect than is possible by looking at individual studies.
2. **Randomised controlled trial (RCT).** Participants in the study are randomly allocated into groups, usually to receive or not receive an experimental treatment or intervention. The random allocation helps to ensure a fair comparison (see article 5: Good Research)
3. **Systematic review of cohort or case-control studies.**
4. **Cohort study.** This usually involves many study participants who are observed over a long period (commonly years). The onset of a particular disease (e.g., cancer) can then be compared between people with different levels of exposure (e.g., number of cigarettes smoked).
5. **Case-control study.** People who have a disease (cases, e.g., those with cancer) are compared to a similar group of people (e.g., same age, sex, and socioeconomic level) who don't have the disease (controls). Researchers then work out the level of exposure in the past (e.g., number of cigarettes smoked) and compare them between the two groups.
6. **Case series or case reports.** A single report, or a series of reports, involving patients with a particular disease and who may have been given a similar treatment.
7. **Expert opinion.** This is used where research studies haven't been done on a particular area and people who have experience or expertise on a particular area say what their opinion is.

Please see the references for more detailed definitions.

It is also important to look at national guidelines which have been drawn up in a particular country. You may even decide to help draw up suitable guidelines for your country or region; these would consider the needs of the local population, the skills of local health workers, and the availability of personnel, equipment, and medicines. The AGREE reporting checklist offers guidance that can help clinicians to evaluate whether a guideline is of high quality or not. It is equally valuable when drawing up clinical guidance.[4]

Incorporating evidence into everyday practice

The findings from research studies and best practice guidelines should form the foundation of eye care delivery. Alongside this, clinical experience and expertise also form very important aspects of good eye care. Experienced and able clinicians will use evidence in their work but will understand the situation of a particular patient (their medical and social history, risks for that patient, likely adherence to treatment, and so on), what is feasible/realistic in a particular health care context, and where there are gaps in the evidence. Another very important factor to consider is what patients themselves prefer once they have had the different options clearly and coherently explained to them. Practicing medicine is an art as well as a science, and it is important to personalise the management approach for each patient.

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4 AGREE reporting checklist. **https://www.agreetrust.org/resource-centre/agree-reporting-checklist/**

How the World Health Organization developed the *Guide for Action*

Andreas S Mueller
Technical Advisor: Sensory Functions, Disability and Rehabilitation Unit, World Health Organization, Geneva, Switzerland.

Alarcos Cieza
Coordinator: Sensory Functions, Disability and Rehabilitation Unit, World Health Organization, Geneva, Switzerland.

Stuart Keel
Technical Officer: Sensory Functions, Disability and Rehabilitation Unit, World Health Organization, Geneva, Switzerland.

The World Health Organization is often called upon to develop global guidance; here is how a range of evidence and expertise was used to develop one such guide.

Member States of the World Health Organization (WHO) adopted a resolution on integrated people-centred eye care at the 73rd World Health Assembly in 2021. The resolution urged Member States to implement this new approach to eye care in their own health systems, and tasked WHO with developing a set of tools and guidelines to support this process. This led to the development of the *Guide for Action* (the *Guide*), which was published in May 2022.[1]

How was the Guide developed?

Establishment of expert groups

WHO established groups made up of experts in the fields of public health and methodology, as well as clinical experts from the field of eye care. A total of 360 experts were selected based on recommendations from professional associations and existing WHO networks, and to ensure balanced representation with respect to gender, geographical region, and income setting; their declarations of interest were also assessed. The groups provided technical input throughout the process of developing the *Guide* and its accompanying tools.

Scoping and systematic reviews

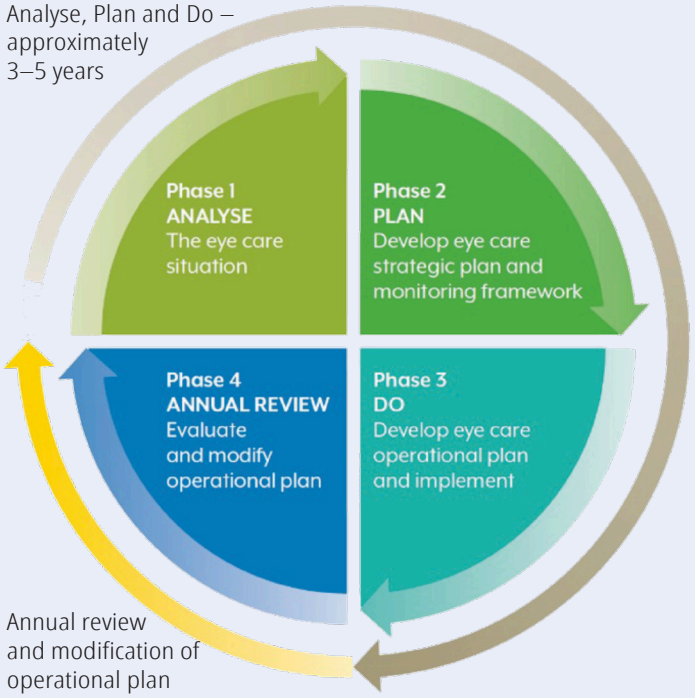
The groups, in collaboration with methodologists and academics from relevant disciplines, carried out literature reviews to identify the best available evidence that could inform the development of each tool. The literature reviews were published in well-known academic journals, which means they were subjected to independent and rigorous peer review.

Expert consensus

A stepwise process was then carried out among each expert group to achieve consensus on the technical elements of the tools. This included obtaining input from experts via online surveys, hosting virtual group consultations, and getting independent written feedback. Decision making was guided by two criteria:

1 What is the evidence for each tool?
2 Are they practical, and could they be realistically implemented within low- and middle-income countries?

Figure 1 The WHO Guide for Action's Analyse, Plan, Do, Review cycle



The *Guide for Action* offers step-by-step support to member countries to plan, implement, and monitor integrated people-centred eye care. It recommends that countries carry out an 'Analyse–Plan–Do–Review' cycle (Figure 1) by using the four tools developed alongside the *Guide*.

The primary audiences for the *Guide* are governments of low- and middle-income countries (LMICs) and the agencies working with them; it is designed for use at the national level but can also be used at the sub-national level.

For further information on the *Guide*, please visit: **bit.ly/GuideAction**. To learn more about integrated people-centred eye care, sign up for the course here: **bit.ly/3EQQHMh**

Peer review

Each tool underwent peer review to obtain feedback and recommendations for revisions. Peer reviewers included individuals from relevant WHO departments as well as eye care and public health experts.

Next steps

Government health planners and service providers, as well as non-governmental organisations supporting eye care, are now encouraged to use the *Guide* as needed.

In order to successfully implement action and improve eye care sustainably, it is important for governments to take lead in the implementation of the *Guide*, and for governments to ensure that any plans they develop are aligned and integrated within wider health plans and budgets.

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1 Eye care in health systems: guide for action. Geneva: World Health Organization; 2022. **bit.ly/GuideAction**

Small-scale eye care research: why and how to do it

Esmael Habtamu
Assistant Professor in Eye Health: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK and Chief Executive Director: Eyu-Ethiopia Eye Health Research, Training and Service Centre, Bahirdar, Ethiopia.

Priya Morjaria
Assistant Professor and Public Health Optometrist: London School of Hygiene & Tropical Medicine and Head of Global Programme Design: Peek Vision, UK.

Suzanne Gilbert
Senior Director, Research & Strategic Opportunities Seva Foundation, Berkeley, CA, USA

In resource-limited settings, small-scale research can focus on community-specific development needs and provide answers to context-specific challenges through pragmatic enquiry and data synthesis.

Collecting data through a community-based interview BHUTAN

Research is a systematic investigation of new or existing concepts, methodologies, and understanding. This systematic investigation can be done on a large or small scale. Table 1 summarises key differences between large- and small-scale research. Large-scale research is often needed for questions that require greater statistical reliability and generalisability. However, in resource-limited settings, the barriers to conducting large-scale research are often the financial and human resources required. Small-scale research, on the other hand, focuses on providing answers to context-specific challenges with limited resources, and does so through pragmatic enquiry and data synthesis. For instance, through the Integrated Management of Presbyopia in Rural Ethiopia (IMPiRE) study, we have piloted the feasibility and acceptability of integrated presbyopia management by primary health care workers as part of the routine primary health care (PHC) system, in four PHC facilities, with a very limited budget.

The focus of small-scale research is usually not generalisability or publication; rather, it is developmental, with the aim of making recommendations to address a particular challenge or to improve services.[1] Here we discuss some of the important aspects of conducting small-scale research.

Developing a scientific mindset

A common limiting factor in conducting small-scale research is the assumption that research has to be a complex and expensive undertaking. However, the quality of research doesn't depend upon its size or the resources it requires. Research can be simple, robust, and pragmatic. It can be conducted at minimal or no cost but be impactful. Developing a scientific mindset and culture is a vital starting point.

A scientific mindset is characterised by curiosity, open-mindedness, and scepticism.[2] Curiosity is constantly asking questions about why something works or doesn't work, how can it be improved, how a challenge can be addressed, and what tools are required to do this. For instance, in the IMPiRE pilot study, we were curious about whether we could improve the accessibility of presbyopia services for rural resource-limited communities.

Open-mindedness means to consider, at the beginning, that all possibilities are valid – until they are disproved. There should not be a predetermined idea of what works and what doesn't work until tested. In the IMPiRE study, we were ready for any possible result: for example, that the community and health service managers would either accept or not accept the delivery of presbyopia services by PHC workers.

However, such open-mindedness should also include systematic doubt or scepticism. As the research progresses, it is important to question procedures and results. This is related usually to questioning the quality of the research or the data produced. In the IMPiRE study, we needed to be clear about the procedure we used to conduct the study, and its limitations, so that the results could be interpreted within defined and sensible limits.

Curiosity, open-mindedness, and scepticism are linked, respectively, with developing the research

question, formulating methodologies, and interpreting the results.

Research question

The first step in conducting any research is identifying the research question or challenge that needs to be investigated. In small-scale research, the questions that are addressed are those that are typically relevant to the local context. Such questions often arise from curiosity about our clinical practices, engagement with stakeholders and the community, a review of medical records or reports, and questioning of the productivity, quality, access, or equity of the services delivered, and so on.

The most common types of small-scale research and the questions they try to address are listed in Table 2.

Our IMPiRE pilot study was conceived because presbyopia management services that can address the need of rural communities in Ethiopia are lacking. We wanted to answer the question: "How feasible and acceptable is the integrated management of presbyopia by primary health care workers in rural Ethiopia?"

Data collection and synthesis

By design, small-scale research data collection can be done with limited human resources, time, and money. Data that are gathered from facility-based services and resources as part of the routine health information system can be synthesised to answer various small-scale research questions related to service access, quality, and equity. Facility-based data, if analysed and interpreted appropriately, has the potential to provide ongoing evidence on service coverage and equitable utilisation, and to do so more efficiently than expensive population-based surveys.[3] For instance, disaggregating data by gender, location, socioeconomic indicators, and disability status can help to quickly paint a picture of who is accessing the services and whether the eye care needs of the community are being met equitably. This indicates whether progress is being made towards achieving universal eye health coverage. Service quality monitoring data, such as for cataract surgery or diabetic eye care, can easily be incorporated into routine facility-based data collection without the need for additional resources.

One of the strengths of small-scale research is the flexibility of its design. Data can be collected in a way that is appropriate to the context, but still be systematic so that it can support reliable interpretation. Like any research, different quantitative and qualitative methods can be used in small-scale research.

Primary data can be systematically collected from small groups of people through observation or interviews embedded within clinical and community-based activities. For instance, interviews or focus group discussions can be used in patient satisfaction surveys or to collect feedback on the experience of health workers in a specific programme. In the IMPiRE project, we directly observed presbyopia service delivery by a PHC worker and conducted in-depth interviews with community members and health service mangers to collect data on feasibility and acceptability.

Secondary data can be systematically collected from randomly selected medical records to assess the prognosis of a specific intervention in a particular clinical setting.

Ethics

As with any other type of research, ethics should be at the centre of small-scale research. Adherence to the ethical standards and requirements of the setting is paramount. Anonymity, confidentiality, and voluntary participation should be strictly maintained while reviewing medical records and engaging with patients and other vulnerable groups.

Data interpretation

A healthy dose of scepticism is required when interpreting all research data, but more so when carrying out small-scale research. Findings should be interpreted with caution, as the study purpose is more concerned with improving a service or addressing contextual challenges through manageable recommendations, than with measuring the impact through statistical or monetary indicators. Data from small-scale research can often be analysed using easily accessible spreadsheet software and presented descriptively; provided the study is planned carefully, complex data analysis tools are not needed.

"Primary data can be systematically collected from small groups of people through observation or interviews embedded within clinical and community-based activities."

Regardless of the quality of the data presented, causality can rarely be inferred from small-scale studies, as sample sizes are usually too small to produce statistically significant quantitative results. Controlling for different variables and confounders are likewise challenging.

The peer review process is an integral part of research data interpretation. However, small-scale research will often not have a chance for rigorous debate and review from a wider readership through a publication process. On the other hand, small-scale research can benefit from 'collaborative review' – where partners such as health care managers, health workers, and stakeholders, including patients and community leaders, are involved in data interpretation.

For example, our IMPiRE pilot study provided useful data that were presented to and discussed

with eye health stakeholders. Its results fed into context-specific recommendations, appropriate to the pilot study districts, and led to a large-scale research proposal that would involve investigating the equitability, quality, sustainability, and impact of the integrated management of presbyopia in a low-resource setting.

Overall, small-scale research is not conducted to test theories, but primarily to benefit the organisation conducting the research or the community it is serving. Therefore, the whole process should be a learning experience for all partners involved.[1]

Table 1 Key differences between large- and small-scale research

Criteria	Large-scale research	Small-scale research
Research question	Theory evaluation or testing intervention; often relevant to the wider discipline	Typically, relevant to local and context-specific challenges
Design	Focus on greater statistical reliability and generalisability	Flexible design with the focus on benefits to the local organisation or community
Ethics	Adherence to the appropriate ethical codes and guidelines	Adherence to the appropriate ethical codes and guidelines, plus consideration of any locally sensitive issues
Data collection	Requires separate, often complex, data collection tools and processes	Can be easily embedded within existing facility or community-based data collection
Resources	Costly in terms of time and money	No or minimal cost
Scale	Involves a large number of researchers, participants, and geographic areas or multiple sites	Conducted within the organisation or confined to a limited area with a small team of researchers and participants
Data measurement	Focuses on statistical or monetary standards	Focuses on producing manageable recommendations
Data interpretation	Both correlation and causality are possible, depending on the design	Needs greater caution; no causality can be inferred
Review	Peer review in publications	Collaborative review with stakeholders

Table 2 Examples of small-scale research questions

Common small-scale research examples	Research questions
Service quality monitoring	Are we delivering a service that meets the required quality standards? What are the reasons for poor surgical outcomes (for example, cataract) in our setting? How could a particular medical or surgical service outcome be improved?
Service coverage and equity analysis	Which group(s) of people are accessing our services (by gender, socio-economic status, location, or disability)? Why are some groups not accessing our services or are not being reached by service delivery? What can be done to improve equitable access to our services?
Health worker feedback surveys	How satisfied are health workers in their work environment or management system? What is the opinion of health workers about a particular intervention?
Client satisfaction surveys	Are we meeting the needs of the community we are serving? How satisfied are our clients with the service being delivered?
Feasibility studies	What are the logistical feasibility, degree of acceptability, and costs of implementing a new health care intervention or the scaling-up of an existing intervention?
Pilot studies	Does a particular tool, process, or intervention work in the way that it is intended?

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Eye health: what research is needed, and where?

Research in eye health is needed to fill evidence gaps, especially in low- and middle-income countries.

Jacqueline Ramke
Associate Professor Of Global Eye Health: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.

Elena Schmidt
Director of Evidence, Research and Innovations: Sightsavers United Kingdom, Haywards Heath, UK.

Research is key to our efforts to improve eye health and has been highlighted in recent global policies. Two of the five recommendations outlined in the World Health Organization's *World Report on Vision* focused on strengthening the quantity and quality of evidence available.[1]

The *Lancet Global Health* Commission on Global Eye Health undertook a global study to identify the 'grand challenges' in global eye health. In this study, 470 people from 118 countries nominated and ranked the key issues that must be addressed to improve eye health at the global and regional levels.[2,3] After a three-round process, the top five challenges in each region were identified (see **http://bit.ly/3Oy4xaR**) and 16 challenges were prioritised at the global level.[3] The top 5 grand challenges globally are summarised in Figure 1.

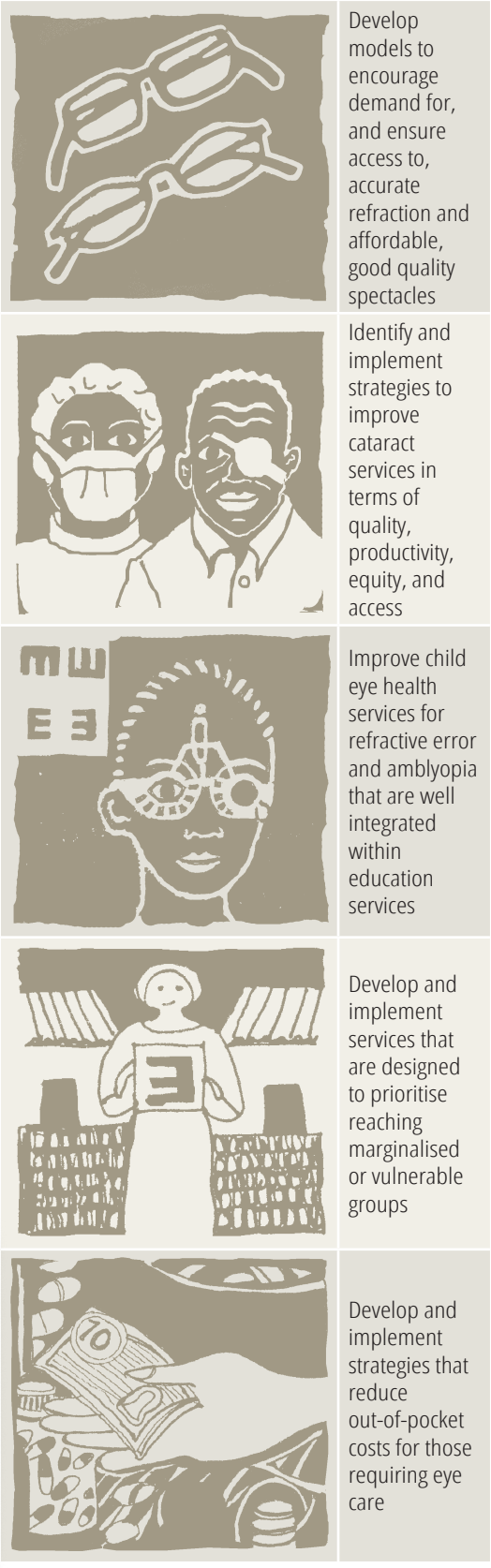
Unfortunately, there are substantial gaps in the evidence on how to address these challenges. Evidence gap maps – a visual tool that shows the state of evidence from systematic reviews – were recently developed for cataract, glaucoma, trachoma, diabetic retinopathy, and unaddressed refractive error.[4] These maps show that the number of systematic reviews summarising and assessing evidence relevant to eye care is growing. However, the available evidence is still dominated by clinical research (prevention, diagnosis, and treatment) and there are significant gaps in evidence about health systems related to eye care, and on how to improve access, equity, and cost-effectiveness of eye care services. In addition, there is unequal geographic representation among the studies included in most reviews, with most of the evidence being generated in Europe, the Americas, and the Western Pacific region.[5]

More research is needed to fill these evidence gaps, particularly in low- and middle-income countries. There is a need to invest more in vision impairment surveys to ensure the availability of accurate data to monitor progress towards universal eye health. Specific attention should also be given to implementation research: how to better connect people with the interventions that we know work, particularly cataract surgery and spectacles. Equally important is research which focuses on strategies that promote equity and improve access for historically underserved groups, as well as research to improve the cost-effectiveness and sustainability of eye care services.

Baseline estimates of service coverage

In 2020, at the 73rd World Health Assembly, all Member States committed to monitoring progress towards effective cataract and refractive error services coverage in the decade to 2030. However, many countries are without recent national baseline estimates of service coverage. Although around half the countries in the world had carried out at least one such survey between 2000 and 2020, many were conducted a long time ago or at sub-national (rather than national) level.

Figure 1 The top 5 grand challenges globally



WOODCUT ILLUSTRATIONS BY VICTORIA FRANCIS

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Building local capacity in operational research: a case study in Nepal and India

A programme of mentor support and training has enabled eye teams in Nepal and India to carry out research to improve their own delivery of eye care services.

Suzanne S Gilbert
Senior Director, Research & Strategic Opportunities: Seva Foundation, Berkeley, USA.

GVS Murthy
Director: Indian Institute of Public Health, Hyderabad, India and Professor: London School of Hygiene and Tropical Medicine, London, UK.

Kenneth L Bassett
Program Director, Seva Canada and Director: British Columbia Centre for Epidemiology and International Ophthalmology, Vancouver, Canada.

Operational Research Capacity Building Study Group
bit.ly/ORCB-study

Operational research provides eye care personnel with evidence they can use to improve the equity, efficiency, and effectiveness of health services and systems.[1]

Operational research builds on and uses monitoring and evaluation infrastructure, including routine administrative data and quality assurance programmes. It is relevant to almost all aspects of hospital and outreach services: reducing waiting times for cataract surgery, to testing the best ways of counselling patients to improve referral from a screening location. It does not include clinical research.

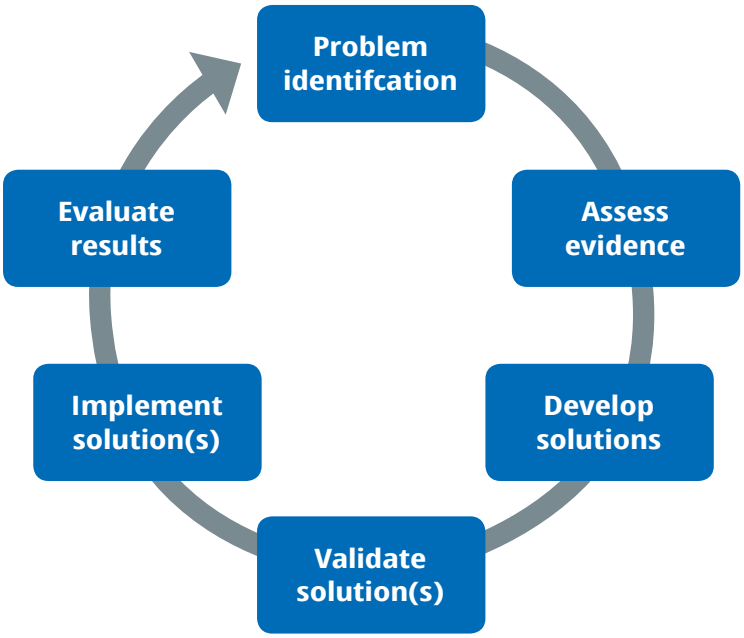
In 2019, the Indian Institute of Public Health – Hyderabad (IIPHH), together with Seva Foundation and Seva Canada (Seva), both international non-governmental organisations, launched the Operations Research Capacity Building (OCRB) programme. The goal of the programme was to strengthen operational research among four hospitals (three in Nepal and one in India) through a spectrum of activities and research projects, designed to be both opportunistic (to reflect immediate eye programme needs), and strategic (to optimise operational research capacity building, e.g., in health services, health systems, human resources, and public health).

The expected outcomes of the programme were as follows:

1 Eye hospitals would develop capacity to conduct operational research and experience the importance of evidence-informed practice.
2 Hospital management would understand the need for investing in operational research and provide dedicated resources for it.
3 Some of the partner hospitals would become research resource centers for their country or region.

The four hospitals who were invited to join had been involved with Seva previously. They all had an established appetite for research, support from their eye hospital leadership, and had at least one investigator in the team who had research skills at graduate level (e.g., MSc or PhD).

Figure 1 Operational research cycle



Mentorship model

Each interdisciplinary eye hospital team was assigned a dedicated mentor (from IIPHH) and a support person (from Seva) who consulted with the hospital-based team once a month, via Zoom. These sessions enabled the local teams to develop the skills needed to carry out the steps in the operational research cycle (Figure 1):

- analyse the root causes of any difficulties (through problem tree analysis)
- identify a research question
- conduct literature reviews
- create specific objectives
- finalise the research methodology, including sampling method and sample size estimation
- obtain ethical approval
- design data capture tools and code sheets
- implement the study
- conduct analyses
- prepare manuscripts for publication.

Figure 2 At one of the workshops, the research teams generated ideas for operational research topics by category, e.g., efficiency of service delivery,quality of service delivery, coverage of service (relative to the population), and patient outcomes.

Additional support with data management, statistical analysis, and presentation of data was provided by a dedicated team based at IIPHH.

The partner hospital teams also attended a series of structured workshops (Figure 2), provided by a panel of research experts with expertise in a range of different disciplines.
Every two months, each of the four hospital teams gave a virtual progress update to one another and to the panel of research experts. Between these sessions, the dedicated mentors and support persons from IIPHH and Seva, respectively, met to refine next steps.

"The participating institutions have become proficient in the key steps needed to carry out operational research, such as statistical analysis."

Outcomes
The mentorship process was resource intensive but yielded excellent results: to date, three of the four teams have published their research protocols in peer reviewed journals, and the fourth team's manuscript has been submitted and is under review.

The participating institutions have become proficient in the key steps needed to carry out operational research, such as statistical analysis. Several of the hospital teams have started workshops and processes within their institutions designed to improve the quality of data collected and its systematic use in programme management, including sharing data analysis skills learnt during the workshops with team members at the hospital (Figure 3).
The operational challenges addressed by the four hospital teams are given below, alongside feedback from their team leaders.

Bharatpur Eye Hospital, Chitwan, Nepal: Improving the follow-up rates for pediatric department patients who are advised to return for follow-up visits.[2]

"This research training really helped me on the personal and professional level. Now, when I think about any problem, I think about the solution for the same. Initially I used to think research needs to be some big topic. But the day-to-day activities that we are doing, thinking about a new way to do it, also is research. We have set up a research team and have started training our internal staff as well as trying to build programs for other eye hospitals."

– Manisha Shrestha,
Pediatric Ophthalmologist

Reiyukai Eiko Masunaga Eye Hospital, Banepa, Nepal: Increasing the volume and uptake of retinal services (screening and treatment) through patient referrals from general community hospitals.[3]

"Through this workshop I learned how to identify a problem and analyse it. The research training and coaching was a great help to us. Through our intervention with the local general hospital, the number of referred people with Diabetic Retinopathy increased and there was a quite significant change in the knowledge of healthcare professionals. The project has brought a lot of changes in how our own team works."

– Ruchi Shrestha,
Medical Director and
Vitreo-retinal Surgeon

Dr Shroff's Charity Eye Hospital, New Delhi, India: Determining the effect of screening and generating awareness in its three-million-person service area through a door-to-door intervention to increase the use of community-based vision centres.[4]

"During our research project the team learned about the seriousness of keeping good data and collecting different data points which may be contributing to the results in an indirect way. I think the way to go ahead is to make research like a culture. Have a group of people who are interested in starting small projects. We can make it a habit to collect that baseline data, which is important for comparison, and then see the impact in a very scientific way."

– Shalinder Sabherwal,
Head– Department of Community
Ophthalmology and Public Health Research

Lumbini Eye Institute and Research Centre, Siddharthanagar, Nepal: Improving timely diabetic patient referral flow and compliance from peripheral eye centres to the main hospital.

"I have had a few publications and I was happy with it. This workshop gave me a deeper understanding of what research actually is. It has lead me to want to experience more. At the institutional level this project strengthened tracking of patient referrals which is very important for a tertiary setting. I feel very fortunate to be part of this team."

– Binita Bhattarai,
Associate Professor and
Oculoplastic Surgeon

Figure 3 Gopal Bhandari shares STATA workshop learnings with Bharatpur Eye Hospital team members

Future plans

The ORCB programme underscored the value of a long-term partnership and mentorship model in developing research skills in eye hospitals. While labour intensive, this level of long-term commitment seems necessary for programme success.

Two online courses are being developed as part of Seva's e-Learning platform, InSight, to make evidence competency a part of the skill development library. These courses will be accessible to eye care workers (anytime, anywhere) with less intensive mentoring input; they include a module on evidence-informed practice and an intermediate-level blended learning path for practitioners. For more information, please email **Insight@seva.org**

The authors would like to acknowledge the valuable contributions of all members of the Operational Research Capacity Building Study Group: **bit.ly/ORCB-study**

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KEY MESSAGES

Key community eye health messages

Types of research

- Basic (experimental) research involves testing or attempting to prove a hypothesis through experimentation.
- Clinical research addresses how diseases in individuals can present and be diagnosed and how a condition can be managed.
- Epidemiological research studies the distribution of disease and other health-related conditions in populations and applies it to control health problems.

Rapid Assessment of Avoidable Blindness (RAAB)

- It is a population-based eye health survey which assesses the prevalence and causes of vision impairment and blindness among people aged 50 years and above.
- A certified RAAB trainer supports the RAAB survey and requires a local team and time commitment.
- The changes in the RAAB survey protocol are reflected by version number, from RAAB4.0, RAAB4.03, RAAB5, RAAB6, to the most recent RAAB7 (2021).

Benefits of developing research skills

- Helps to answer clinical question and to deliver good quality eye care by making evidence-based decisions.
- Provides knowledge to build on to engage with complex topics in a specialised field.
- Expands knowledge about specific problems and is a great chance to expand the network.