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Vision and Health for Everyone

The Peek approach to measuring and creating impact

Dr Andrew Bastawrous, October 2019

There is a global vision crisis. Over a billion people worldwide need better access to eye care and 30 million people are avoidably blind. The number of people with avoidable blindness and vision loss is set to triple in the next 30 years.

Cost-effective solutions to the leading causes of poor vision exist, primarily cataract surgery and glasses. But for the majority of people with poor vision, these solutions remain out of reach.

Thanks to the tireless efforts of eye health organisations across the world, in many places the barriers to better vision are being removed through training, infrastructure improvements, and awareness and treatment campaigns. But there is so much more to do. At Peek Vision, we are helping to tackle the global vision crisis by equipping eye health providers with new ways to measure their work and improve their services. This paper explains our approach to measuring and creating impact.

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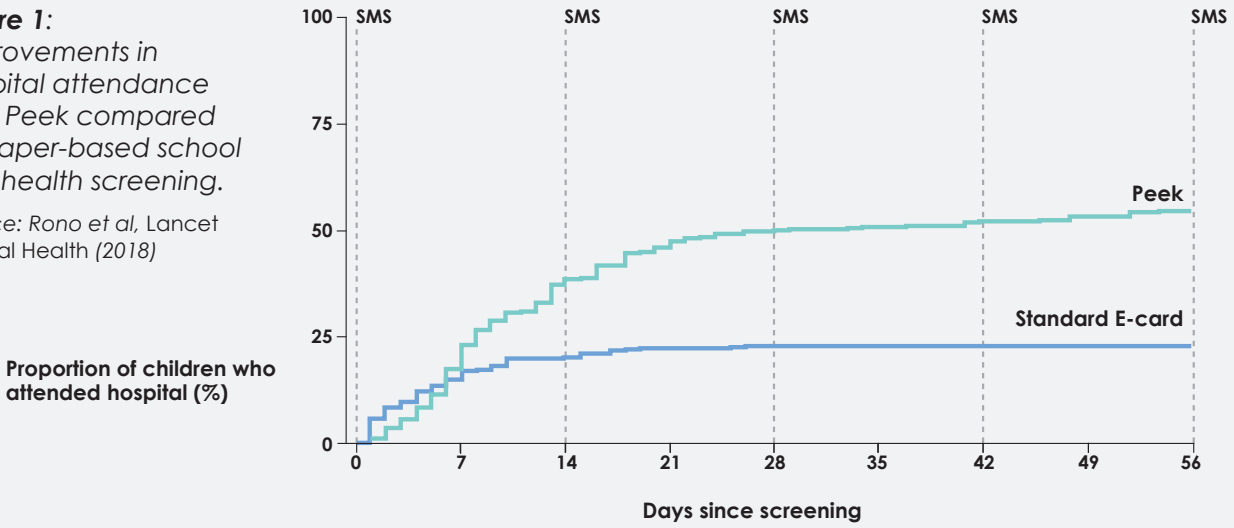
***Figure 1**: Improvements in hospital attendance with Peek compared to paper-based school eye health screening.*

Source: Rono et al, Lancet Global Health (2018)



Peek develops solutions to identify and address the barriers to better eye health. Our solutions include a clinically-validated visual acuity test smartphone app that can be delivered by non-specialist personnel with the same accuracy as tests operated by eye health professionals. This enables task-shifting and increases the number of people who can be screened in a given area.

For example, in Kenya, one in twenty school children has a sight problem but there are not enough eye health workers to identify them. In Trans Nzoia county, teachers were equipped with Peek to screen and refer children with an eye problem to the local hospital using our smartphone-based school eye health system.

21000 children were screened by 25 teachers in nine days. Compared to conventional paper-based screening and referral, the Peek system increased both screening coverage (the number of children who could be screened in a given area) and adherence to referral (the number of children who attended follow-up appointments). The adherence to referral was more than doubled when using Peek, from 22% to 54%[1] (figure 1).

We have also trialled a similar school screening programme in Botswana which included an outreach service to further improve the

attendance at referral. In this trial, over 90% of children attended follow-up appointments. This outreach model was then adopted in Kenya and referral adherence increased to over 90% when over 160000 additional children were screened in more than 400 schools.

Our experiences in Kenya, Botswana and elsewhere have led us to develop a novel approach to measuring eye health outcomes. We believe this approach could help transform eye health in low- and middle-income countries, providing better insights into how eye health services are performing and enabling rapid improvements, even where resources are limited.

1 Rono HK, Bastawrous A, Macleod D et al. Smartphone-based screening for visual impairment in Kenyan school children: a cluster randomised controlled trial. *Lancet Global Health*. 2018, https://doi.org/10.1016/S2214-109X(18)30244-4

In many eye health programmes, success is measured by the number of people who are screened or treated. Although this helps services to understand how an eye health service is performing, it does not tell the whole story. To achieve health coverage for everyone, we need to put these numbers into context by focusing on some key metrics:

UNMET NEED

How many people have an eye health need that hasn't been met?

For example, they have a cataract which hasn't been treated.

MET NEED

How many people have an eye health need which has been met?

For example, they had a cataract which has been treated and can now see clearly.

BARRIERS TO HEALTHCARE

For those people who haven't had their eye health need met, what are the barriers?

For example, they couldn't have their cataract treated because the surgery was too far from their home and they couldn't get to the appointment.

These three key variables - unmet need, met need, and barriers to healthcare - **translate into measurable attributes of a service**:

COVERAGE
OF SCREENING

Of those with an unmet need, **how many are identified through either screening or self-identification?**

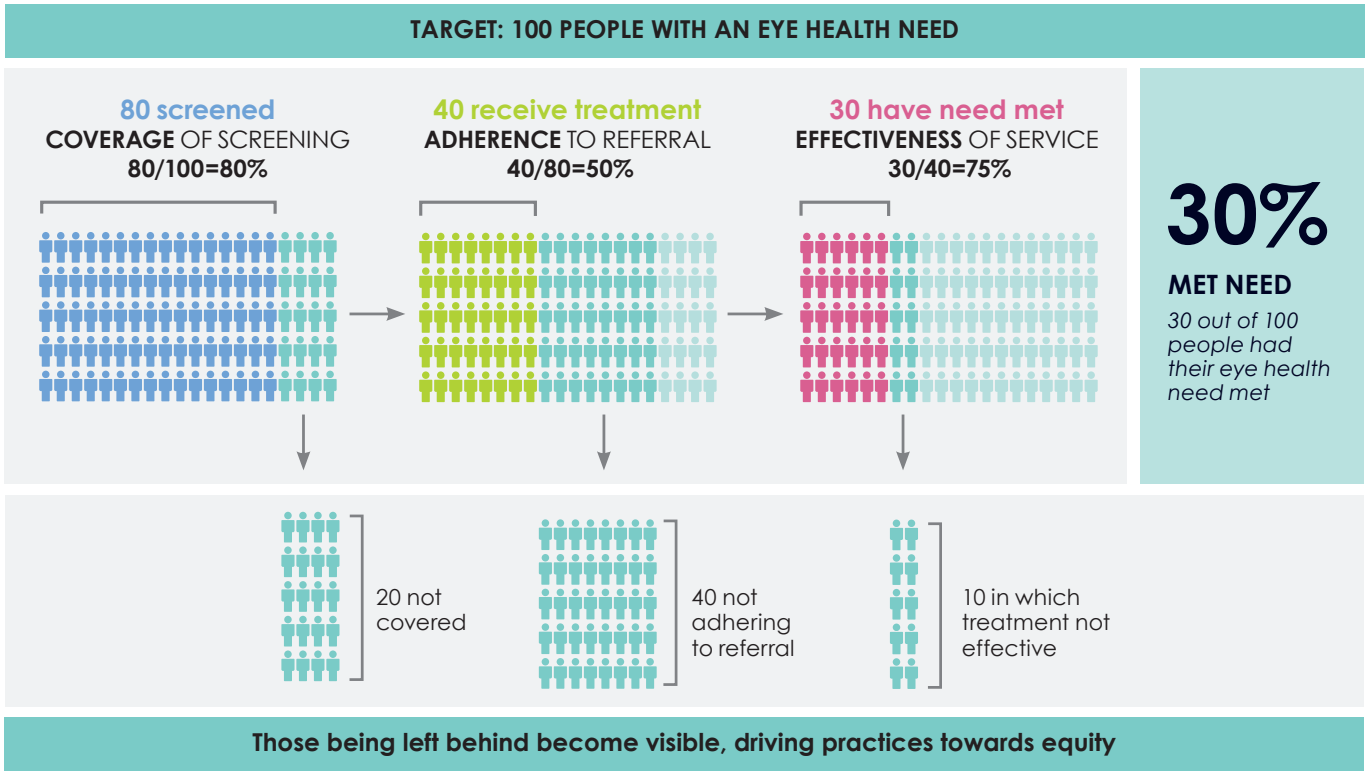
ADHERENCE
TO REFERRAL

Of those identified with a need and referred to the next point in the health system, **what proportion make it?**

EFFECTIVENESS
OF SERVICE

Of those who receive an intervention, for **what proportion has that intervention worked?**

Figure 2 *- Example showing key metrics at each stage of a patient's journey through the eye health system*



As a hypothetical example (see figure 2), imagine there are 100 school children who have an eye health need. 80% screening **coverage** is achieved which means that 20 children (20%) who should have also been screened were missed.

Importantly, the Peek system allows us to look at what features differentiate those 20% who weren't screened from the 80% who were screened. This means programmes can direct their interventions accordingly. For example, if several schools in an area haven't been screened because they are difficult to access by road, service managers know they need to look at providing transport to ensure they are covered.

Adherence in this example is 50%, which means that half of the children referred for follow-up appointments actually attended. This means that half of the children that potentially have a problem with their sight didn't attend a follow-up appointment to be further examined.

Note that programmes that report adherence typically cite 10-20% as normal. This is often due to the barriers to access that we described earlier - factors such as lack of specialist eye health personnel or poor awareness of treatment.

Likewise for **effectiveness** - in this example, the intervention (which might be as simple as providing glasses) worked as intended for 75% of the children who attended their follow-up appointment. So in total, despite great effort and resource use, only 30 children out of the original population of 100 in need ended up having their need met.

Better data alone won't solve the global vision crisis, but it is a vital step to achieve universal health coverage.

Programmes using Peek in Kenya and Botswana have shown that a timely recognition of the barriers to receiving services can lead to change. For example, in Botswana, less than 20% of children screened were initially adhering to referral due to the distances and costs of services, so an outreach programme was tested and adherence increased to over 90%.

Traditionally, this type of information is gathered on paper - if at all - and is analysed manually. This is a hugely complex task and a strain on overstretched resources. It also makes it almost impossible to respond quickly to gaps in services. However, using the Peek system, programme implementers have access to live, real-time field data from which they can drive systematic improvements.

By putting into context the numbers related to coverage, adherence and effectiveness, eye health services can make rapid, cost-effective improvements to the eye health of the people they serve. We know from experience that even small changes can have a significant effect on the potential success of a patient's journey through the system. Where substantial investment or other support is needed to implement improvements, eye health providers can now access timely data. This can help to make their case to government or other stakeholders, presented in a way that makes the barriers to better eye health compelling and clear.

To solve the global vision crisis, we need more investment in specialist eye health services and personnel, better access to affordable treatments, and better global awareness of the issue, from patients to policymakers. But these changes won't happen overnight. Better data alone won't solve the global vision crisis, but we believe it is a vital step for eye health services to achieve universal coverage.

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Our approach to measuring and creating impact

Challenges in receiving universal health coverage

Common data gaps reported by public health programmes:	The scale of actual need and specific problems that need to be solved	Coverage of services	Adherence between tiers of the health system (community to primary, primary to secondary)	Quality of services delivered, i.e. effectiveness

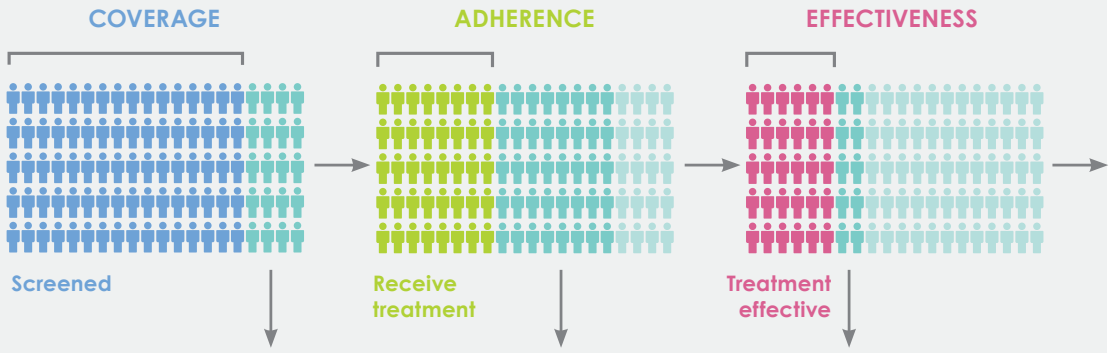
Peek generates visibility of the patient journey and barriers at an individual and population level

NEED

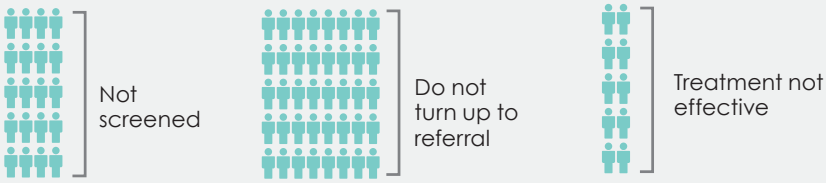
SCREENING

TREATMENT

OUTCOME



MET NEED



Access to real-time data supports outcome driven decision making

Eye health services make rapid, cost-effective improvements, to better meet the needs of the people they serve

CASE STUDY

Peek works with inspired and dedicated partners in low-and middle-income countries to improve access to eye health. This recent case study shows how an eye health team working in a low-income country have been able to make transformative changes using the data surfaced by Peek systems.

Before the eye health team implemented Peek, they had plenty of good prior data regarding the numbers of people screened and treated over the previous years. Many people with an unmet eye health need had their needs met. However, those having their eye problems resolved (i.e. achieving 'met need' status) were only a small fraction of the entire population with an eye health need.

What looked like a success story - 3000 screened and 600 treated in just one month - was in fact masking a very low proportion of people with an eye health problem having their needs met. With Peek, the team were able to gain visibility of the system at work (figure 3, on page 8).

The original target population was 6000 people. This meant that 3000 of the 6000 targeted were screened - in other words, 50% were missed. After screening, 600 people were referred for treatment, of which 200 (33%) received it and 400 (67%) did not. Of those treated, 150 (75%) met the intended outcome.

We can estimate the overall unmet need amongst the target population of 6000 based on the existing data. In this example, we know that 600 out of the 3000 people screened were referred for treatment - that's 20% of the people screened being referred.

But only 200 of those 600 actually attended the referral. Out of that group of 200, 50 (25%) were false positives (i.e. they didn't actually need treatment - this is common with any health screening programme) so 150 (75%) of the people referred were truly in need (true positives).

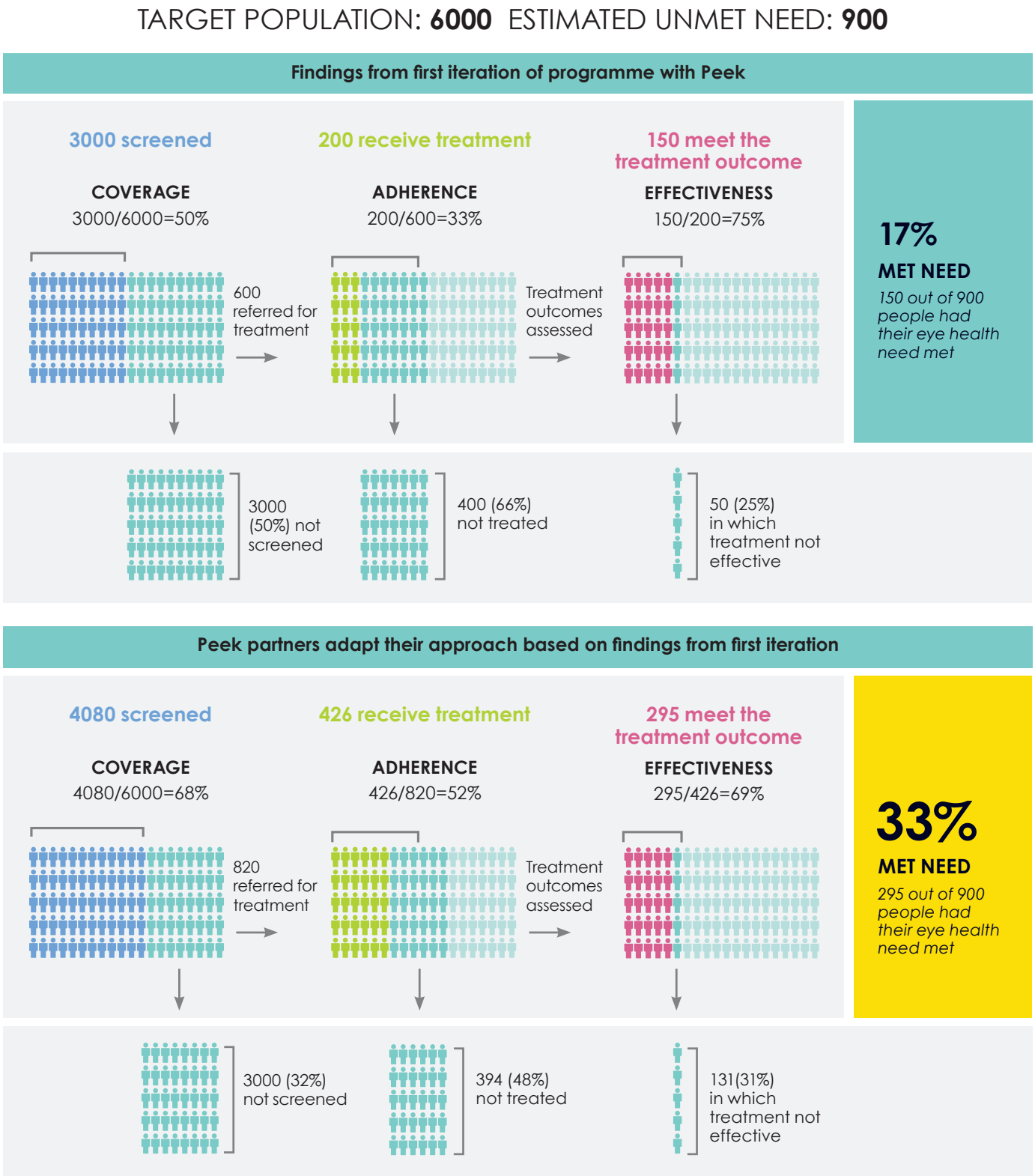
To estimate the unmet need we therefore multiply 20% (the proportion of people referred from screening) by 75% (the true positive rate), which comes out at 15%. 15% of our target population of 6000 equates to 900 people with an unmet need.

If the unmet need is actually around 900 people, in this example just 17% (150/900) of people with an eye health issue actually had their need met.

Within one month of reviewing this data, the team working on the ground were able to adapt their approach. Using the data, they looked at the root causes of why people didn't have their needs met and made "quick-win" changes to address the issues they surfaced.

As a result they almost doubled the proportion of people who had their eye health needs met. 4080 of the next 6000 targeted were screened (i.e. 32% missed). 820 were referred for treatment, of which 426 (52%) received it and 394 (48%) did not. Of those treated, 295 (75%) met the intended outcome. Thus 33% (295/900) had their unmet need met in this second iteration, and the team understood exactly where they needed to focus next to make even bigger improvements with the next iteration.

Figure 3 – *Illustration showing how an eye health team working in a low-income country were able to use the data uncovered by Peek to adapt the way they delivered their programme, ensuring fewer people were missed and more people had their eye health needs met.*



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