Insights Series

Issue 13
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transforming-the-system-of-care

Sight to the world: How Aravind improves access to care for millions

A thought leadership paper on
'Transforming the system of care'
co-authored with Dr. Aravind Srinivasan, MS, MBA

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Preface

The Insights Series

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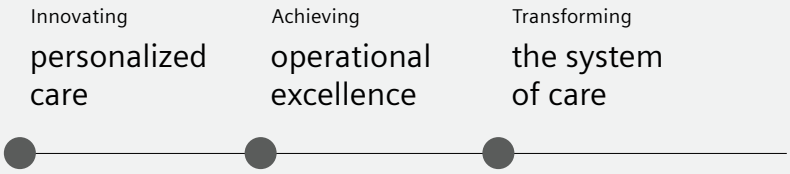

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Executive summary

Across the globe, it is estimated that more than 39 million people suffer from blindness.[1] In a large majority of these cases – up to 80% – the cause of the blindness is preventable or treatable.[2] In more than half of all cases, blindness is the result of cataract.[1] This is a serious medical eye condition, but it can be treated quickly, effectively, and cost-efficiently to restore vision. Improving access to care is a central element of transforming care delivery, one of the fundamental challenges facing healthcare providers worldwide. Remarkably innovative and effective approaches exist to tackle this challenge.

The problem of blindness is particularly evident in India, where it is estimated that close to five million people are blind.[3] Difficulties in treating these people are largely the result of poverty. Problems are further compounded by poor infrastructure, which makes it difficult to reach patients; poor logistics that reduce access to the necessary consumables; a lack of awareness of treatment options; and a scarcity of qualified workers.

Most of these patients reside at what many regard as the 'bottom of the pyramid,' a market segment that is generally considered unattractive by healthcare providers. Dr. Govindappa Venkataswamy viewed the situation differently. For him, this 'bottom of the pyramid' was precisely where he could have the greatest impact. In 1976, he established the first Aravind Eye Care Hospital in south-east India, dedicated exclusively to eradicating needless blindness caused by cataract.

Today, the Aravind Eye Care System (AECS) has treated more than 65.5 million patients and performed 7.8 million surgeries.[a] By embracing a model of high volume and intense specialization, AECS can perform cataract surgery 98% cheaper than in the U.S.[4,5] In addition, the outcomes achieved by AECS are as good as, or better than, those realized in the U.S. and Europe.

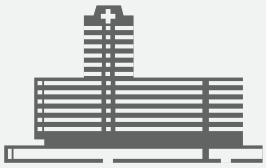
How does AECS succeed in a market that many others view as unattractive? And what can other market segments and more developed markets learn from its extraordinary success story?

Dr. Aravind Srinivasan, nephew of the hospital's founder, describes the success in straightforward terms, highlighting the mission to "provide care to the poorest of the poor," and to "do something beautiful." They achieve this through the application of clear operating principles based on the three dimensions of access to care: affordability, availability, and acceptability. These "Three A's" – affordability, availability, and acceptability – are essential for improving access to care.

"The way to build economies of scale in India is not by serving the top 20 or 30 million people. It is by serving the bottom *billion* people," says Dr. Aravind. The traditional market-driven business model is not effective for serving this 'bottom of the pyramid' segment. For Dr. Aravind, the key to success in such a market is to *drive the market*, by identifying and building a new market in response to a realistic assessment of existing conditions.

[a] *As of March 2020.*

About Aravind Eye Care System



Aravind Eye Care System founded 1976

Key figures (as of 2020)

99 sites
5,000 beds
>5,000 staff (**80%** women)

Daily

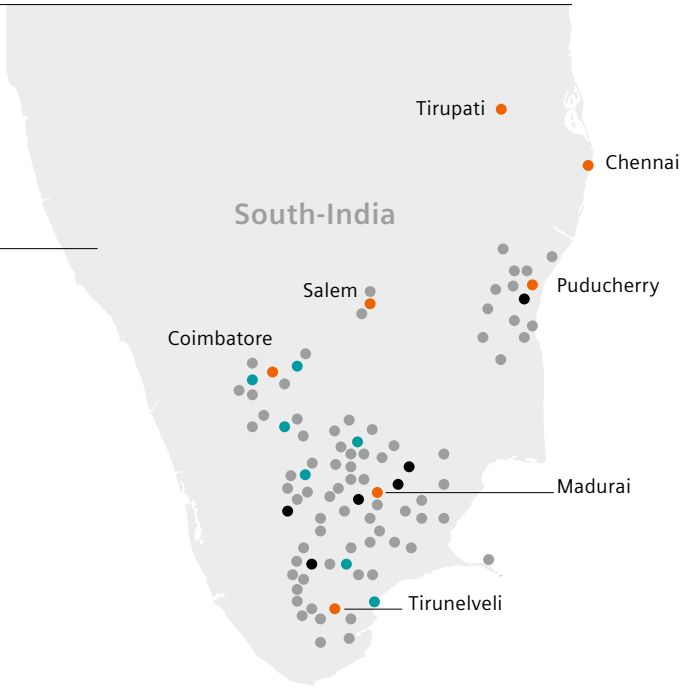
14,000 patient examinations
1,600 surgeries
11,000 manufactured IOLs

Source: Aravind Eye Care System

Aravind Eye Care System (AECS) was founded in Madurai, India, in 1976 with a modest 11-bed hospital. Today it operates 99 eye care centers with a total of 5,000 beds, providing services that range from primary to advanced tertiary care. On a typical day, AECS performs approximately 14,000 patient examinations and 1,600 surgeries.

These numbers seem staggering by the standards of Western hospitals, but for Dr. Aravind they are the norm. AECS's daily activities also include teaching classes for 100 residents and 300 technicians and administrators, and its in-house manufacturing facility, Aurolab, produces about 11,000 intraocular lenses (IOLs), which supply AECS internally and are exported worldwide.

It all adds up to a remarkably efficient model for improving access to care, with more than half a million eye surgeries performed and 700,000 prescriptions for eyeglasses dispensed annually. A further 800,000 surgeries are performed each year by global, independent partner institutions who use the Aravind approach.

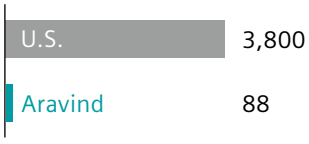


99

locations in South-India with a service area of 100 million people:

- Tertiary care centers **(7)**
- Secondary care centers **(7)**
- Outpatient centers **(6)**
- Primary care centers **(79)**

Cost of cataract surgery (US$)[4,5]

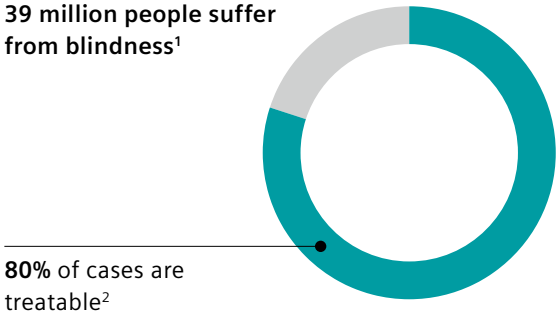


"Patient charges per cataract surgery relative to average income" per year

What makes AECS so impressive is not only its size, but also its results. Its mission was clearly established by founder, Dr. Venkataswam (Dr.V), and his vision is being applied with extraordinary impact and effectiveness. With its unique, low-cost approach, AECS offers cataract surgery for approximately US$88[4] – 98% less than in the U.S., patients are often charged as much as US$ 3,800 per surgery. Even taking into account the adjusted purchasing power for both countries, it is significantly cheaper.[b] Despite this low price, AECS performs close to half of its surgeries for free or at highly subsidized rates, in keeping with its mission to serve the poor. Nonetheless, it operates profitably, earning a "healthy margin."

[b] Average income per year (2018): India US$7,763 (purchasing power parity - PPP); USA US$62.795[6]

The challenge



Globally, about 1.3 billion people live with some form of visual impairment,[7] and 39 million people are considered to be legally blind.[1] Blindness is more prevalent in developing countries such as India than in wealthier Western countries.

The primary cause of blindness, in India as elsewhere, is cataract – the clouding of the eye's lens. Most cases of cataract-caused blindness can be treated quickly, effectively, and cheaply. Cataract surgery can be performed in less than ten minutes. However, access to proper care is difficult, particularly in many parts of India.

In India, it has been said that blindness is "like having a mouth without hands."[8] This underlines the significant and often devastating effect of visual impairment on quality of life. The health impact of blindness does not stop at loss of vision; it also considerably shortens life expectancy. Its economic impact is also severe as it often directly causes unemployment and poverty. And the impact on families is profound. People over the age of 50 are particularly susceptible to cataract. Specific causes of cataract remain unknown, although ultraviolet sunlight, diabetes, hypertension, smoking, and previous eye injuries are among the main drivers.

Receiving effective and affordable treatment is difficult in India. With a population of more than 1.3 billion people, the country has a low supply of eye care services. It has 20,000 practicing ophthalmologists, about 15 ophthalmologists per million people (compared to 81 in Germany and 59 in the U.S.).[9]

The consumables necessary for cataract surgery – lenses and surgical equipment – are often prohibitively expensive, especially if purchased from abroad. In addition, there are barriers related to the patients themselves. Many poorer people have no familiarity with eye care, are afraid of surgery, or cannot take the time off work for a medical procedure. For many, even the charge of US$88 is beyond their reach.

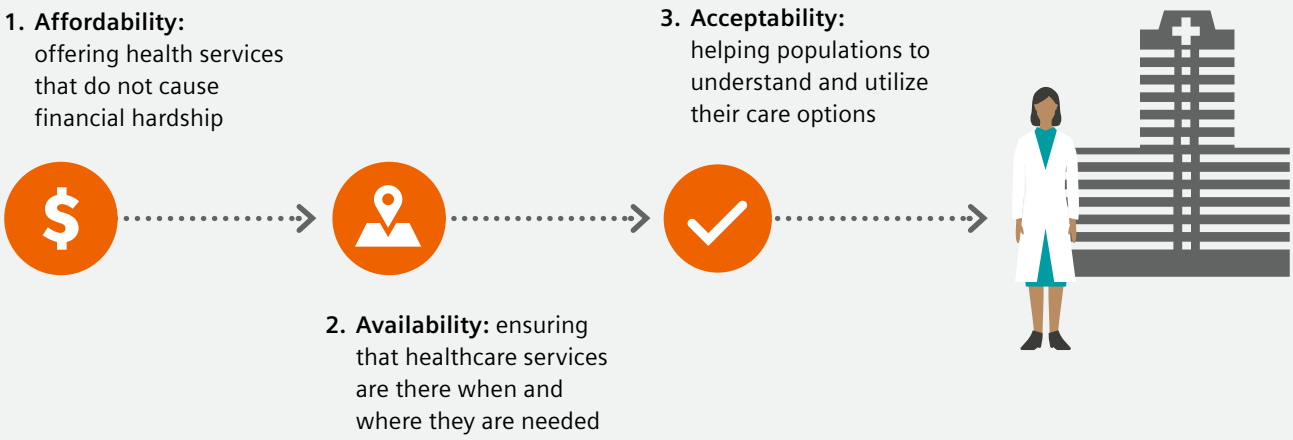
The solution

The model of the Aravind Eye Care System successfully improves access by addressing the following three barriers:

1. **Affordability**
2. **Availability**
3. **Acceptability**

Retaining a sharp focus on these three dimensions brings coherence and discipline to AECS's efforts, and keeps its day-to-day work in line with the overall mission.

Aravind Eye Care System increases access to care by making care affordable, available and acceptable



1. Affordability

Providing affordable care in India demands a fundamentally different and more frugal approach than that applied by Western care providers. Drawing an analogy to the hospitality and travel industries, Dr. Aravind asks, "Imagine if India had only five-star hotels. How many people could afford to stay there? How many people could travel if India only had first class sections in trains and airplanes?"

To meet this affordability challenge, AECS developed a business model that drastically lowers costs through a combination of increasing workforce productivity and stripping out costs by manufacturing consumables in-house. These efforts are supported by rigorous benchmarking.

Increasing workforce productivity

In order to get maximum value from surgeons' time, AECS's practice model enables surgeons to perform five times more cataract surgeries than the Indian average and up to eight times more cataract surgeries than the U.S. average. Each operating theater is equipped with two fully functional tables. While a surgeon is operating on a patient at table 1, nurses are preparing a second patient at table 2. As soon as the surgery at table 1 is complete, the surgeon simply turns to the other side to operate on the second patient who has already been fully prepared.

This 'assembly line' approach in no way compromises the surgeons' accuracy or concentration; in fact, it has the opposite effect, removing distractions and allowing them to focus their full attention on the surgical procedure. As with an elite athlete who invests countless hours in perfecting a certain skill, there is a direct correlation between repetition and excellence. As Dr. Aravind notes, "when you build a certain level of efficiency, people become very, very good at what they're doing." Almost all non-surgical tasks including patient preparation, cleaning, and sterilization are handled by nurses. This frees up additional time for surgeons to concentrate on surgery, allowing them to perform between six and eight surgeries an hour.

Stripping out costs

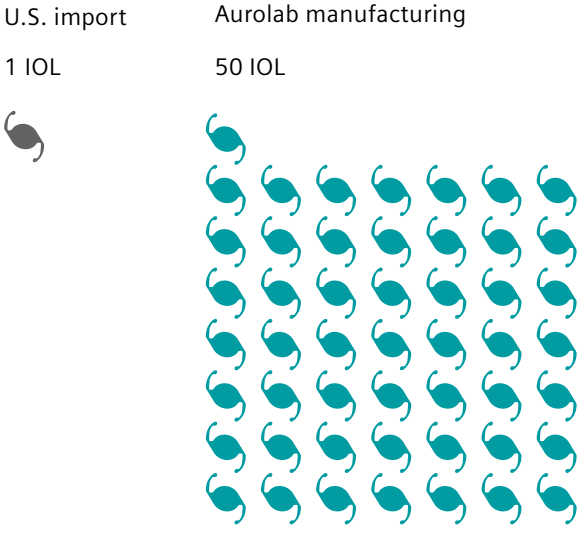
The essence of cataract surgery consists of removing a patient's clouded lens and implanting an intraocular lens (IOL). These IOLs are a costly part of cataract surgery. Until the early 1990s, AECS purchased them abroad at a cost of approximately US$200 each, as there were no local manufacturers in India. This led to two classes of treatment for patients: paying patients would receive an IOL, while non-paying patients unable to cover the costs of the artificial lens were forced to go without and were required to wear thick corrective eyeglasses. However, that was not in keeping with Dr. V's original mission. He asked himself: "If our mission is to give eye care to all in the same way, why are we differentiating?"

"In 2019 about 60% of the people can afford to pay for surgery. But in 1976 it was only 20%."

Dr. Aravind Srinivasan

In order to make IOLs available to all patients, irrespective of their ability to pay, AECS decided to manufacture its own – a bold step for a hospital with no previous experience in this area. In 1992, AECS established a not-for-profit manufacturing facility named Aurolab. Today, Aurolab manufactures 11,000 IOLs daily. The lenses meet the highest quality standards, they are ISO certified, and several products have CE certification. Most remarkably, Aurolab produces these IOLs for a sale price of about US$2 per piece[10] compared to US$97 in the U.S. – again, 98% cheaper.

For the cost of 1 IOL from the U.S., Aurolab manufactures 50



In addition to producing IOLs for use at AECS facilities, Aurolab has become a leading global supplier to the eye care industry, offering more than 200 products including pharmaceuticals (retinal products, eye drops, antiseptics), ophthalmic equipment (phacoemulsification machines, slit lamps, retinoscopes), suture needles, and surgical blades. Aurolab exports its consumables to more than 160 countries worldwide and it is estimated that more than 30 million people worldwide see through Aurolab lenses.[11]

Benchmarking sites and surgeons

In order to maintain its high efficiency and its ability to perform surgery at low cost, AECS constantly tracks KPIs at a staff, site, and enterprise level. Data is collected in a range of areas, including the number and type of surgeries performed, complications, revisions/re-surgeries and the reasons for these, and recovery processes. The data, which is aggregated to KPIs, makes it possible to compare and evaluate different sites and individual surgeons. If performance gaps are identified, measures can be taken to close them and thereby maintain the high quality of AECS's outcomes.

2. Availability

In addition to making its care affordable, AECS also faced a challenge in making its services available, both physically and in terms of the time a patient must invest. Many patients could not travel to an AECS hospital because of the cost, a lack of time due to absence of work, the need to be accompanied by someone who could see, or their own visual impairment. To address these barriers, AECS implemented a hub-and-spoke model.

Reaching out to patients

One way in which AECS seeks to make its care available is through mobile outreach camps that literally bring eye care to the doorstep of patients in rural areas. AECS operates seven to eight of these mobile camps every day, with doctors and nurses travelling to rural communities to offer eye examinations, refraction tests, and diagnosis. Camps are set up in community halls, schools, on the street, or in village squares. Each camp sees approximately 200 patients daily. Most can be treated on-site with spectacles, their lenses and frames fitted directly at the camp. About 29% of patients are identified as needing cataract surgery. These patients are transported to the nearest Aravind hospital by an AECS bus service, and provided with meals and accommodation.

Expanding primary eye care centers

Outreach camps alone are not sufficient to guarantee the physical availability of care to all people in rural areas. Despite the high number of camps, AECS was only able to reach less than 10% within its catchment areas.[12] It has therefore expanded its network with 79 primary care centers covering a population of 5 million people in remote areas. These primary care centers handle more than 500,000 patient visits per year. After working with primary care centers for two years, AECS has been able to expand its reach to 75% of the people living in its rural catchment areas.

Sharing the model worldwide

AECS's mission is not limited to India; its goal is to eradicate blindness worldwide. In many African countries, the ratio of ophthalmologists to people is far lower than in India. To help combat this problem, AECS has founded Lions Aravind Institute of Community Ophthalmology (LAICO). The idea is to share AECS's approach, methods, and best practices with hospitals around the world through teaching, training, research, and consultancy. More than 350 hospitals and clinics in 29 countries now follow the AECS approach. The effectiveness of the LAICO training is clear: ophthalmologists participating in the training increase the number of surgeries they are able to perform by an average of 45%.[13]

Besides physical availability, the Aravind model also provides availability in terms of time – with flexibility designed to accommodate patients, and by ensuring that visits and treatment are quick and efficient. This is achieved by taking all necessary steps to ensure that resources are in adequate supply and are utilized and allocated as efficiently as possible.

[c] *In Ethiopia, Kenya, Mozambique, Rwanda, Tanzania, and Zimbabwe, the ratio of ophtomologist to inhabitants is less than 2 per million.* [9]

Maximizing scarce resources

The single most valuable resource of any eye clinic is the time of its ophthalmologists. This must be used to achieve the greatest possible impact. The processes and task-shifting (to nurses) discussed above are an important part of this effort, allowing ophthalmologists to devote their time and energy to their principal task: surgery.

Ensuring that adequate support staff are available when needed can be a challenge. Every year, AECS recruits around a thousand young women from village high schools, who would otherwise have little access to the labor market and vocational training in rural India. AECS trains them to perform nursing tasks and their role is vital to AECS's overall performance. "Trust me, Aravind's backbone is these young women," says Dr. Aravind.

Optimizing clinical operations

Another element of ensuring the timely availability of necessary resources is efficient administration. A system as large as AECS requires highly professional and capable management. Cataract surgery, particularly in the Aravind model, has become fairly routine. However, the administrative challenges of managing an organization of this size and complexity are immense. As Dr. Aravind readily admits, "the biggest challenge in running this organization is logistics, not surgery."

One important step toward optimizing clinical operations is that AECS does not work on an appointment system. Instead, it is committed to making sure that every patient who arrives at a clinic is seen by a doctor that same day. Patients can expect short waiting times and adequate levels of staff, with electronic medical record systems tracking and displaying the current and estimated wait times.

Operations are also streamlined through efforts to engage and motivate the workforce. All employees are continually informed of how their own work contributes to AECS's overall mission. Each department displays its objective on a notice board. For example, the notice in the medical records department reads: "To contribute to Aravind's mission of eliminating needless blindness by recording all relevant patient information accurately without any delay and providing timely reports to support effective decisions." This clarity about goals helps to create a sense of identity and purpose among all employees.

3. Acceptability

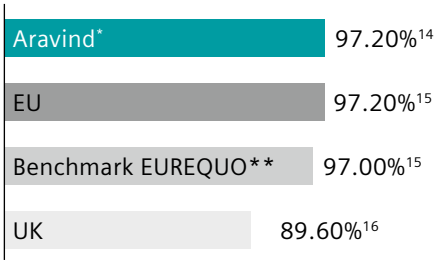
Acceptability is the third dimension of access to care. In many of AECS's service areas, acceptance of eye surgery among the general population is poor. This is often the result of several factors: a lack of awareness among rural populations that many of their cases are curable; concerns about the costs of the surgery; and a more general fear of surgical interventions and possible complications.

Increasing awareness

An essential part of the challenge that AECS must overcome is raising awareness of the services it offers. Steps to address this include making vigorous efforts to bring its services directly to their target population, for example through the outreach camps. This eliminates the need for patients to travel to unfamiliar surroundings – a journey that could be prohibitively expensive as well as confusing and intimidating for many. In addition, mobile vans disseminate information about AECS services using brochures, public announcements, videos, and simple presentations. Mobile communication also plays an increasingly important role. Accordingly, AECS has been sending SMS messages to its target population for several years now, and is raising its profile on social media.

Patient outcomes

The standard test to measure clarity of vision after cataract surgery is known as "Corrected distance visual acuity" (CDVA). A CDVA score of 6/12 is regarded as an indicator of successful surgery.



* with injection of intracameral moxifloxacin

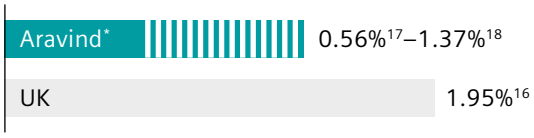
** European Registry of Quality Outcomes for Cataract and Refractive Surgery

"Offering cataract surgery at low cost does not mean that we compromise on quality."

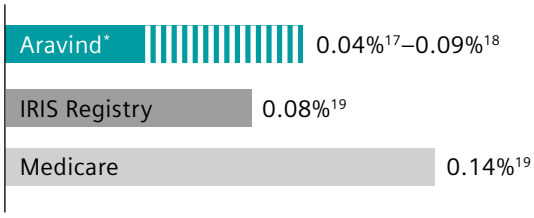
Dr. Aravind Srinivasan

Complication rates

Posterior capsular rupture, zonular dehiscence w/ and w/o vitreous disturbance
KPI for one of the most common surgical complications



Postoperative Endophthalmitis Rate
KPI for one of the most common inflammations subsequent to surgery



Achieving superior outcomes

By delivering superior outcomes and demonstrating this to prospective patients, AECS reduces patients' fears and anxieties. A simple and straightforward message – "What we do works, and the risks are very, very low" – helps to reassure patients and their families, thereby boosting acceptability. Medical evidence supports this message. Among AECS patients, outcomes are as good as in the EU and better than in the UK.[14–16] Their complication rates are below the rates in the U.S. and UK.[16–19]

The future

Aravind Eye Care System is aware that its care model is not immune to competition; cataract is a relatively easy to treat disease and the AECS model has attracted attention from would-be challengers. In addition, to pursue its mission of eradicating needless blindness, it must also treat eye diseases other than cataract.

AECS has, therefore, identified three goals for the coming years:

1. **Increase volume:** By 2030, AECS aims to perform one million surgeries and see 10 million outpatients per year.

2. **Improve efficiency:** AECS aims to increase its operational efficiency by an additional 25% by eliminating idle time and further optimizing clinical operations.

3. **Broaden the portfolio:** AECS aims to expand its services to treat other rare eye diseases such as eye cancer (a type of cancer with very low incidence) and facial and orbito-cranial deformities.

Conclusion

The Aravind model, with its focus on affordability, availability, and acceptability, delivers better outcomes at lower costs, and provides access to high quality eye care – even surgery – to patients who would otherwise be unable to obtain it. AECS not only outperforms Western countries in vision outcomes after cataract surgery, it also achieves lower complication rates.

Can this model be replicated elsewhere?

Some of the elements of the Aravind approach are unique to the Indian market and cannot be exported in their entirety. Yet some of the basic elements do have broader applicability and can serve as useful operational principles in other settings.

The 'three A's' – affordability, availability, and acceptability – are central guiding principles that can serve as useful elements to a wide range of healthcare initiatives. While all three appear straightforward, perhaps even simple, applying them consistently can be challenging.

Affordability is difficult to evaluate outside of a particular context; the definition of 'affordable' varies greatly from Atlanta to Bangalore to Copenhagen. Nevertheless, the basic elements for improving affordability are common to all health systems. Regularly evaluating processes makes it possible to define measures such as streamlining, reducing input factors, eliminating unnecessary steps, and insourcing to reduce costs and make care affordable to a broader population.

Availability is a challenge in every part of the world. Underserviced populations exist even in the wealthiest countries. AECS overcomes distance and physically reaches its patients with a carefully designed network of care centers that cover primary to tertiary care. Such hub-and-spoke models achieve proximity to patients and guide them efficiently through the network. In addition, healthcare providers can now reach their patients with telemedicine services, overcoming many of the availability barriers that previously existed. Timely availability depends heavily on resources. Therefore, it is critical to support the single most scarce resource: the healthcare workforce. Identifying and removing wasteful activities and automating or re-assigning tasks allows all employees to work at the top of their license.

Acceptability is the final piece. Even when care is affordable and available, patients need to be willing to accept the care that is offered. Creating awareness that healthcare services exist and that they are effective and safe are important elements of achieving the necessary level of acceptability.

In addition to the 'three A's,' the Aravind approach also vividly illustrates the importance of an overarching vision or goal. The dedication with which the entire AECS team embraces their founding mission – eliminating unnecessary blindness especially among the poor – demonstrates the power of a central, guiding philosophy against which operational elements and decisions can be measured. Dr. Aravind refers to this as "emotional infrastructure", which their founder Dr. V called, "the joy of doing something beautiful". A purpose like this is invaluable.

Suggested follow-up on

siemens-healthineers.com/insights/transforming-care-delivery

- Insights Series Issue 7:
  Do one thing and do it better than anyone else
- Insights Series Issue 4:
  Achieve twice as much but only work half as hard
- Insights Series Issue 2:
  Culture of diversity, respect, and inclusion
- Harvard Business Review:
  Transforming care delivery to increase value

Information

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Contact

If you have further questions or would like to reach out to us, please do not hesitate to contact our expert directly:

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Dr. Aravind Srinivasan graduated in medicine from PSG Institute of Medical Sciences, Coimbatore, South India in 1992 and completed his residency in ophthalmology leading to Masters in Ophthalmology from Aravind Eye Hospital and Postgraduate Institute of Ophthalmology, Madurai, South India in 1996.

Having worked in the medical field, he had a passion for management. In 2000 he did his MBA with specialization in strategy from the University of Michigan, Ann Arbor, USA. After MBA, he took over as the Administrator of Aravind Eye Care System and was instrumental in bringing changes to the various facets of the organization. From 2011, he is serving the organization in the role of Director-Projects of Aravind Eye Care System. He is on the Board of Govel Trust that runs the Aravind Eye Hospitals. From September 2017, he is leading the Aravind Eye Hospital Chennai as Chief Medical Officer.

On the clinical front, Dr. Aravind is a high volume cataract surgeon. And in Non-Clinical aspects, he is innovating, executing and working with all stake holders in the respective branches to ensure harmony in work, mentoring staff to invent and implement innovations in areas of need to ensure better patient centred care towards.

He is involved in teaching eye health management courses. He is also a resource person for Indian Institute of Management and Mentor for the MBA students of Wharton School of Business and University of Michigan. Dr. Aravind's area of specialization concentrates on overall evaluation and interpretation of performance of each Division and to track progress of performance so as to facilitate benchmarking both internally and externally to achieve patient centred care across the system. Besides administration of the hospitals and grooming managers, Dr. Aravind also evaluates new projects and ensures replication of the "ARAVIND Way" – As a Trainer and Mentor at Management courses, he contributes in extending the Aravind Model of high volume, high quality, affordable cost eye care to developing nation.

Dr. Ralf Meinhardt
Senior Global Marketing Manager
at Siemens Healthineers

Ralf Meinhardt engages in thought leadership activities for Transforming Care Delivery. Prior to his role at Siemens Healthineers he spent several years in the pharmaceutical industry, consulting and scientific research. Ralf holds a Doctor of Economics and Social Sciences degree from the University of Erlangen-Nuremberg. In addition, he holds a Master of Science degree in Management and Bachelor of Arts degree in Business Administration. He studied at the University of Erlangen-Nuremberg and Indian Institute of Management, Bangalore (IIMB). His scientific background is in the field of corporate strategy where he has authored several publications.

Dr. Herbert Staehr
Vice President
Global Head of Transforming Care
Delivery at Siemens Healthineers

Herbert Staehr is passionate about healthcare and, as global head of Transforming Care Delivery, drives activities to equip healthcare providers to deliver higher-value care. Prior to this position, he led Portfolio Development and Marketing within the Enterprise Services and Solutions business of Siemens Healthineers. Before joining Siemens Healthineers, Herbert Staehr worked with a major private hospital group in Germany in senior leadership roles including serving as managing director of an acute care and a post-acute care hospital. Earlier, he led the group's Corporate Development department. He was employed for several years in the Healthcare Consulting practice of McKinsey & Company on various European and international assignments. Herbert Staehr holds a PhD in Healthcare Economics from the University of Hohenheim, Germany. He obtained a dual degree (Bachelor of Arts and Diplom-Betriebswirt) in International Business and Finance from the European School of Business, Germany, and Dublin City University, Republic of Ireland.

At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey towards expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare. An estimated five million patients worldwide benefit every day from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics and molecular medicine as well as digital health and enterprise services.

We are a leading medical technology company with over 120 years of experience and 18,500 patents globally. With about 50,000 dedicated colleagues in over 70 countries, we will continue to innovate and shape the future of healthcare.

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