



NOORA HEALTH



CONTINENT

Asia



COUNTRY

India



HEALTH FOCUS

General



AREAS OF INTEREST

Alternate care providers



HEALTH SYSTEM FOCUS

Service Delivery

NOORA HEALTH, INDIA

Noora Health challenges the status quo of health delivery by transforming family members into equipped caregivers through engaging practical training at hospital premises.

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ABBREVIATIONS

HLEG	High Level Expert Group
IVR	Interactive Voice Response
NABH	National Accreditation Board for Hospitals & Health Care Providers
UK	United Kingdom
US	United States
US\$	United States dollar

CASE INTRODUCTION

The shortage of trained medical professionals in India means that most patients recovering from medical interventions rely mainly on care provided by family members. With very limited information or training, families are often ill-equipped to provide support during the recovery process, resulting in high rates of patient relapse and complications. Research has shown the value of equipping family caregivers to become more competent and confident in providing safe and effective care to patients (Reinhard et al., 2008; Scherbring, 2002).

Noora Health aims to transform patient families into a core component of high quality health care delivery by providing them with actionable health information. Noora Health has developed a train-the-trainer approach and certification programme for hospital staff, usually nurses. The programme teaches trainers how to effectively deliver health education and awareness to patients and their families. Noora Health also provides a range of learning aids and materials, which it develops with input from content specialists. Patient families receive an interactive, skills-based training programme, delivered by the trained hospital staff, focused on practical skills they can use at home to facilitate recovery post treatment. This allows family members to support loved ones during their recovery, alleviating their anxiety and easing the transition from the hospital to the home. The training is optional for families, who are told about it upon admission to hospital and during their stay by the ward superintendent. The training is twofold: a theoretical base (classes) coupled with training implementation (practical sessions). Available in different languages, classes vary in size (between 5 and 30 people) and location (hallways, waiting rooms and wards).

Since launching, the programme has been implemented in 26 hospitals across India and has trained 50 000 caregivers. During a pilot study with adult post-surgical cardiac patients, Noora Health observed a 36% decrease in complications, a 23% decrease in 30-day readmissions and a 55% increase in customer satisfaction, over a period of three months

The Noora Health case study shows how families are an untapped resource that could support an overburdened health system. By equipping family members with the basic skills to deliver effective home-based health care following a hospital admission, better patient outcomes can be achieved and readmission rates lowered. It also demonstrates the value of human-centred design and stakeholder engagement. Initially identified via a needs-finding assessment as part of a university class, the programme has grown and evolved with input from patient families and hospital staff to optimize its value to the health care system. By developing a portfolio of tools and content, Noora Health has constructed a platform to accommodate variability in needs across geographies and across public and private facilities.

They [family members] take weeks out of their lives to be with their loved ones, but basically they are relegated to standing outside, sitting outside, sleeping outside the whole time. They get to see their family member for a couple of hours each day ... Then at the end of the whole thing they are given this enormous task to take care of the patient at home. (Shahed Alam, Co-founder, Noora Health)

1. INNOVATION AT A GLANCE

Organization Details

Organization name	Noora Health
Founding year	2014
Founders' names	Edith Elliott, Jessie Liu, Katy Ashe, Shahed Alam
Founders' nationality	American
Current head of organization	Edith Elliott
Organizational structure	Not-for-profit (501(c)(3) registered in the US)

Innovation Value

Value proposition	Training of patients and their families with high-impact health skills essential to improve recovery at home and prevent complications.
Beneficiaries	Patient families from health care facilities in India that serve patients with low socioeconomic backgrounds; 50 000 family members representing roughly 35 000 patients over two years
Key components	<ul style="list-style-type: none"> • Mobilization of an additional workforce (patients' families) in the care process • Flexible, scalable training tools that improve hospital staff's interpersonal skills and career development, namely the train-the-trainer and certification approaches • Interactive Voice Response Technology for follow-up interaction and engagement geared towards low-literacy families

Operational Details

Main income streams	Donations (90%); revenue (10%) [data from 2015]
Annual expenditure	US\$ 385 000
Cost per person served	The programme is free to patient families; the cost is covered by the health care facility (US\$ 0.50 to US\$ 1 per family member trained); cross-subsidy model between private and public facilities to fund operations at resource-constrained facilities.

Scale and Transferability

Scope of operations	Technology research and development, and fundraising are based in the United States; operations management, content design and development is based in India.
Local engagement	Narayana Hospitals in Bangalore, Kolkata, Mysore, Shimoga, Jaipur, Hyderabad, Ahmedabad, Dharwad, Davangere, Raipur, Jamshedpur, Guwahati; Sri Jayadeva Hospital in Bangalore; Sathya Sai Institute in Whitefield; Manipal Hospitals in Bangalore, Mangalore, Salem, Visakhapatnam
Scalability	<ul style="list-style-type: none"> • Noora Health is currently testing and optimizing its model in the existing locations before pursuing further scale to new countries. • Content is tailored to the specific context to make sure the materials are targeted and well received. • To scale the intervention to a new context, there needs to be hospitals that have an interest in reducing readmission rates following hospital procedures, minimising complications and increasing patient satisfaction.
Sustainability	While Noora Health's current development activities are supported by philanthropic funding, the organization is also testing multiple routes to long-term financial sustainability, particularly a cross-subsidization model between private and public hospital clients.

2. CHALLENGES

India's health sector has made substantial progress since independence, with indicators such as infant mortality rate (IMR) dropping from 150 to 50, maternal mortality ratio declining tenfold from 2000 to 200 per 100 000 live births, and life expectancy at birth increasing from 31 to 65 years (National Health Mission, Government of India, 2011; Ministry of Health, Government of India 1961). India seeks to achieve universal health coverage by 2020, but the realization of this goal is hampered by a lack of availability of appropriately trained, motivated and supported health workers (Rao et al., 2011).

Although the production of health workers in India has expanded in recent years, their distribution remains imbalanced (Hazarika, 2013). The workforce is concentrated in urban areas, and bringing qualified health workers to rural, remote and underserved areas is difficult (Rao et al., 2011). The relocation of rural poor to urban slums and the lack of local health infrastructure drive many patients to urban secondary- and tertiary-level hospitals (Bajpai, 2014). These patients often receive suboptimal care, with compromised access to clinical expertise, tools and health information.

The ratio of doctors and midwives per 1 000 people in India is currently at 0.7 and 1.7 respectively, much less than the ratios in the United Kingdom for example, which are at 2.8 and 8.8 respectively (World Health Organization [WHO], 2015). In addition, the projected shortage of doctors is approximately 600 000, based on the recommendation of a minimum doctor population ratio of 1:1 000 made by the High Level Expert Group (HLEG) for Universal Health Coverage (Planning Commission of India, 2011). There are 0.7 hospital beds per 1 000 people (World Bank, 2016), which is slightly lower than the average for the African region (1 per 1 000) and significantly lower than that in Europe (6.3 per 1 000) (WHO, 2009). Some evidence suggests that financial pressure to discharge patients quickly can increase readmission rates to hospital (Kosecoff et al., 1990), placing added strain on already overburdened medical systems. While data for India is limited, data from the United

States (US) suggests that roughly US\$ 17 billion is spent per year on return visits that are preventable with proper education and training (PerryUdem Research & Communications, 2013). If one assumes that trends in India may be similar, return visits and readmissions represent a potentially inefficient use of already over-extended hospital resources (Chen, 2015).

The period following discharge from hospital carries significant risk, and about half of adults experience a medical error after hospital discharge, with 19% to 23% suffering adverse events (Kripalani, 2007). Challenges after hospital discharge include the discontinuity between the hospital and primary care settings, changes to the medication regimen, new self-care responsibilities, and complex discharge instructions. In resource-constrained settings, there is little time and few resources for health education, and patients are often given home-care instructions in a rushed discharge synopsis that is not always in their native language or appropriate for their literacy level. In addition, studies have shown that 40% to 80% of medical information provided by a health practitioner is forgotten immediately, and that which is retained is often inaccurate or incomplete (Kessels, 2003).

The importance of patient- and family-centred care has been emphasized in several health-improvement strategies in the US, United Kingdom (UK) and Canada (Conway et al., 2006). In 2004, the WHO launched the World Alliance for Patient Safety, which aims to facilitate efforts to engage and empower patients, families and communities to be active in their own care, and create an enabling environment for partnerships between patients, families, communities and health-care providers and policy-makers (WHO, 2016). While family members are increasingly seen as essential members of the care continuum and caregiving team, they are not always prepared for their role (Brodaty & Donkin, 2009; Bull, 1990). Interventions can be aimed to support caregivers to become more competent and confident in providing safe and effective care to patients (Reinhard et al., 2008). Interventions that address family inclusion, education and communication between health

care workers and families have been associated with improved hospital discharge planning in certain patient groups (Bauer et al., 2009). In a review by Kelly (2011), interventions that reduced readmission to hospital included patient empowerment, carer inclusion, bridging the discharge process from hospital to home,

improving capacity for self-care and improved understanding of self-administration of medication (Ferrell et al., 1995; Griffiths, Johnson & Piper, 2004). It is important to equip family caregivers so that they feel prepared to deliver care, and have the knowledge and skills needed to do so (Scherbring, 2002).

3. INNOVATION IN INTERVENTION

Noora Health aims to train patients and their families with high-impact health skills essential to improving outcomes after treatment, and preventing complications. This is done on an individual hospital basis, where the intervention is tailored to each hospital's specific needs and resource availability. The delivery of the intervention can be broken into three main layers.

3.1. TRAIN-THE-TRAINER

Noora Health has developed a train-the-trainer approach and certification programme for hospital staff, usually nurses. These training staff are selected by the hospital management in charge of the programme. In some cases, the training is an additional duty for the staff (usually set up on a roster basis) and in other cases the hospital hires dedicated trainers. The training includes a mixture of technical and interpersonal skills, such as communication, empathy development, and patient-centred care methodologies. Depending on the staff's clinical background, the training could also include some medical material. The programme teaches trainers how to effectively deliver health education and awareness to patients and their families, incorporating evidence-based approaches from adult learning theory. The training takes 4 to 8 hours, depending on the facilities' needs and constraints. Noora Health also provides a range of learning aids (videos, paper-based materials, etc.) and teaches staff how to incorporate these into their health lessons. Noora Health develops its own training aids and materials with input from content specialists. This is especially relevant for medical content to ensure the accuracy and quality of the materials.

The goal of the train-the-trainer approach is to help stimulate cultural change within hospital facilities, where staff own the programme implementation, feel equipped to provide training, and recognize the importance of family inclusion in caregiving. This encourages capacity building, as Noora Health works to equip staff with the tools and content to continue running the programme without its direct, continued input. As the family training is provided on hospital premises, Noora Health works with involved stakeholders to develop an implementation framework suitable for the hospital and its existing processes. The Noora Health team conduct follow-ups to check on quality control, correct implementation, and tailor any content or processes as necessary based on feedback from the hospital.

So we go in, operationalize the programme, train people to make sure they know how to run it well and effectively, and then give them the tools and content they need to run the programme. Then we come in more as support – you could think of as like auditors – to make sure that things are happening in the way that we trained them and if there is any other training that needs to happen, if there is any content update that needs to happen, if we need to add a new programme, then we are there to support the hospital. (Shahed Alam, Co-founder, Noora Health)

3.2. FAMILY TRAINING

Patient families receive an interactive, skills-based training programme, delivered by trained hospital staff, focused on practical skills they can use at home to facilitate recovery post treatment. This allows family members to support loved ones during their recovery, alleviating their anxiety and

easing the transition from the hospital to the home. The training is optional for families, who are told about it upon admission to hospital and during their stay by the ward superintendent.

The training is twofold: a theoretical base (classes) coupled with training implementation (practical sessions). Available in different languages, classes vary in size (between 5 and 30 people) and location (hallways, waiting rooms and wards). A timetable is usually provided to the families, showing when and where classes are available in each offered language. Carefully designed videos provide a contextualized visualization of the information that is complemented by interactive explanations from the trainer. Individual practical sessions teach patients and their family members how to use certain tools (thermometer, spirometer, etc.) and perform certain activities (measuring pulse, etc.). Some hospitals also provide these basic devices to patients at discharge.

Family members are not intended to replace the nurses when it comes to measuring vital signs or administering medication, but instead to assist with manual and patient-focused activities (e.g. patient posture) and identify patient warning signs or complications. To standardize the latter, patient families fill in a simple recording sheet (see Figure 1 below), to track the patient's temperature, pulse, water consumption, etc., both at the hospital and at home. The information collected at home can be shared with the doctor during the follow-up visit, which usually happens 20 to 40 days after discharge.

Thus far, Noora Health's training focuses on care for cardiac patients. Moving forward, the organization is expanding its programme to cover oncology, newborn care, and chronic disease (such as diabetes), with hopes of accommodating the needs of multi-specialty hospitals.

Figure 1: Patient sheet provided to family caregiver to monitor recovery

3.3. FOLLOW-UP

Hospital discharge instructions for families developed by Noora Health include a pack of printed materials and links to tutorials they can revisit on YouTube if they have Internet access. Some facilities also provide hardcopies of the video materials, for free or at a low cost. Patients typically return to the hospital for a follow-up, at which point they are able to share the home-monitoring results. Beyond this, patient follow-up in the form of a phone survey is conducted by Noora Health for impact evaluation.

Noora Health is also working on an Interactive Voice Response (IVR) platform and mobile application to deliver information to patient families in real time. The platform is customised to serve three functions: 1) facilitate in-hospital logistics of the programme (including nurse training); 2) collect feedback from patients and family members; 3) disseminate additional information after patient discharge to ensure a consistent standard of home care. Ideally the platform will help Noora Health facilitate communication between patient and hospital after discharge. The IVR platform is envisioned to assist with quality control and provide refresher training to families. *"It is more like 30, 60, 90 days out when they're at home that they start forgetting; they'll know what pulse is, but they will forget the range and it will be drastically wrong. So those are the types of things that we need to remind them better on."* (Shahed Alam, Co-founder, Noora Health)

Noora Health also monitors hospital stakeholders and personnel to ensure quality of care, update training and content, and introduce additional

training. Depending on the facility, this follow-up is generally done at least once per month either in person or via phone/voice conference.

4. IMPLEMENTATION

4.1. INNOVATION IN IMPLEMENTATION

Utilize existing resources and structures

Noora Health's approach is to make the most of existing resources through the involvement of willing family members in the care delivery process. It also recognizes the value of integrating into the existing hospital structures rather than setting up an entirely new process in a complex system. Sensitive to the already overburdened clinical staff, Noora Health's programme minimizes changes to the existing hospital workflow. Repetitive and scattered information reaching the patient in a non-systematic way is replaced with structured education and patient-focused interaction. Different technologies (such as IVR and video training materials) are used to maximize patient engagement and improve implementation efficiency, streamline monitoring and evaluation, and reduce costs through automation.

User centred design and feedback-based iterations

Core to Noora Health's approach is the focus on user-centred design. This was fundamental in the development of its model. The team spent time engaging with potential users about what would be beneficial. *"We shared [the initial ideas] with people and started to get feedback on what would actually work. Then started narrowing down: what do people really want? They want to learn about their condition, they want to know very simple actionable items to do when they get home."* (Shahed Alam, Co-founder, Noora Health)

Its user-centred approach also allows for the adoption of continuous feedback. This encourages the team to iterate based on the experiences and inputs of Noora Health's clients and beneficiaries. *"There is not a week that goes by that each of us doesn't actually speak to, or engage with, those that we're serving."* (Anubhav Arora, India

Operations Director, Noora Health) The team conducted early user-testing with nurses, who would run the programme and report back how patients and families responded. This also helped the team fine-tune the Noora Health materials to be inclusive of different literacy and education levels. *"One of our worries was, how do we involve, in a place like this, patients from all different demographics? People who are coming from rural areas with, perhaps, little to no formal education, and then at the same time sitting next to people who have passed through MBA's?"* (Shahed Alam, Co-founder, Noora Health) This testing and feedback cycle occurred for four months before the pilot was formally launched.

The feedback-informed iterations continue to be part of Noora Health's central approach. Regular interactions with hospital staff running the programme help the team to develop and improve the materials and processes. *"There are regular check-ins with the nurses every month. We figure out the challenges, we figure out anything that is lacking and anything that they need us to train them on, or any other visual aid or any other aid they want us to make for them that can help them in trainings."* (Shahed Alam, Co-founder, Noora Health)

4.2. ORGANIZATION AND PEOPLE

Noora Health's co-founders, Shahed Alam, Katy Ashe, Edith Elliott and Jessie Liu, met at the Stanford Design School course, Design for Extreme Affordability, a programme that teaches human-centred design of interventions, products or services for resource-constrained settings. As a starting point, the four graduate students conducted a landscape assessment of current needs in hospitals across India, beginning with Narayana Hospital in Bangalore. While they initially planned to do something to improve the efficiency of hospital flows and processes, the

exclusion of family members from processes of care made a big impression on the team.

They [family members] take weeks out of their lives to be with their loved ones, but basically they are relegated to standing outside, sitting outside, sleeping outside the whole time. They get to see their family member for a couple of hours each day ... Then at the end of the whole thing they are given this enormous task to take care of the patient at home. (Shahed Alam, Co-founder, Noora Health)

The students also recognized the overstretched schedule of hospital staff, especially nurses. From this, the idea arose: *“Why don’t we use this untapped resource [patient families] that is ready and willing? ... They know the warning signs of a complication; they know what the patient’s baseline is better than a clinician would. So, why not give them a few more tools? Why not give them a few more things to help out?”* (Shahed Alam, Co-founder, Noora Health) From these experiences and interactions with families and staff at the hospitals they visited, Noora Health was founded. It was named after the mother of one of the first patients they interacted with.

Founded in 2014, Noora Health is still in its early development phase. It is a not-for-profit organization, with its technology research and development and fundraising based in the US and its operations management, content design and development based in India. While most of its work is focused in India, the team is working to expand further into the US. Noora Health’s team has grown beyond its original four co-founders to include six full-time members and six fellows. Through offering different fellowships, Noora Health can conduct multi-disciplinary work and explore a cultural fit between new team members and the organization.

4.3. BUSINESS MODEL

Noora Health’s training programme is entirely free to the patients’ families, with costs covered by the health care facility. The main value to the hospital is a reduction in hospital readmissions rates and complications, coupled with increased patient satisfaction and improved long-term customer retention; the latter being especially relevant for private hospitals. Noora Health is not responsible

for the hiring of any hospital staff; instead it trains hospital employees.

Currently, the cost to the hospital in India is US\$ 0.50 to US\$ 1 per family member trained. This number is expected to decrease as Noora Health’s initial investment is amortized over greater family member numbers. The cost is broken down into a once-off implementation cost, and an annual licensing fee for the content, which includes all materials and technology where applicable (such as the IVR or tablets). Hospital-specific costs are determined via three metrics: 1) the implementation work required for programme commencement, including content and delivery customization; 2) the value the programme brings to the hospital (based on patient satisfaction); and 3) the number of public hospitals they can cross-subsidise per private facility (currently between 3-to-1 and 4-to-1). At the time of research, Noora Health was still determining the optimal pricing model, which is difficult given the limited available comparison data and few competitors to benchmark off.

The programme has been implemented in hospitals across India and the US, albeit with slightly different business models. Currently, Indian operations remain more mature. In the US, where the problem of readmission rates and the subsequent cost to the health system is also severe, Noora Health has implemented a more technological solution. Patients (and/or family members) are provided with a tablet that educates them through interactive sessions personalized for their condition and circumstances. As in India, family members are invited to practise new skills at the hospital (e.g. changing a dressing/bandage) to ensure they are ready to perform these activities at home.

Noora Health tailors its programme and pricing model to distinguish between private and public hospitals. There are limited funds available in public hospitals for such programmes. Noora Health is trying to set up a cross-subsidization system such that revenue from private hospital clients covers the cost of implementing the programme in public hospitals. Determining the cost-effectiveness of its model will be particularly valuable for demonstrating the benefit of the programme in resource-constrained settings.

5. OUTPUTS AND OUTCOMES

5.1. IMPACT ON HEALTH CARE DELIVERY

Improved patient outcomes

Noora Health collects pre- and post-implementation data across a range of patient-related metrics, including complications 30 days after discharge, readmission for the same problem (at any health care facility), and any behavioural changes (e.g. diet, exercise, medication adherence, etc.). Most of these data are collected through patient interviews conducted via phone by Noora Health.

These data have documented Noora Health's impact. During a pilot study with adult post-surgical cardiac patients below the poverty line at a Narayana Health facility in Bangalore, Noora Health observed a 36% decrease in complications, a 23% decrease in 30-day readmissions, and 55% increase in customer satisfaction, over a period of three months (Noora Health, Pilot Study). The director of the Narayana Hospital in Bangalore, Joseph Pasangha, notes: *"The average length of stay ... has come down by about a day and a half. Re-admission rates ... [are] another thing we have seen dipping..."* (Director, Narayana Hospital) And with this new level of patient and family knowledge, doctors note that their time is freed for more targeted patient interaction and focused recovery instructions. *"One of the things we asked them [the doctors] was: 'Do you have to spend less time with the patient? Is this saving you some time?' They were like, 'No, we're spending the same time but we're noticing that the quality of the questions has changed. They're asking me much less basic questions and I'm able to spend much more time on the specifics.'"* (Shahed Alam, Co-founder, Noora Health)

So far, the programme has been implemented in 26 hospitals across India and has trained 50 000 caregivers. The team, with mentorship from Stanford University, has conducted a study on its intervention in Kolkata, which identified a reduction in complications as high as 70% (publication undergoing journal review). Researchers from Stanford University are also

independently evaluating Noora Health's programme in the US.

Capacity building of hospital staff and patient families

Facilities have also benefitted from the staff training and certification. Hospitals report a reduction in the typically high turnover of nurse staff due to increased job satisfaction. These staff have improved their interpersonal and communication skills, positively influencing health care delivery. Noora Health is working to standardize this accreditation, currently co-certified by each hospital, with the aim of creating a nationally recognized certification transferable across facilities; this kind of certification has become one of the key selling points for potential new hospital clients.

Patient families are also witnessed feeling more empowered by their ability to contribute positively to health care delivery. *"One more thing that we see is the people we train, they become very active caregivers. Before the programme we used to see that helplessness, that feeling of 'what can I do as a caregiver?' But post the programme, they realized their role, they realized that there are simple things that they can do to move the needle, to improve the recovery of their patient. They start getting themselves involved more in the care, which not just helps their own patients, but also the doctors and the nurses and the whole hospital system."* (Anubhav Arora, India Operations Director, Noora Health) This increased knowledge and confidence was visible across demographics. *"What we saw was these people sitting as peers, side-by-side, learning things that they were really scared about when they go home, and even if you have an MBA you don't have health training ... Both demographics [educated and uneducated families] were really successful in keeping track of things, following up on the skills we taught them. So that was pretty exciting for us."* (Shahed Alam, Co-founder, Noora Health)

5.2. COMMUNITY AND BENEFICIARIES

Hospital staff perspectives

Dr A.M. Jagadeesh, National Accreditation Board for Hospitals and Health-care Providers (NABH) Coordinator at Sri Jayadeva Hospital, explained that prior to the introduction of Noora Health, information was given to patient families in a non-systematic way at the time of discharge. According to the Nursing Superintendent at Sri Jayadeva Hospital, even this information had gaps, such that patients lacked knowledge of simple day-to-day activities such as regular hand washing.

After implementing Noora Health's programme, the structured delivery of educational information to families has made a substantial difference in the quality of post-operative care. As the training at the Sri Jayadeva Hospital expanded to include all nurses, the ward cultivated a shared responsibility amongst staff and fostered organizational flexibility (e.g. during leave periods). Classes are also delivered in the ward around 15:00, making it possible for patients to attend too. Nurses note high family interest, sparked at admission (*"Admission people will tell the patient's relatives about the classes, brochures, agreement papers"*), and describe receiving follow-up calls from patient families after discharge, enquiring about various aspects of home care (Nurse, Narayana Hospital).

The biggest thing that we noticed was the deep engagement that the family members felt within this process and how even security guards would be taking notice, wondering what's going on, and wanting to help because they were like: "This is such a great thing and we want to be part of this, we want to do this." The nurses that were involved were really excited to be part of it, because they felt that this was a need, they felt that this was something that was good to do. (Shahed Alam, Co-founder, Noora Health)

Patient perspectives

Patients, many of whom travel more than 150 km to arrive at the ward, describe their own interaction with the programme, noting training on *"how to wash hands, observe the permits and how*

much water to give, recording every ... time he drinks water, every time he goes to the loo, and how many times the patient blows on the spirometer." (Patient family member) They note better awareness of complications and warning signs, indicating that they call the nurses *"if there is some pain during walking or when there is a difference in the pulse and when there is a palpitation, like the heart beat has increased."* (Patient family member) Patients and families describe alleviation of personal stress and satisfaction with the video format and visual representations.

The wife of a patient describes the impact of the knowledge and skills she learned during the training. For example, prior to the programme, her family members would sit on the patient's bed during hospital visits; with better understanding of infections, however, the wife has ensured that, *"even at home we have the sofas away from the patient."* (Patient family member)

The Noora Health team started receiving feedback from patients and their families who were passing on what they had learnt to other family and community members post-discharge. *"When you get these extremely engaged and empowered people, we have seen that once they get back to their communities they start sharing this information."* (Shahed Alam, Co-founder, Noora Health)

5.3. ORGANIZATIONAL MILESTONES

From its inception at Stanford University, Noora Health has achieved several major organizational milestones. In just two years Noora Health has implemented its programme in 26 different hospitals. A number of accelerators and funders have supported Noora Health on this journey: Y-combinator; C-IDEA; Mulago Foundation; Ashoka Innovators for the Public; Echoing Green; Jester Foundation; Stanford d.school, Design for Extreme Affordability; Innovations in Health care and Social Entrepreneurship Accelerator at Duke University; Fast Forward; Paul Graham. Noora Health's success has been acknowledged by several business and global health journals.

6. SUSTAINABILITY

A crucial element of sustainability for Noora Health is the balancing act between standardization and contextualization. While the former would allow Noora Health to roll out its programme across numerous facilities with limited resources, the latter is crucial to best serve the specific needs and variable patient demographics of each health care facility.

Coupled with the issue of sustainability is that of compliance. Noora Health focuses on two key stakeholder groups: the hospital staff and the patients' families.

Smooth integration among hospital staff is key to Noora Health's success. Keeping staff motivated and engaged without increasing their burden is a major challenge. For example, the Sri Jayadeva staff initially resisted the Noora Health training programme and sought only irregular adoption; since then, however, the programme has been widely implemented. So far, Noora Health has been auditing each facility to ensure quality and compliance; however, moving forward, to ensure long-term sustainability, Noora Health is working

on a monitoring and evaluation process that will allow each facility to provide continuous visibility on its performance to both its governance as well as to Noora Health.

Meanwhile, class attendance, information retention and skills dissemination are crucial for successfully engaging patients' families. As Shahed explained, *"People are using the stuff we are teaching them and sharing it with others. On average, what we see is that they will share it with 2 or 3 other people within their community, not just within their household. But, the accuracy of that is not always 100%."* (Shahed Alam, Co-founder, Noora Health) Dissemination issues like these have inspired Noora Health to work on technological solutions that may help maintain the quality of the information utilized and shared.

Finally, while Noora Health's current development activities are supported by philanthropic funding, the organization is also testing multiple routes to long-term financial sustainability, particularly a cross-subsidization model between private and public hospital clients.

7. SCALABILITY

To date, Noora Health has been testing and optimizing its model across private and public hospitals in India and a few facilities in the US. The organization reports a global demand for its service, indicating requests to take its programme to *"women's health clinics in Kenya, government hospitals in Nepal, oncology centres in India, and health clinics in California."* (Shahed Alam, Co-founder, Noora Health) However, Noora Health recognizes the importance of optimizing its model in the existing locations before pursuing aggressive scaling strategies.

While Noora Health has had great success working with hospitals led by forward-thinking individuals, it acknowledges that the bureaucracy and apathy at many large hospital facilities may make further partnerships more difficult. As a result, Noora

Health is focused on providing strategic guidance and tools on post-hospitalization patient care training, rather than acting as a primary implementer. It has developed a rich portfolio of tools and content that can be combined to construct a maximum value-adding programme for each facility. Ultimately, Noora Health hopes to combine a successful scaling strategy with direct and targeted value propositions.

Thus far, Noora Health has successfully addressed the balance between human and technological components across geographies. In India, due to large family member engagement, a human-centred approach is most effective, with technology playing a supplementary role; in the US, the reverse may be more appropriate, with a tablet and web application disseminating health

training and tracking progress of patient knowledge. Thus, despite transferability in the essence of the programme (such as the education content), the delivery mechanism requires careful tailoring across geographies and societies.

Adapting adequately to the demand from both resource-rich and resource-poor hospitals poses another scalability challenge for Noora Health. In resource-rich settings, there has been high demand for Noora Health from hospitals that collect revenue from its customers and

consequently value customer satisfaction and retention. Additionally, limited space in these facilities makes delayed recovery and treatment of complications in existing patients less financially beneficial than surgical interventions on new ones. Meanwhile, resource-poor facilities, where budgets are tight and basic amenities are often missing, might perceive Noora Health's programme as a luxury. These considerations have led Noora Health to start developing a cross-subsidization model.

8. KEY LESSONS

8.1. IMPLEMENTATION LESSONS

Getting started

Noora Health highlights the value of a needs-based assessment conducted in order to design an effective innovation. As graduate students, Noora Health's co-founders prioritized understanding the challenges faced by different stakeholders.

We came over here on a basic needs-finding mission. We went through a few ideas of what we wanted to do here, before we got here, and honestly it was so far from what we ended up finding would be useful. We wanted to do something that was patient flow-related, like process flow of a patient through a facility and how you can make that better ... We came here and realized nobody cared about that. It's not an issue. We left things open and talked to as many patients, doctors, nurses, everyone within the system, from the chairman to the security guards, to get an understanding of what's happening here in health care and what can we do. We tried to do it in both public and private settings. (Shahed Alam, Co-founder, Noora Health)

The following summer, the team ran a pilot in one of the original hospitals explored, using a minimal viable product, i.e. a set of basic self-made educational videos. Despite some logistical and operational difficulties, there was a high demand for the service, spotlighting the desire information among patients and their families. It is this initial

and fast proof-of-concept that allowed the team to raise funding and launch operations soon after.

Maintaining efforts

Delivering solutions to complex health problems can be challenging for small organizations with limited resources. This is one of the reasons why Noora Health is investing in developing strong monitoring and evaluation processes. Being able to track the progress of the programme's implementation in different hospitals allows the team to identify potential challenges and provide adequate and timely support so that the intervention does not wane as time passes and the novelty wears off. It also allows for internal checks within the hospital so that the hospital's implementation team can pre-emptively assess and address potential challenges.

Overcoming challenges

The biggest challenge that we have faced so far is that essentially, our intervention is a health intervention that comes in and tries to plug into a busy chaotic clinical environment that has multiple stakeholders, and multiple issues already within the system. We're really trying to transform, culturally transform, the way care is delivered. So, some of the biggest challenges really are meeting the needs of not just our end users, which are the family members and the patients, but making sure that our system is something that is easy for the doctors, the nurses, non-clinical staff, administrators, to make the whole hospital

environment something that works more smoothly for the benefit of the patient. (Shahed Alam, Co-founder, Noora Health)

One of the major challenges Noora Health faced was making sure its intervention worked within the complex, pressured system of the hospitals it targeted. The intervention is tailored to each hospital's workflow to create as little disruption and additional work for staff as possible. It was important to set up the programme to integrate as seamlessly into existing structures as possible. This helped overcome the initial reluctance of those who felt the programme added additional work to their already busy workload. Garnering support from the different stakeholders involved was also an important step. *"When you introduce a new thing, obviously there will be resistance to change. First thing is, resistance to change. Secondly, they will definitely feel that this is something extra ... If you are doing something other than your routine work, they think this is extra. ... They'll get used to it. It's not an issue if you ask me. We should take it as a part of our routine work. It will become like that."* (Quality Assurance Team at Jayadeva Hospital)

8.2. PERSONAL LESSONS

Noora Health's mission is founded on personal experiences. Edith Elliot was thirteen years old when her mother had brain surgery: *"There's nothing worse than watching someone you love suffer and not knowing what to do,"* (Edith Elliot, Co-founder, Noora Health). The Noora Health team dream of creating a compassionate care model that includes family members and is *"really written into the DNA of how care is provided throughout the world."* (Shahed Alam, Co-founder,

Noora Health) In deriving motivation from a need they see daily and have also experienced personally, the team can foster impact even in the early stages of their intervention.

When challenges arise, Noora Health focuses on the user. Arora describes their approach, which is to *"not to focus too much on the bad days. You can learn a lot from the bad days, but any time you see that smile on the user, or anybody you are reaching out to, that should keep your energy going, that should keep you going... You can only do so much at the end of the day, but even moving the needle by a little [bit], if everybody moves the needle by so much, collectively we can create a huge impact."* (Anubhav Arora, India Operations Director, Noora Health)

Focus is important, but so too is the process. Thus, Noora Health also stresses the relationship with the user, encouraging their staff to develop a nurturing approach that is focused on and responsive to the needs of the patients. *"The thing that I think has really grounded us and kept our approach connected to what we are doing has been our roots in human-centred design, and how it really puts the user first; the basic needs and understanding of the user. That just begins with getting the empathy for those who you are serving. One of the things I think that we have gained a lot from is always keeping that in mind, and continually talking to the people who we are serving and making sure we are adapting to any changes that we need to as an organization to keep meeting their needs. So, just always keeping the user in the centre of what everyone is doing and always engaging with them no matter which part of the organization you are in."* (Shahed Alam, Co-founder, Noora Health)

CASE INSIGHTS

1. Families are an untapped resource that could support an overburdened health system. By equipping family members with the basic skills to deliver effective home-based health care following a hospital admission, better patient outcomes can be achieved and readmission rates lowered.
2. User-centred design can lead to appropriate, context-specific solutions that address real, rather than perceived, needs. Placing a high value on feedback from clients and beneficiaries allows an intervention to be continuously adapted and improved.
3. Interactive voice-activated technology platforms can support ongoing patient education, even for low-literacy or illiterate patient groups.

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