

High Volume, High Quality Cataract Surgery

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By the current Indian definition of blindness (vision in the best eye $< 6/60$), there are over 12 million¹ people blind due to cataract in India. The only population based study places incidence of cataract blindness (based on WHO definition of VA in the best eye of $< 3/60$) at 3.8 million new cases² per year. Even though some argue this to be an over estimate, the current levels³ of cataract surgery is far below what needs to be done to clear the backlog and take care of the incidence. As our economic status improves leading to changed life styles, the requirement for better vision will be on the rise and people will be demanding cataract surgery earlier than the current definition of blindness. This is already happening in the urban areas amongst the middle and upper class of the society. This phenomenon combined with the rapidly growing older population will increase by many fold, the number of cataract surgeries that need to be done. This challenge will need to be addressed immediately. While increasing our infrastructure of hospital facilities, ophthalmologists and other manpower could be a solution, it is also necessary to explore ways by which the productiv-

ity of the current infrastructure can be increased significantly and at the same time providing better quality of services. While an average ophthalmologist in the country may be performing around 300 cataract surgeries there are several ophthalmologists who either as private practitioners or as part of an institution perform 1,000 to 2,000 surgeries a year, often of a very high quality, since without good quality it will be difficult to sustain such high patient load. The purpose of the article is to explore the factors that contribute to this and thereby make a contribution to enhance the productivity and quality of the current eye care infrastructure. The process leading to high quality and high volume cataract surgery has two major elements - demand generation and an efficient use of resources to meet the demand, with the whole process governed by a certain attitude. Figure 1 (a) shows the interaction.

In the case of industries producing and marketing a product, we always associate good quality with high sales. In fact, whenever a product has a low demand or sales, the first question that is raised is one of quality. However, in health care there is often a difficulty in accepting that higher volumes can be done with good quality.

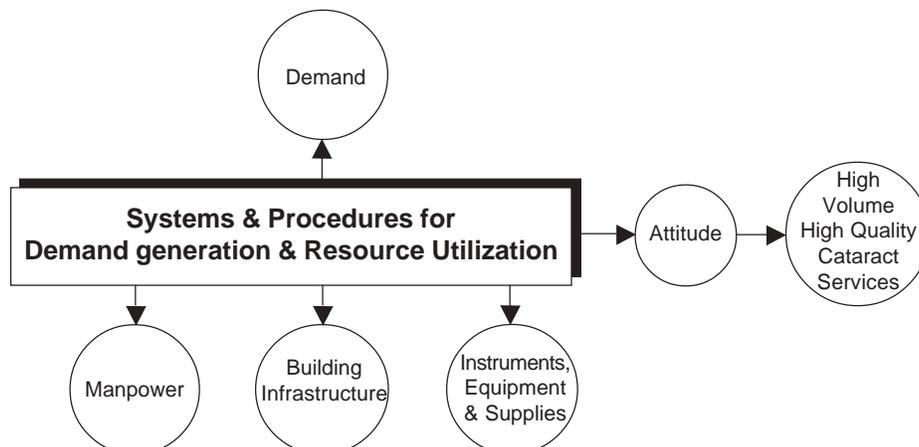


Figure - 1

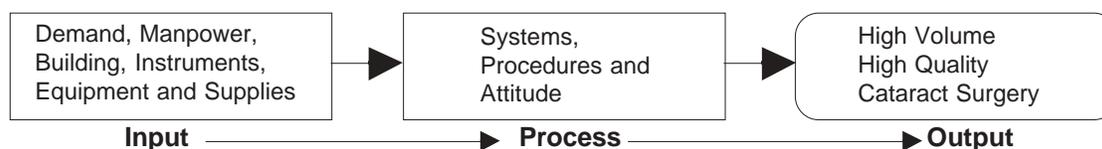


Figure - 2

Productivity and high quality is a core management function and is dependent on demand, quantum of resources, quality of resources (manpower & infrastructure), systems and motivation of the employees. For an eye care programme to achieve its maximum potential in performance, the top-level management must establish a work culture, ensure adequate demand, provide quality resources and establish systems that optimise the utilisation of resources. One way to achieve this is by applying the systems ap-

proach in which the demand and resources (building, manpower, instruments, equipments & supplies) can be considered as the input; systems, procedures and attitude as the process; high volume, high quality cataract surgeries as the output.

The following analysis can help in developing a better understanding in designing systems by which this can be achieved. Each element within inputs and process (Table-I) is explored further to look at activities that lead to higher volumes and higher quality.

Table - I: Factors contributing to High Volume and High Quality

Activities & Inputs that help in achieving		
	High Volume	High Quality
Demand	<ul style="list-style-type: none"> • Community outreach • Community involvement • Using satisfied patients as motivators • Counselling • Building an institutional image 	<ul style="list-style-type: none"> • Case Selection • Uniform demand • Forecasting and planning for expected workload • Base hospital approach
Building Infrastructure	<ul style="list-style-type: none"> • Bed strength, OPD & Operation theatre capacity • Accessibility • Working days/time 	<ul style="list-style-type: none"> • Layout • Maintenance • Sanitation and Hygiene
Manpower	<ul style="list-style-type: none"> • Number of staff • Staff Mix • Working hours • Job allocation 	<ul style="list-style-type: none"> • Trained staff • Technical Skills • Task-Skill matching • CME
Instruments, Equipment & Supplies	<ul style="list-style-type: none"> • Number and balance of operating tables, operating microscopes, surgical instrument sets • Availability in required quantity • Available when required 	<ul style="list-style-type: none"> • Good maintenance • Spares planning • Calibration • Quality of instruments • Reliability • Selection of brand and vendor for quality supplies
Systems and Procedures	Procedures that ensure good: <ul style="list-style-type: none"> • Patient flow • Work flow • Cash flow • Flow of supplies • Resource utilisation 	<ul style="list-style-type: none"> • Standardisation • Clinical effectiveness • Medical records • Quality assurance systems • Review meetings • Management Information System • Patient centred systems
Attitude	<ul style="list-style-type: none"> • Commitment to address the magnitude of the problem • Willingness to do large volume • Team work • Discipline 	<ul style="list-style-type: none"> • Patient centred behaviour • Desire to be perfect • Willingness to continually learn • Willingness to change

Demand

In most developing countries, the gap between the level of eye care services and clinically defined need for treatment is almost 10 to 20 times. In India, 2.5 million cataract surgeries are performed against an estimated backlog of about 23 million eyes blind due to cataract. The current level of surgery is yet to equal the incidence. Compared to the overall availability of beds, ophthalmologists and other resources, the number of cataract surgeries done is quite low. The hospital surgeries per bed per year could be as low as 15. This indicates an urgent need for stimulating demand which will result both in, cost reduction and increased number of patient treated. The clinically defined need, will have to be converted into a need felt by the patient, through health education and motivation. Delivery mechanisms will need to be developed, that ensure accessibility and affordability. The demand generation activity has to become a structured activity in each eye care programme. In doing this, attention will need to be paid both to increasing the patient load and in maintaining a quality.

Generating volume

Broadly two approaches could be employed to get patients to the hospital. One is to reach out to the potential patients through eye camps, mailing, volunteers etc., and bring them to the hospital. The other approach is to attract them to come to the hospital on their own.

Community outreach through eye camps continues to be the time tested method for getting a large number of patients. Community through its voluntarism and material resources can substantially improve the effectiveness of an eye camp. However, more often than not, the hospital or government staff are pressed into service to carry out the publicity, arrange for the campsite with necessary

furniture, accommodation for the medical team, etc. All these activities can easily be done by the community and in all cases can be done better. The community knows what resources are available and has a better understanding about harnessing them for the camp work. If they are brought in as equal partners, they will not only do all these activities but also cover the costs. Such a partnership, not only results in an efficient eye camp, but also releases the programme's manpower to do more such eye camps. In the following table (Table-II), it can be seen that forty percent of total cataract surgeries at Aravind Eye Hospital in Madurai is on patients recruited through eye camps which were organised with the support of voluntary organisations in the community.

Using operated patients as motivators through active counselling and building an institutional image are some of the means of having the patients come to the hospital on their own. At the hospital, in order to convince patients to accept medical treatment and also to clarify the queries of the patients there is need for trained patient counsellors or social workers. The social worker should be capable of establishing personal contacts with patients, educating the patients on proper eye care, assisting them in following the hospital procedures, and ensuring that the patient's needs are met during their stay in the hospital. **Word of Mouth** has the maximum impact in marketing services to the potential patients. The hospital should ensure that the patients are satisfied with the services of the hospital. Every satisfied patient has the potential of being a motivator for getting more patients to the hospital. The foundation to this approach is the quality of services and the satisfaction of the patients. Significant investment in this approach is worthwhile as it provides a stable demand base for the hospital and drastically reduces the cost of case finding through outreach activities.

Table-II: Surgeries through eye camps at Aravind Eye Hospital, Madurai

	1994	1995	1996
Total Cataract Surgeries	51,281	61,801	67,382
Cataract surgeries through camps	20,613 (40%)	25,196 (41%)	27,482 (41%)
Number of eye camps	483	484	580

Influencing quality

As in any system the outcome depends on the quality of input and in this instance attention to case selection will influence the visual outcome following cataract surgery. The case selection process in an eye camp or hospital and pre-operative preparations should incorporate necessary steps to ensure that the patient does not have any other co-existing infections, systemic diseases or other eye diseases that could seriously compromise the outcome. This can be easily achieved by establishing clinical guidelines and ensuring that they are followed.

Since a hospital's capacity can't be changed at a short notice, fluctuations in demand can adversely affect quality and cost. Developing an infrastructure to do 5 surgeries every day or 50 surgeries every day is only a question of organisation. But when a hospital with a capacity to do 5 surgeries a day, is required to do 50 surgeries due to sudden inflow of patients, then it could lead to compromises in quality. Thus managing demand fluctuations is critical to maintain quality and control costs. This can be addressed somewhat by predicting the demand fluctuations and planning accordingly. All non-patient activities like staff training, major maintenance, seminars and workshops could all be scheduled during the slack periods. An attempt can also be made to even out the demand by a better understanding of the reasons for the fluctuations. If logistics of travel are a problem during the monsoons, the appropriateness of arranging transportation can be explored. While all this could cost additional money, it could substantially reduce the cost per patient treated. In Northern India, in some centres they were able to break this annual cycle of high and low demand by conducting screening eye camps in the summer and transporting the patients to the base hospital. Some alternative strategies for managing the variations in demand are reservations (to smoothen day to day fluctuations), active outreach activities (to smoothen seasonal variations) and having developmental activities (training, renovation, etc.) during the lean period. The objective of outlining strategies for managing demand variability is to match the service rate to the demand rate so as to avoid building of queues and long delays. This will also ensure that the quality is maintained and patient satisfaction is achieved.

Another approach that can lead to better quality is the **base hospital approach**. When the eye camp approach started in the 1930's, it was always done in make shift places as the hospital and logistic infrastructure in the country was grossly inadequate. In the last six decades, this has changed considerably. Most people now live within an hour of travel from a hospital (PHC or an eye hospital). This offers an opportunity of conducting eye camps in such hospitals or screening them in the community and transporting them to an eye hospital for surgery. This approach can significantly improve the quality and reduce costs too. In the base hospital, there is better control over the resources and in well run hospitals they are organised for optimum utilisation. Patients with diabetes or hypertension can stay a day or two longer before surgery and similarly patients with post-operative complications can also stay longer. This will increase both the uptake and the outcome. This is not possible in a surgical eye camp as the venue has to be vacated by a certain date. Hospital based surgery also has a positive impact on the health seeking behaviour. Having been through the hospital process, the patients are more willing to come on their own for follow-up or bring another relative for treatment. This, of course is based on the assumption that the patient returns satisfied with the experience in the hospital.

Building Infrastructure

The outpatient area, diagnostic facilities, number of beds and operation theatres available for ophthalmic work determines the capacity or the volume of work that can be done. The accessibility to the facility and the number of working hours each day determines the number of patients who can be treated. Larger facilities with longer working hours can certainly handle higher volume of patients as compared to facilities which are opened to patient registration only for 2 hours a day. Thus, relating to building infrastructure the volume depends on the size of the facility and the number of hours in a day it is opened to the patients. In addition to this, an important factor is a certain balance between the out-patient, operation theatre and in-patient facilities. Such a balance is driven by factors like in-patient length of stay, output of surgeries per hour and the proportion of admissions to out-patients.

Relating to the building, the factors that contribute to quality are the layout, its maintenance, sanitation and hygiene. A poor layout makes it difficult to maintain good quality. For example, it is not uncommon to see operating rooms which directly open into patient corridors or built across toilet facilities. In such instances it is very difficult to maintain high standards of asepsis inside the theatre. Poor layout of diagnostic facilities discourages the ophthalmologist from using them on a regular basis which in turn can affect the quality of clinical work. A good layout makes it possible for increased efficiency and improved quality.

Manpower

The staff strength, its composition, working hours and job allocation determine the volume of work done. Higher volumes can be achieved with larger number of staff in the right composition working longer hours on clearly specified jobs. In diagnosing or treating a patient there are number of clinical tasks. Some of these are routine and repetitive by nature while others are complex and requires fine clinical judgement. In many settings an ophthalmologist does the entire range of clinical tasks including the routine ones which are often the most time consuming. With proper training, paramedical staff can perform many of the routine tasks regardless of how specialised they are. They can be taught to perform a range of activities from the simple task of measuring visual acuity to the use of A-Scan or computerised field analysis. Building this concept of **smarter working** by allocating routine work to the paramedical staff can significantly increase the volume of work that an ophthalmologist can do. The same principles can be applied to the tasks of the manager also.

On the other hand, better quality of the work is achieved through proper training and developing of technical skills. Care must also be taken to match the tasks to be performed with the skills of the per-

son. This process of training is not an one time activity, as there are constant developments in the field of health care and more so in the practice of ophthalmology. It must also be recognised that quality is not an absolute standard but it is something which evolves continually based on technological innovations and patient expectations. Thus, there is a need to have a system of continuing education and skills development to keep in pace with new developments and changing patient expectations. This applies equally to both the clinical and non clinical personnel.

The above principles of optimum resource utilisation has been scientifically studied with relation to output of cataract surgeries. The following Table - III gives the surgical (ECCE with PC-IOL) output per hour under different scenarios for a well trained surgeon at Aravind Eye Hospital in 1993⁴.

Instruments, Equipment and Supplies

A high volume of clinical work can be done when the diagnostic equipment, surgical equipments and instruments are available in the required quantity and when required. The quality of instruments, maintaining a high uptime of equipment through good spares planning and maintenance helps in achieving better quality. Regular calibration of diagnostic equipments again contributes to quality. Selecting tested brands of pharmaceuticals and suppliers who are reliable, ensures that there are no compromises to quality resulting out of sub standard supplies or non availability. Thus cost can't be considered in isolation; in purchase decisions the other factors to be considered are quality, reliability in supplies, after sales service, etc.

Systems and Procedures

The entire infrastructure consisting of building, manpower and equipment will need to be employed to meet the demand for eye care services in a manner that it results in high volume and high quality.

Table - III

Ophthalmologist	Tables	Scrub Nurses	Running nurses	Instruments sets	Surgeries per hr.
1	1	1	1	1	1-2
1	1	1	1	3	3
1	2	2	1	6	6
1+1 Resident	3	3	2	8	8-10

This can be achieved through proper systems and procedures. The systems which lay down the patient flow, work flow, flow of supplies and cash flow all contribute towards the performance for high volume of services. High volume and quality in the services can be maintained through standardisation, a process which helps in ensuring that a set procedure is followed. This makes it possible to easily compare the outcome to the process which can then lead to changes for improvement. It also helps in determining the clinical effectiveness of each procedure.

The other aspect which helps in quality improvement is the medical records. Procedures should be in place to have a good medical record system which ensures completeness of the record, proper storage and security. A good medical record system provides a continuity in care and also serves as a linking process for the activities of various clinical personnel. Very often, the doctor who examines a patient at one time may not be available during the follow up visit. Without the medical record either a complete diagnostic work will have to be repeated at considerable cost and time and not doing it could result in poorer quality of clinical work.

A good management information system with regular review meetings can again help in maintaining a high quality. The formal quality assurance system can be put in place which monitors clinical parameters such as intraoperative complications and clinical outcomes. A regular analysis and review of this data can lead to continuous improvement, leading to high quality. In addition to working towards high clinical quality, it is also necessary that the hospital strives to achieve high patient satisfaction. This is possible when the administrative and other systems are geared towards the patient requirements and redesigned as Patient Centred Systems.

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Attitude

Even with the best infrastructure and perfect systems in place it requires a certain attitude to get best results out of the whole process. In a dynamic environment such as in a hospital, it is not possible to predict every single activity and specify the procedure. Since the major resource in a hospital is the manpower, there will also be some variability in the understanding and interpretation of procedures and guidelines. Thus a positive work culture and a certain attitude is required to achieve high volumes of services. Such an attitude should stem from a commitment to make an impact on the magnitude of the problem in the community, a willingness to do large volume and work as a team in a disciplined manner. Similarly certain attitude is also required to maintain high quality standards and constantly improve upon them. It requires an attitude of willingness to learn and willingness to change to move towards perfection. A patient centred behaviour, of wanting to do the best for each patient helps in achieving high quality standards and having highly satisfied patients.

Conclusion

Given the high backlog of cataract blind and the level of incidence, there is an urgent need to move beyond the debate of whether high quality can be achieved in high volumes. Since there are no preventive measures to stop cataract formation, the only way to solve the increasing backlog of cataract blindness, is to do a significantly higher volume of cataract surgeries. Given the limitations in creating additional resources and the delay involved, the only practical option available is to increase the productivity. With proper organisation and the right attitude it is not only possible to achieve high volume and high quality but it is something that has to be done immediately in face of the rising backlog of cataract blindness.