

Chapter –VI

Discussion

Sustainability of the Quality Management System (QMS) has become a challenging task for any of the organization across the globe. However it is essential for healthcare organizations to implement and sustain a QMS to provide safety and assurance to their patients. This research indicated several finding with regard to factors responsible for sustainable quality management system in the operation theatre of the teaching hospital.

This chapter of the thesis describes the interpretation of the result finding of the various data sets to find the answers of the research questions posed in the outset. For the purpose of the analysis triangulation of results of various data sets has been done at this stage to explore the factors responsible for sustainable QMS. Triangulation is a method of cross verification of the data collected through multiple sources. Case study approach was used in the current scenario, thus the analysis of multiple data sources were combine to do in-depth study of the QMS in the Operation Theatre.(Research in Healthcare, Julius Kim, Chris White,2000 ,p 136)

Several studies and reviews reported the critical factors responsible for implementation of QMS in the hospital settings.(Wardhani et al,2008)This study is the extension of the previous research studies and explores the quality management initiatives taken by the hospital for the establishment of the QMS in the OT complex and factors responsible for it's sustainability.

Under the three major discussion points discussion has been done; first one is the discussion related to QMS status at the beginning of the data collection means existing status of QMS second is perioperative care

process and third one is the critical factors responsible for sustainability of the quality management system in Operation Theatre Complex.

Discussion related to existing Status of QMS in OT Complex:

Research Question 1. What is the status of existing quality management system in the Operation Theatre Complex of a teaching hospital of Pune city?

All the key informants unanimously agreed to the fact that quality management system in the OT was in the developmental stage and it will be established fully within next six months of the time. Interview data and review of records demonstrate the existence of a structured OT committee and OT manual. But no involvement of the quality department or presence of quality manager was found in the OT committee meeting and same was also reported by the hospital quality manager. So at the ground what kind of difficulties is being faced by the OT staff were not known to quality department. However the draft OT manual was prepared by the hospital quality department. This shows the structural gap in the framework of OT committee and also gap in the interdepartmental coordination. A study conducted by M. Soudec (2005) also reports the similar result that accreditation and quality management of OT department of French healthcare settings should have two essential factors. These are Contextual factors and Technical resources. Contextual component is like committee of OT and includes the clear definition and scope of the quality approach for the OT department alone or whole operative system and existence of institutional quality policy. The second component includes finalization of quality handbook, liaison with the quality department of the hospital or clinic. M. Soudec (2005) also described the significance of the identification of responsibilities within the OT department. OT committee, steering committee, members and chairman of committee should be identified. Setting up a quality system, documenting structure, auditing of

practices and checking of compliance and incident analysis are the functions of the committee.

Irregular frequencies of OT committee meetings demonstrate the level of commitment of the top management. Because majority of times due to busy schedule of the chairperson OT committee meetings were not conducted as per the protocol. This shows the level of commitment of the top management. An OT complex is a highly dynamic department of the hospital. Approximately more than 100 healthcare professional work in the multidisciplinary teams on daily basis so this department needs a special attention of the management to provide quality service to their patients. Most of the studies reported the top management commitment as one of the most important driven force for the implementation of the quality management practices in the hospital (Int J Res ManagTechnol 2012; Emad A. Al-Shdaifat,2015). It should be noted that the presence of the documented Quality Management policies were found as OT manual. Although OT related staff was not trained completely about the OT manual. Few indicators were implemented at the time of interview. %of re-scheduling of surgeries, % of unplanned return to OT (re exploration),% of cases received appropriate prophylactic antibiotics within 2 hrs prior to surgery,% of modification of anaesthesia plan, %of adverse anaesthesia. It was also confirmed with the key informants that within next 2-4 month of the period all the indicators will be established due to scheduled audit of the NABH. All the key informant mentioned the importance of top management commitment in terms of time and adequate resource (Manpower and Material)availability for the sustainability of the QMS in OT this is in the line of the research conducted by Patrick Eshun&NeaYasmineEshun (2013) at two regional hospitals of Finland.

Discussion related to Perioperative care process (Research question 2, 3,4)

As quoted by Goetz Bosse et al (2014) about the study conducted in the Netherlands that the critical incidents commonly occur in the preoperative and postoperative phase of perioperative care than intra operative phase. However the WHO surgical safety checklist only contains the checkpoints of OT before, during and after the surgical procedure not the entire perioperative care as a whole ,means it doesn't include all the activities taken placed in the preoperative holding room and post-operative room. It might not be enough to neglect preoperative and post-operative care.(deVriesENet al, 2011) This means the activities of pre-operative and post-operative phases are equally important like intra-operative phase.

In this research study data related to perioperative care of patients were obtained with the help of comprehensive checklist. Activities of healthcare professionals during the perioperative care of patients include the entire care path of surgical patients. This path starts from the entry of the patient in the preoperative holding area to the exit from the post-operative recovery room.

Discussion of the perioperative care is described under the three following main headings:

- Preoperative Holding room Activities
- Operation Theatre Activities
- Post –Operative Recovery Room Activities
- **Preoperative Holding room Activities:** Observation data demonstrate the significance difference in the standard practices of patient identification, documentation and patient preparation in the pre-operative holding room however the document checking parameters were found as per the standards in the initial stage of QMS. It was

expected to be improved with the implementation of multifaceted quality management activities of QMS in the OT. But due to scarcity of the experienced nursing staff in the preoperative room it was not improved as expected.

- **Arrival of Patient:**

In the ideal situation ambulatory patients should be transferred to the OT on the equipped wheel chair and patients who were unable to walk should be transferred on the equipped trolley. Observation data demonstrates that all the ambulatory patients don't arrive on wheel chair. There was no existence of written protocol about the transfer of patients to OT in the initial stage of QMS. The intramural transfer of the patients should be by fully equipped transportation equipment. Protocol has been made for the safe patient transfer in the mid stage of QMS and also followed appropriately till the late stage. All the ambulatory patients arrived on the wheel chair in the mid stage of QMS development. This practice was sustained till late stage of QMS implementation.

In the initial stage few ambulatory patients arrived without footwear and also transferred to OT for surgical procedure as it is. Transfer of such patients may increase the possibility of infection by contaminating the OT Complex corridor. In the mid stage of the data collection significant improvement were seen in the transfer of the patient due to the availability of belt in the wheel chairs. This shows the significance of structural measures for effective implementation of protocols.

Patient Verification: As per the national patient safety goal minimum two identifiers should be used for the verification of the patient identity i.e Patient name, Date of birth or IPD number (NPSG, Universal Precautions). In the majority of instances of the initial and mid stage nurses have used OT booking list and medical file of the patient for the

identity verification. In the late stage of the QMS implementation ID bands were observed on the wrist of the patients and nurses were also found checking the identity of patients by verifying the particulars of ID with the medical record and verbal confirmation with patients. Identification process in the preoperative holding room has improved with the presence of the ID bands in the late stage.

Document Verification & Nurses' Documentation:

100% compliance were found for the checking of availability of the required medical documents (PAC, Pathology, Radiology reports) of the patient in the patient file. All the preoperative room nurses check the availability of medical documents in the patient's file irrespective of their qualification and years of experience. Whereas partial compliance was found for the checking related to content written on the consent form in the initial stage. In any case if they found the deficiencies in the consent form then they used to report firstly to the OT nurse in charge and the concerned resident doctor and ward nurse. If it is not checked correctly at preoperative room and deficiencies were noticed by the operating surgeon or senior surgeon before taking the patient in the OT then entire team has to wait till the rectification of the consent because without rectification in the consent form patient can not be taken in side the OT. Waiting for the rectification of the deficiencies of the consent form is a very time consuming process because for this signatures of patient and patient's relative's are required so team has to wait sometimes till they arrived. Marvin F. Kraushar (2008) has described the significance of the consent as one of the most powerful risk prevention tool to protect the treating physician, because completeness of the consent forms protects the treating surgeon and team in case of litigation.

Consent should be obtained by the surgeon or surgery team. Resident doctors can also do this job. But in the current study this job was done

majority of the time by the nurses of the ward. Many errors (like incomplete information about the risk involved with surgery and anaesthesia, wrong diagnosis or name of the surgery) have been noticed in the consent due to lack of knowledge of nurses. It is necessary for preoperative nurse to check the consent thoroughly prior to sending a patient for surgery to prevent such avoidable errors. This checking has no relation with the education level of nurses but years of experience matters and it was found that nurses who were having more than five years of work experience in the OT they know the essential components of the information that need to be checked and accordingly they check. This protocol of meticulous checking for completeness of consent by the nurse has improved (90%) in the mid stage but declined (73%) in the late stage because of scarcity of the experienced staff in the OT. This declined percentage shows the significance of skilled staff for the sustainable implementation of quality management initiatives. But it did not affect the patient safety because of the multi level checking system.

As per the guidelines proposed by the NABH consent should be obtained in the language which is understandable by the patient and relatives. The study setting belongs to Maharashtra so majority of patients understand Marathi. In the late stage of QMS new consent form in the Marathi language was introduced for all kind of surgical procedure. When faculty members of the surgery departments has started cross checking of consent form before taking patient in the theatre. Probably due to this reason in the late stage of QMS process of obtaining consent has improved.

Patient Preparation:

Observation data demonstrate the gap in the checking of quality parameters of patient preparation in the preoperative holding room. The reason behind this was unavailability of the written protocol about the

checking of parameters like surgical bath, site marking NBM status. Nurses always checks the status of removal of jewellery but usually they don't check the NBM status. NBM status can influence the anaesthesia process so it is often checked by the Anaesthesia residents before transferring the patient from preoperative room to OT but not always. If it is not checked at preoperative room then inadequate NBM status may cause the cancellation of the surgery. Nurses expressed that checking of NBM status is the job of anaesthesia team so they don't check.

Gap in the practice of verification of patient preparation was also due to unorganized flow of the patients. Data demonstrate that all the patients scheduled for that particular day usually arrive in the morning itself and this happens with all the speciality of patients. One single nurse is not adequate for preoperative room to handle all the patients at a time.

Sometimes due to the delayed arrival of first case patient, nurses don't get enough time by resident doctors for all the verifications. If the process flow of arrival of patient will be streamlined and an experienced nurse will be posted in the preoperative room of OT then up to an extend this problem can be resolved. Usually circulating nurse hands over the patient to the OT but due to absence of circulating nurse preoperative nurse has to handover that patient to the respective OT. Absence of nursing staff during handover of the patient creates little chaos in the preoperative room. This shows the requirement of more than one nursing staff and MPW staff for comfortable shifting of the patient to the bed in the preoperative room at least during the peak hours.

Operation Theatre Activities:

Operation theatre readiness: Parameter that describes the adequate availability of human resource, instrument, equipment and physical

infrastructure required to provide standard quality service to patients during the perioperative care(Donabedian,. It was depicted from the data that majority (6 out of 9) of the structural parameters related to readiness of OT were as per the standards but unavailability of adequate supplies(Sterile supplies e.g. sterile instruments, linen, dressing material),equipment issues, pharmaceutical items (suture material) during the surgery and inadequate man power(Circulating Nurse, MPW staff) were found and same was reported by the surgeons. Availability of resources did not improve with the implementation of the QMS across the three stages. Data shows that unavailability of adequate sterile supplies during the surgery was due to following reasons ;gap in the handover practices means incomplete flow of information related to requirements of supplies for next day scheduled surgery, unavailability of the instrument in the OT complex., and also can be due to the workload on night shift staff.

As per the OT Complex protocol the scrub nurse who had assisted the surgery was responsible for the cleaning and packing of the used instrument set for the sterilization. If she could not do in her shift then reliever staff was used to the remaining task of instrument preparation. Usually all the preparation for the next day surgery is being done during the night hours.. Review of duty roaster shows that usually two nursing staffs were assigned in the night and minimum one senior staff was always available to assist the emergency cases in the night shift. It was not possible for OT matron to assign both senior staff in the night time due to scarcity of senior staff in the peak hours that is morning 9am to evening 4 pm. OT complex require minimum twelve nursing staff (one staff for each OT. Total eight scrub nurses for eight OTs, minimum one nurse for Preoperative and one for Post-Operative room ,one for OT reception and one extra for emergency cases except two administrative nurses. Management is responsible for planning of resources for sustainability of QMS (Kunkel ST et al, 2006).After the repeated request

management didn't take the action and this resource inadequacy was one of the reason for the dissatisfaction among the healthcare professionals and delayed flow of entire perioperative care. Surgery is a team sport. Equipment and instrument unavailability is one of the major challenges that affect the teamwork and patient safety in the operation theatre. This shows the level of commitment of the top management for the implementation of QMS.

Surgeon, Anaesthesiologist and Nurses have reported the resource availability and management commitment for the establishment of the QMS as the main cause of gaps in the entire perioperative care process. Studies conducted by various researchers e.g. J Res ManagTechnol (2012) Emad A. Al-Shdaifat(2015) show highly positive relationship between the quality management implementation and management commitment. Because management is responsible for the resource allocation.

Process parameters in readiness of OT are related to processes responsible for OT set up. Data illustrates that there are four process which are responsible for the readiness of OT for surgical procedure. Out of these four process parameters e.g.

1. Discussion between surgeon and nurses about OT Set up: Discussion between surgery team or operating surgeon and nursing team or scrub nurse prior to surgery in OT regarding the requirement of instruments and equipments in the OT.
2. Readiness of OT trolley by nurses before the arrival of patient in the OT.
3. Instrument sterilization validation by scrub nurse.
4. Display of patient and procedure related details on white board.

OT set up is the responsibility of OT nursing team as per the requirement of scheduled surgery. In the current setting OT

booking closes by 5 pm as per the usual protocol. So after this time nurses get the booking list of scheduled cases for the next day and accordingly they should do the preparation. It was observed that in the initial stage of QMS only in the 73% cases surgeon were found discussing with the nursing team regarding the instrument requirement. Surgeons expect that nurses should know the instrument requirement at least for the commonly performed surgeries (eg. Hernia, Laparoscopic and Open Cholecystectomy, I&D etc.). However in the 80% cases nurses were ready with OT trolley before the arrival of the patient. Three main reasons were found for remaining 20% cases first one is inexperienced scrub nurses secondly due to inadequate sterile supplies from the CSSD and thirdly long surgery list thus surgery team doesn't give enough time for OT set up and call the succeeding case patient in between. Although it was found that for uncommon procedure special requirement were always discussed by the surgeon or surgery team with the OT nursing team and OT technician well in advance. The outcome of this discussion between surgeon and nurses should be the correct preparation as per the requirement. Surgeons reported that some time when they modify the plan of surgery after the incision then probably they require special kind of instrument and equipment but it rarely happens usually they anticipate the required preparation in advance so that arrangement can be done without wasting the time during the surgery. Data shows that the correct flow of information play very important role in the preparation of the requirement of the surgery. Because usually evening and night staff is responsible for the preparation for the next day surgery and normally morning shift staff gets the instructions from the surgery team for the

preparation. Exchange of information is very important for quality services because multifunctional teams are involved in the care of surgical patients.

Data demonstrates that irrespective of the experience and qualification in almost all (90%) the instances nurses were found to comply with the checking for validation of accuracy of sterilization of instrument by checking the sterility indicators (Change of colour indicates the accuracy of the sterilization) and it was sustained throughout the period of implementation of QMS across all the three stages. Nurses check the indicator and then record the same information in the sterility indicator register.

Display of the information about the patient and procedure on the white board (which is wall mounted in the OT) was not a documented protocol, but it helps the team to verify the identity of patient and scheduled surgery. The data shows that in the initial stage of QMS only 50% of scrub nurse used to write the information of patient before each case but in mid stage this decline to 43% and in the late stage remain 50%. Adherence to this parameter was only depending upon two factors; firstly the supervision of surgeon and secondly the willingness of scrub nurse. It was found that when surgeon supervise and insist scrub nurse to write the details of the patient on the white board then they do. As in the initial stage of QMS there were no existence of the surgical safety check list so these details on the board helps the surgical team to be on the same pace during the surgery. The observation data describe the compliance to this parameter mostly in the first case whereas in the subsequent cases due to lack of time it did not follow. At this time if resident doctors

take initiatives for writing the details of the patient then this gap can be bridged for the subsequent cases. This can be supervised by the surgeon in fact the leadership of operating or senior surgeons can make it compulsory.

Before induction of anaesthesia: Data evident that out of total six process parameters to measure quality of process before induction of anaesthesia only 100% compliance were found only for two parameters in the initial stage. Whereas significant improvement was observed across the three stages of QMS in all the six parameters & they have shown almost 100% compliance in the late stage of QMS.

Before the beginning of the surgery surgical team introduction is required but being a part of the medical college all the professionals know each other so formal introduction was not in practice but they know each other. There should be a briefing session before the induction of anaesthesia. In the briefing session surgical team members discuss about the different patient concerns. It was being practiced by the Anaesthesiologist and Surgeons but nurses were not involved in the briefing. In all the instances of the late stage of QMS it was being practiced. These results were supported by the result of the study conducted by Crittenden (2006). As per the WHO universal protocol for surgical safety before the induction of anaesthesia Anaesthesiologist or anaesthesia team and nursing team are required to verify the identity of patient, name of the procedure, antibiotic prophylaxis, known allergy. Anaesthesia team check all the related parameters. In the late stage of QMS 100% compliance were observed. This was the result of the surgical safety implementation and

the training of the staff regarding the significance of the safety checklist.

Patient counselling about anaesthesia is always done by the anaesthesia professionals. This shows the higher compliance with the anaesthesia related activities during the perioperative cycle.

Observation data demonstrate that operating surgeons communicate the expected duration of the surgery to the anaesthetist but usually don't inform formally to all the members of the surgical team. In the initial and mid stage partial compliance were found but after the strict implementation of surgical safety checklist in the late stage 100% compliance were observed.

Before skin incision: Data demonstrate the partial compliance in the initial and mid stage of QMS implementation with the parameter related to verbal confirmation of the identity of patient by operating surgeon before incision .However 100% compliance were found in the late stage of QMS. These results are similar to the study conducted by Walter L Biffi (2015). This shows the effectiveness of the implementation of surgical safety check list. Due to multi-level checking of identity (Nurse level, Resident level, Lecturer level) and familiarity with the patient because they have been treating the patient throughout so at times surgeon verbally don't confirm the identity of patient. If the surgeon mentioned that they know the patient that is why they did not verbally reconfirm the identity then it was not considered as compliance as per the standard. The operative site should be marked before incision. In the Indian context induction of anaesthesia takes place in the OT itself and site

Surgeons mark the site in the OT itself thus patient don't arrive in the OT with marked site. This site marking also can be done in the preoperative room or in the ward after the preparation of the site . Since in the late stage surgical safety checklist were in place so parameters related to before skin incision show the full compliance in the late stage. At this stage anaesthesia team and surgery team are required to discuss about the airway difficulty and anticipated blood loss during surgery. In the current study in all the stage of QMS team was found discussing this point before the skin incision. These result in the late stage were similar to the study done by Christopher Rydenfalt (2013) in Swedish country hospital by observing time out portion of perioperative cycle of twenty four surgeries. As per WHO surgical safety time out or surgical pause to be performed by a checklist coordinator. Circulatory nurse usually act as a coordinator and initiate the time out but it can be any one member of the surgical team (Anaesthesia team, Surgery team, nursing team). Since in the current study setting only one scrub nurse was assigned to each OT so in the absence of the circulating nurse resident doctors can act as a checklist coordinator. Surgical safety checklist were in place in the late stage of QMS,however it has been observed that healthcare professionals only ticked marked for the sack of documentation without cross checking with real evidences. These results were in the line of the results of the study conducted by Brigid M. Gillespie(2015)

Intra Operative care: During the operative procedure circulatory nurse should be available in the OT for circulation of required surgical items (instruments, equipment or other disposables or consumable items). In the current setting

usually MPW staff helps in the circulation of necessary items during the surgery other than handling of patient and cleaning of the OT but rarely circulating nurses were assigned to OT. Due to unavailability of the circulating nurse at times MPWs don't understand the requirement of the surgical team and it increases the frequency of movement of the MPW from the OT. During all the three stages of QMS no significant improvement was found with respect to structure parameters.

Before Transferring of the patient from the OT :

Immediately after closure of incision only three parameters out of total seven parameters have shown the full compliance, these were preservation of specimen, correct labelling of the specimen in the OT, discussion among surgical team members about planning of the transfer of patient immediately after the closure of the incision. Scrub nurse should verbally confirm the instruments, needle, sponge counts before transferring out the patient as per the WHO surgical safety checklist (WHO,2009).There should be a protocol of three times counting of the instrument, needle etc. First counting at the time of OT trolley setup, second counting before the closure of skin incision and third at the time of cleaning of the instrument. For all the three stage of QMS partial compliance was found. No significant improvement was observed even after the implementation of QM activities. It should be improved over the time with the maturation of QMS.In the current scenario the use of a comprehensive checklist can be done .Both nurse and surgeon should document and sign about the confirmation of counts. After the completion of the surgery there should be debriefing session and circulating nurse or nursing team

verbally reconfirmed by announcing name of the performed surgery. In the current setting it is not practiced due to the absence in the OT. Whereas scrub nurse found to be busy in the changeover activities for the next scheduled surgical case. If any equipment or instrument failure issues were found during the surgery they should be addressed before team leaves the OT so that in future cases that can be rectified.

Post-Operative Room Activities: Before the arrival of the patient in the post-operative room structural parameters should be as per the standards but observation data confirms that that in the initial stage out of total six parameters three parameters has shown full or hundred percent compliance. Postoperative room bed was in all the instances found ready. Medical gas supply for each bed was adequate, pulse ox meters were also in the adequate numbers means one for each bed but all were not functioning. Bed rails in the initial stage were not found in all the post-operative beds but in the late stage all the parameters have shown the improvement and reached to the full compliance except the availability of MPW staff for comfortable shifting of the patient on the post-operative bed. This discomfort in the shifting has two reason one is the ergonomics of the post-operative bed. The height of the trolley is much more than the post-operative bed thus it requires more than four trained staff for shifting. In this setting where resident doctors are always available this shifting can be managed by the surgical team but all the team members are not trained for shifting of the patient. In the mid stage bedrails were attached with all the bed. This structural

improvement in the bed helped in assuring prevention of patients from the fall.

No significant difference were found in across all the three stages of QMS regarding the hand over by surgery and anaesthesia team to post-operative nurse. It was observed and also reported by the post-operative nurse that at the time of transfer of the patient surgical team don't give her complete instructions she has to check the post-operative notes for further instructions. There should be structured handover protocol or format do avoid the ambiguity. Delayed post-operative transfer of the patient were found due to incomplete notes of surgeon. As per the criteria if patient is out of the anaesthesia effect then also due to incompleteness of operation or surgeons note patient cannot be transferred to the respective ward. Pain score card was used to maintained only in the case of epidural anaesthesia but in the late stage it started regularly for all the patients.

Above description reveals that in the entire perioperative care parameters related to anaesthesia activities shows more compliance than the activities of surgery team and nursing team. Resource availability adequate medical supplies, adequate resource availability and process redesigning can helps in sustaining the QMS in the OT. Allocation of resources and redesigning of the process is mainly the responsibilities of the top management so top management commitment and leadership plays very important role in QMS implementation. Jack A. (2004) also discussed the similar results.

Research Question No. 4: What are the trends of change in various quality parameters during across all the three stages of quality management system?

Quality Management practices followed by the multifunctional healthcare professionals of the OT were observed in three different stages of quality management development. This helped the researcher to explore that in which area of the operation theatre complex (Pre-operative holding room, Operation Theatre, Post-operative recovery room) and in which stage (Initial, Mid and Late stage of the QMS development) most significant changes were happened. Four trends were observed.

1. Parameters already established as per the standard:

Observational data demonstrate that 22% (13 out of 60 parameters) practices of healthcare professionals were as per the standard across all the three stage of quality management implementation. This means for those parameters 100% compliance was established in initial stage of QMS are being informed by the preoperative nurse. Preoperative nurses never allow the patient inside the operation theatre with incomplete medical file.

In all the stages anaesthesia related parameters always comply with the standard practice means in all the cases their preparation were found adequate. Analysis of field notes and interview data of anaesthesia faculty member demonstrate that the leadership of teaching faculty plays important role in the adherence of practices by the resident doctors. Anaesthesia resident doctors were assigned specific roles and responsibilities as per their residency duration in the hospital. Junior Residents (JR) in their first year of residency are basically an observer. JR-I in the beginning of their residency observe the activities of the anaesthesia professionals, in

the second year JR-II assist the JR-III and faculty members in PAC. They regularly visit the OT checks all the preparations related to anaesthesia early morning around between 7 to 7.30 am means 1-2 hours before the starting of the routine cases. JR-III assists the Senior Anaesthesiologist in the induction of anaesthesia. Anaesthesia records were also found completed immediately after the surgery.

OT technicians check the lights, temperature and humidity required for the surgery before starting of the surgery at around 7.30-8.00am.

Anaesthesiologist and Surgeons discuss about the estimated blood loss and airways difficulties but nurses were never a part of this briefing. As per the MCI norms surgery and anaesthesia departments were divided into units and each unit was assigned fix OT days and faculty members were also fixed. Being a teaching hospital where everyone knows each other so there was no formal introduction session in OT before surgery.

S.N.	Parameters	Initial Stage	Mid Stage	Late Stage	Trends
1.	Readiness of Anaesthesia Equipment & medicine	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
2.	OT light is adequate as per requirement	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
3.	OT Temperature is as per requirement	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
4.	Humidity of OT is as per norms	100% compliance	100% compliance	100% compliance	Target Achieved Established

					Parameter
5.	Surgical team members know each other	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
6.	Patient counselling about the anaesthesia procedure by anaesthesia team	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
7.	Anticipated blood loss is discussed by surgical team members	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
8.	Specimen is preserved in appropriate solution	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
9.	Specimen are labelled correctly by surgery team	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
10.	Post op bed is ready	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
11.	All the equipment's for post op monitoring of patients are available in adequate no	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
12.	Medical gas supply is adequate and in working order	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter
13.	Anaesthesia records are completed and signed by authorized person(Anaesthetist)	100% compliance	100% compliance	100% compliance	Target Achieved Established Parameter

	immediately after surgery				
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1. Practices never followed in any of the stage of quality management implementation:

Parameters which were never followed in any of the stage of quality management implementation are included in this category. They were only four in numbers. All four comes under process parameters because these were related to the process of patient preparation before surgery. Prior to surgery certain physical preparation of patient are required to be done. Resident doctors (Surgery) and ward nurses are responsible for the complete preparation of the patient prior to surgery. After the arrival of patient in the operation theatre complex preoperative nurses should verify the preparation of the patient in the holding room itself. Any type of deficiency in the patient preparation may increase the duration of surgical procedure or cancellation of procedure. Verification of the NBM status of the patient is very important for the anaesthesia procedure. Before taking the patient inside the OT anaesthesia resident inquire about the NBM status that is why nurses never found asking this to patient. In the multi-level checking system (Checking by ward nurse, Resident doctors, Operating Surgeon or surgical team) exists in the teaching hospital prior to surgery. No adverse event were found thus if site preparation is not checked by the nurses then at the level of resident doctor it is being checked. But as per the standard protocols (SURPASS Checklist, De Vries et al,2010) preoperative professionals should check all kind of patient preparation including surgical bath and NBM. This kind of deficiencies in patient preparation increases the idle time of the operation theatre and causes dissatisfaction among the surgical

team. These are the common pre-operative preparations and if verifies in the holding area than surgical procedure time can be saved. Observation result shows and all the multifunctional professionals including Nurses, Surgeon and Surgery residents reported that site marking is always done in the operation theatre before surgery whenever is required. Because of this practice preoperative nurses don't check the preparation of surgical site. Preoperative checklist always found in the patients' file. Preoperative checklist includes verification of the patient preparation but surgical bath or shower was not the component of the checklist but studies shows the positive impact of the surgical bath on the prevention of the surgical site infection.

2. Continuously Increasing trend: Parameters with partial compliance but increasing trend :

Parameters of this category of trends show the continuous improvement in the practices of healthcare professionals after the implementation of multifaceted quality management initiatives. Out of total 60 parameters of the checklist 18 parameters means 30%of parameters were improved across the quality management stages. This shows the improvement in the practices of healthcare professionals in the mid and late stage of the quality management system implementation. As mentioned in the chapter no-IV (Observation and Results) that in the late stage redesigning of consent form was done and new consent form (Consent form for all kind of surgical procedures and consent form for anaesthesia) WHO surgical safety checklist, post-operative checklist were introduced and the training was also provided to all the users (Surgeon, Anaesthesiologist, Nurses, Resident doctors) of the checklist. Studies across the globe demonstrate the importance of WHO surgical safety checklist. These checklists are the security tool,

improve the communication, teamwork and improves the surgical safety (Helmio et al,2010,Bell R, Pontin L.,2010,Sewell et al,2011, Bashford T et al, 2014, Collins SJ et al, 2014).

2. Increasing trend Parameters:

S.N.	Parameters	Initial Stage	Mid Stage	Late Stage	Trends
1.	Immediate assessment of vitals of the patients by pre-operative nurse	Zero Compliance	Zero Compliance	Partial compliance	Increasing trend
2.	Pre-operative checklist signed by Pre-operative Nurse	Partial compliance	100% compliance	100% compliance	Increasing trend
3.	Patient arrival details are recorded in Pre OP register immediately	Partial compliance	Partial compliance	Partial compliance	Increasing trend
4.	Required instrument and equipment discussed by surgery team with scrub nurse prior to surgery in OT	Partial compliance	Partial compliance	100% compliance	Increasing trend
5.	Validation of Instrument sterility by scrub nurse is done and recorded	Partial compliance	100% compliance	100% compliance	Increasing trend
6.	Surgical team discuss patient related concerns in OT (Briefing)	Partial compliance	Partial compliance	100% compliance	Increasing trend
7.	Patient identity verification by anaesthesia team in	Partial compliance	Partial compliance	100% compliance	Increasing trend

	OT				
8.	Anaesthetist has verbally reconfirmed with patient about any known allergy in OT	Partial compliance	Partial compliance	100% compliance	Increasing trend
9.	Duration of surgery is announced by surgeon	Partial compliance	Partial compliance	100% compliance	Increasing trend
10.	Operating Surgeon has confirmed the identity of patient with medical record and verbal confirmation with patient	Partial compliance	Partial compliance	100% compliance	Increasing trend
11.	Operating Surgeon verifies the scheduled procedure name with record and verbal confirmation with patient.	Partial compliance	Partial compliance	Partial compliance	Increasing trend
12.	Airways difficulty is discussed by anaesthetist with surgical team members in OT	Partial compliance	100% compliance	100% compliance	Increasing trend
13.	Anticipated blood loss is discussed by team members	100% compliance	100% compliance	100% compliance	Increasing trend
14.	Check for antibiotic administration status and repeat dose and documentation done	Partial compliance	100% compliance	100% compliance	Increasing trend
15.	Nurse verbally confirms the instrument, sponges,	Partial compliance	Partial compliance	Partial compliance	Increasing trend

	needle counts				
16.	Verbal reconfirmation of performed procedure by circulating nurse/nursing team with surgical team	Partial compliance	Partial compliance	Partial compliance	Increasing trend
17.	Transfer of patient is planned by surgical team	Partial compliance	100% compliance	100% compliance	Increasing trend
18.	All the monitoring equipments are in working condition	Partial compliance	Partial compliance	Partial compliance	Increasing trend
19.	Bed rails are placed properly	Zero Compliance	100% compliance	100% compliance	Increasing trend
20.	Patient's physical privacy is maintained while shifting patient from stretcher to bed	Partial compliance	100% compliance	100% compliance	Increasing trend
21.	Bed side patient monitoring instructions are given to post op nurse by surgical team	Partial compliance	Partial compliance	100% compliance	Increasing trend
22.	Patient's file is handed over to post op nurse during patient shifting	Partial compliance	Partial compliance	100% compliance	Increasing trend
23.	Patient's operation notes are completed and signed by authorized person(Operating surgeon) immediately after surgery	Partial compliance	Partial compliance	Partial compliance	Increasing trend

24.	Anaesthesia records are completed and signed by authorized person (Anaesthetist) immediately after surgery	100% compliance	100% compliance	100% compliance	Increasing trend
25.	Patient's transfer plan is explained by surgical team to post op nurse	Partial compliance	Partial compliance	Partial compliance	Increasing trend
26.	Pain management score card maintained by Anaesthesia team	Partial compliance	Partial compliance	100% compliance	Increasing trend

Fluctuating (Up & Down) Trend

S.N.	Parameters	Initial Stage	Mid Stage	Late Stage	Trends
1	Checking for completeness of consent by Pre-operative nurse	Partial compliance	Partial compliance	Partial compliance ↓	Fluctuating (Up & Down) Trend
2	Circulating nurse is always present in the OT for circulation of required items (Instruments , sutures, other equipment)	Partial compliance	Partial compliance	Partial compliance ↓	Fluctuating (Up & Down) Trend
3	With no delay OT technician (attendant) gives support to the surgical team in case of any	Partial compliance	Partial compliance	Partial compliance	Fluctuating (Up & Down) Trend

	requirement.				
4	Patient has been discharge as per criteria	Partial compliance	Partial compliance	Partial compliance	Fluctuating (Up & Down) Trend

Out of these total 26 increasing trend parameters majority (10) of were related to operation theatre activity whereas only one parameter was related to preoperative room and rest of them were related to postoperative room activities (please refer chapter no V : Research question no 4) It should be considered here that WHO surgical safety checklist includes more parameters related to operation theatre (Before the induction of anaesthesia, before the incision ,before patient leaves the operation theatre) thus the improvement were also found more in the operation theatre related parameters in the current study.

3. **Static/invariable/No significant change trend : Parameters with partial compliance but no significant difference were found in the mid and late stages**

Few parameters showed no significant difference across the three developmental stages of quality management system. Means they comply partially with the standards but don't show any improvement in mid or late stage of the quality management implementation. Out of total 60 parameters only 11 (18%) parameters demonstrate no improvement.

Parameters with No Significant difference across the three QMS Developmental Stage:

S.N.	Parameters	Initial Stage	Mid Stage	Late Stage	Trends
1.	Check for Pre- op orders in medical record (Patient File) by Preoperative Nurse	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
2.	Check for NBM status with patient by Preoperative Nurse	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
3.	Availability of adequate sterile medical supplies (Instruments, Linen) and pharmaceutical items	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
4.	Availability of adequate staff for shifting and positioning of patient on OT table as required	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
5.	Availability of equipment as per requirement	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
6.	Patient and surgery related details are displayed on white board of OT	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
7.	OT trolley is ready for surgical procedure before patient enters in OT	Partial compliance	Partial compliance	Partial compliance	No Significant Difference

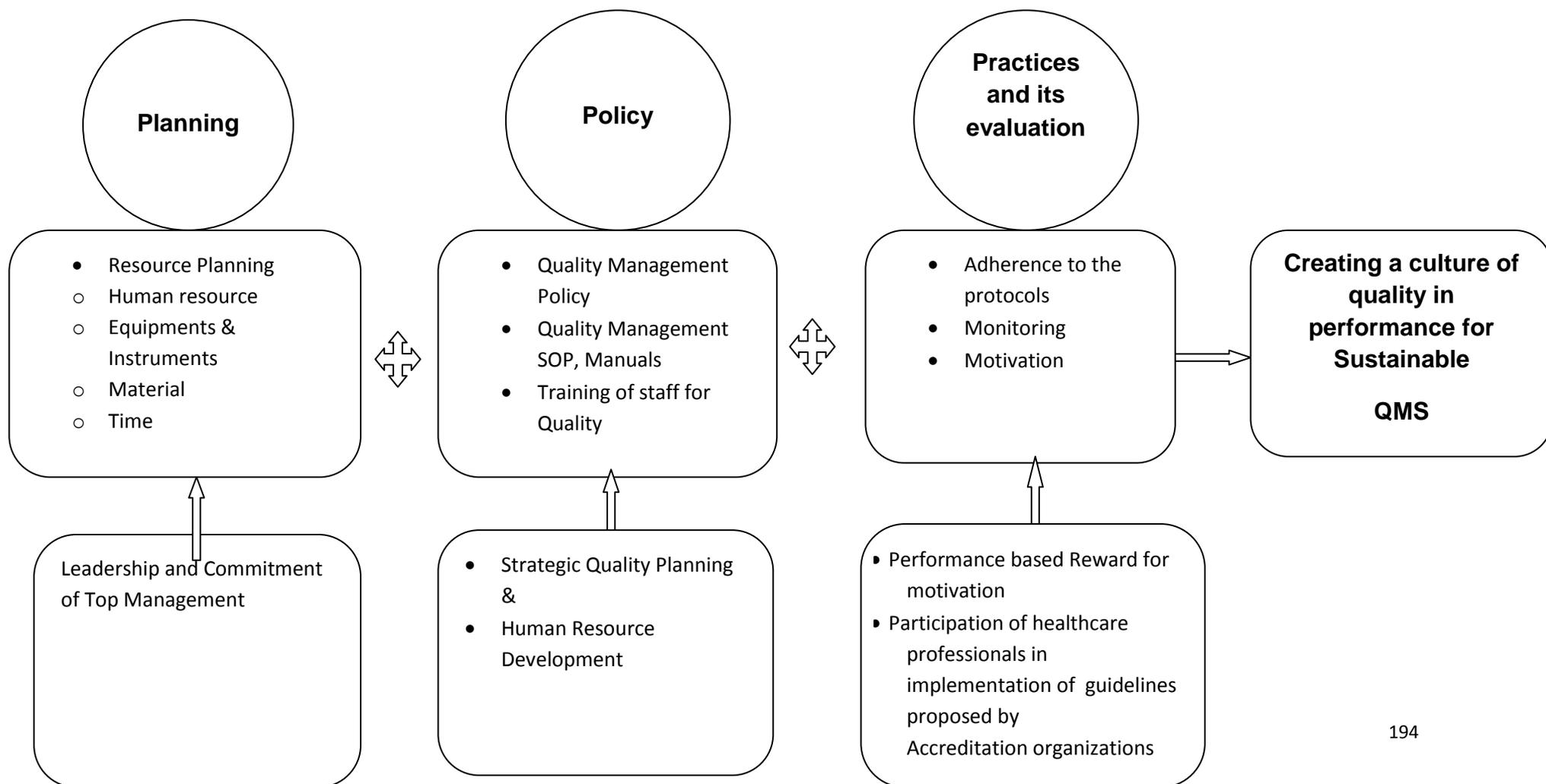
8.	Lab form (HPE) is filled up correctly by surgery team in OT	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
9.	Care plan for recovery of patient is discussed and planned in OT	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
10.	Adequate staff is available for shifting of patient on Post Op bed	Partial compliance	Partial compliance	Partial compliance	No Significant Difference
11.	Comfortable shifting of patient on postoperative bed is done	Partial compliance	Partial compliance	Partial compliance	No Significant Difference

Two parameters out of total eleven were related to preoperative room activities and also two parameter were from postoperative room where as remaining seven parameters were from the operation theatre related activities.

Factor analysis also applied to check the commonalities among the factors. Analysis shows that all identifies seven factors can be divided in to two main components i.e. Top management commitment and Human resource development (HRD). Their cumulative weight is 59.4%. This implies that apart from the Top management commitment HRD is also important. Because quality initiative cannot survive without right people, people who are improving.

Importance of the right people in the Quality Improvement was also mentioned in the study conducted by Jack A. et al,(2004).skill development & retention is the core of HRD.Following model of three Ps of the QMS are responsible for sustainable,

Figure No. : 3P' of Sustainable Quality Management System



Recommendations following the study

1. Top management should allocate the adequate resources (Manpower, Material, Instruments, Equipment and Time) to OT related staff for quality improvement.
2. Redesigning of following process will help in the improvement of perioperative care of the patients
 - Transferring a patient from ward to OT(it should not be more than one hour before the scheduled time)
 - Optimization of changeover time is necessary for OT set up and to ensure the patient safety (Minimum 20 minutes time for setting up for next procedure.
 - Surgical instruments packing
3. Job redesigning of resident doctors, nurses, multipurpose healthcare workers(MPWs)
4. On the Job training (OJT) for nursing and MPW staff is recommended. Sometimes due to busy schedule OT staff doesn't get time to attend the classroom training program and OJT is more effective.
5. Development of a comprehensive checklist extracted from WHO- Surgical Safety Checklist and SURgical PATient Safety System (SURPASS)is recommended.
6. Top management should motivate staff to participate willingly in the quality management activities. Proactive leadership of the concern physicians to promote and motivate the members of his team to follow the protocol.
7. Performance based reward system for all the staffs specially Nursing, MPWs, Resident doctors.
8. Checklist should be printed as a white board and mounted on the wall.
9. The process of instrument, sponge, needle counting should be improved. Checklist board can be used to keep account of additional instruments used etc.

Limitation of the study:

Scope of the Quality Management System in Operation Theatre (OT) has a very broad concept. It includes various aspects of OT management like implication of physical facility of the OT, Infection control practices, Equipment maintenance etc. Many studies related to QMS in OT were done as a team research however current study has been done by a single researcher thus some of the aspects were not covered. It did not include the observations of the practices of specialities other than general surgery OT.

Recommendations for future research:

Results of this study can be further explored in future and a team research can be done in other specialities like Ophthalmology, Orthopaedic, Neurology, ENT etc. A comparative study can also be done to check the compliance of standard practices across other specialities of the hospital .

In future such studies can be done in different types of the hospitals like corporate hospitals, charitable hospitals to formulate the strategy to establish the sustainable QMS in such settings. Comparison of the QMS approaches of different kind of settings or type of hospitals can be done.

Implications of Research:

No single factor is responsible for the sustainability of the QMS in the OT. This study result highlights the factors which are more critical and required more attention at the time of implementation of QMS in the OT of a teaching hospital. The results of this research study has proposed a model of three P's of the sustainable QMS in the OT complex.

Finding of the study demonstrate the significance of the role of top management in QMS implementation, willingness of the healthcare professionals in QMS, and Human resource development, Role of Accreditation bodies.