

**Review of post operative notes after caesarian section at Muhimbili national  
hospital**

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**MMed (Obstetrics and Gynaecology) Dissertation  
Muhimbili University of Health and Allied Sciences  
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**Muhimbili University of Health and Allied Sciences**

**Department of Obstetrics and Gynaecology**



**REVIEW OF POST OPERATIVE NOTES AFTER CAESARIAN SECTION AT  
MUHIMBILI NATIONAL HOSPITAL**

**By**

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**A Dissertation Submitted in (partial) Fulfillment of the Requirements for the  
Degree of Master of Medicine in Obstetrics and Gynecology of**

**Muhimbili University of Health and Allied Sciences  
October, 2017**

**CERTIFICATION**

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: “*Review of post operative notes after caesarian section at Muhimbili National Hospital*”, in (partial) fulfillment of the requirements for the degree of Master of Medicine of Obstetrics and Gynaecology of the Muhimbili University of Health and Allied Sciences.

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**Prof. Andrea B. Pembe**

(Supervisor)

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**Date**

**DECLARATION AND COPYRIGHT**

I, **Dr.Njoli M. Jean Pierre**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

**Signature:** .....

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## **DEDICATION**

I dedicate my dissertation work to my family. A special feeling of gratitude to my loving parents, Charles and Julienne Moudio whose words of encouragement and push for tenacity ring in my ears. My brothers and sisters have never left my side and are very special.

## **ABSTRACT**

### **Background**

Post-operative notes (PON) documentation following caesarean section (C/S) is crucial for subsequent management of patients after the surgery. No study has ever been done in our setting to assess the contents of PON. The aim of this study was to evaluate the completeness of written PON from C/S at Muhimbili National Hospital (MNH).

### **Methodology**

One thousands two hundred PON were reviewed against pre developed criteria. Each note was assessed for completeness of the criteria developed. The criteria were developed by reviewing literature and discussion with doctors in the department of Obstetrics and Gynecology. The persons who performed the C/S were identified, either registrars/residents or specialists. Analysis was done using Statistical Package for Social Sciences (SPSS) version 20 and results were presented as frequency tables.

### **Results**

Among 1200 PON reviewed, 833 were emergencies and 367 were elective C/S. Registrars/residents wrote 68.5% of the PON, and specialists wrote 30% of them. The main indication for C/S was previous scar (26.2%) followed by CPD/obstructed labor/big baby (17.5%). Four post operative notes (0.3%) were complete. Four criteria (indication of C/S, intravenous antibiotics, pain management and intravenous fluids) came out to be present in all PON. The criteria with deficiencies varied from 99.8% for the highest to 2% for the lowest. Difference in writing PON between registrars/residents and specialists were noted in: washing and draping, type of uterine closure, suture used for uterine closure, swab and instrument count, appearances of fallopian tubes and ovaries. P-value for those elements was < 0.001.

### **Conclusion**

Few PON met the agreed criteria. Differences of contents of the notes between registrars/residents and specialists were noted in some of the criteria. There is a need for a standard national guideline for operative notes documentation. A checklist can also be available in theatre, to remind surgeons on what type of information is needed to help in patient's care post surgery.

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**LIST OF ABBREVIATIONS**

AAAHC	Accredited Association for Ambulatory Healthcare
B.P	Blood Pressure
C/S	Caesarean Section
GSP	Good Surgical Practice
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
PON	Post Operative Notes
RCOS	Royal College of Surgeons
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization
WHO-FIC	World Health Organization Family of International Classifications

## **OPERATIONAL DEFINITIONS**

Post-operative note - is a report written in a medical record to document the details of a surgery, the findings, as well as the post-operative orders for the care of the patient.

Complete PON – is a PON that comprises of all items, as per agreed with specialists during development of the criteria.

## INTRODUCTION

Caesarean section (C/S) is a surgical procedure where delivery of the baby is done through an incision made on the mother's abdomen and uterus, instead of delivery through the birth canal (1). It can be performed as an elective or emergency case. An elective C/S is performed when there is an apparent medical need for the operation during pregnancy or if it's requested by the mother in advance (2). An emergency C/S is a procedure done when circumstances during pregnancy and/or labor call for delivery of the baby (3). Emergency C/S can be performed in case when the fetus receive inadequate amount of oxygen (fetal distress), arrest of progression of labor in spite of adequate contraction of the uterus (obstructed labor), descent of the umbilical cord out of the uterus before delivery of the fetus (cord prolapsed), umbilical cord surrounding the neck. Indications for elective C/S can be: previous caesarean section, big baby, partial or complete implantation of the placenta on the lower segment of the uterus.

The rate of C/S around the world has been increasing, especially in America where the rise has been the most rapid since 2000 (4). The World Health Organization (WHO) considers C/S rates of 10–15% at population level to be the optimal range for targeted provision of this life saving interventions for mother and infant; lower rates suggest unmet need, while higher rates suggest improper selection and non medical indications for a patient to undergo the surgery (5). But it must be noted that trying to achieve that specific rate, rather than providing the service to a woman in need should be avoided (6).

The current rate of C/S worldwide is presently stated to be between 18-35% (7). Caesarean deliveries account for 15% of births worldwide, with the highest rate in Latin America and the Caribbean (29.2%), and lowest in Africa (3.5%) (8). In developed countries, the proportion of caesarean births is 21.1% whereas in least developed countries only 2% of deliveries are by C/S (8). Tanzania has shown a considerable increase in the number of C/S. Over the last three decades, Muhimbili National Hospital has registered a percentage of C/S of 3.6% in 1982, 15.7% in 1999, 31.6% in 2004 and 55% in 2015 (MNH Obstetrics database, 2015). Similar increase of C/S rate is noted in Kilimanjaro Christian Medical Center, with 22% in 1996, 23%

in 1998, 25% in 1999, 29.9% in 2005 and 35.5% in 2010 (9). The worldwide increment of C/S rate has played a part in the reduction of maternal morbidity and mortality, and neonatal complications in developed countries (10–12). Apart from medical reasons, non medical factors like physicians interest in profit, maternal wishes and defensive medicine also contribute to the high C/S rate (12). Accessibility to this surgical procedure is strongly variable from one region to another in a developing country, reasons being the boom of private health services combined with a better socioeconomic status in urban areas compare to the remote zones (12,13).

A post-operative note (PON) is a report written to document the details of a surgical procedure. It contains information about the procedure done. Identification of the patient, supportive diagnosis, promotion of the continuity of care are some of the multiple specific objectives set by Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and Accredited Association for Ambulatory Healthcare (AAAHC) for sufficient information after a surgical procedure (14,15).

Current medical practice is strongly associated with litigious issues. A mistake done, a procedure not recorded can be considered as not done. Therefore detailed information about what was done intra-operatively is important, as it can prevent medico legal implications due to missing information (16,17).

PON can also help in evaluating epidemiology of certain conditions. Proportion of C/S with a specific indication cannot be calculated if the reason for the procedure is not mentioned in the notes. Association of post operative complications with a type of technique or a type of suture can easily be measured, when all information are found in the PON.

## **LITERATURE REVIEW**

The continuous rise of C/S rate worldwide does not only positively affect the maternal and perinatal morbidity and mortality, but can also increase it, especially in low income countries (5,11,18–20). Low financial resources, poorly equipped facilities, insufficient medical staffs and poor surgical technique contribute to a poor management and outcome of cases after the surgery. Common complications encountered are hemorrhage, severe anemia, wound infection and death (7,10,21).

The decision to perform a primary C/S has important implications for maternal morbidity in the current pregnancy, and mode of delivery in subsequent pregnancies (22,23). As any other surgical procedure, C/S carries a high level of risk, and therefore it should be carefully planned. Patient counseling, prophylactic antibiotics administration and aseptic conditions are some of the basic needs for a safe procedure to be done (5). At the end of the procedure, proper documentation is important to facilitate continuous care.

Post-operative notes describe the events that have happened during the procedure. Therefore, it is the responsibility of the surgeons operating and writing the notes to ensure their accuracy and legibility. PON may be used later for research, audit that can lead to improvement of surgical practice (14,24). High quality documentation of the notes allows transfer of information among the team responsible for the care of patients. Low quality of notes, on the other hand increases the risk of inappropriate decisions which may delay or disrupt care and contribute to poor maternal outcome. These PON are usually written based on standardized guidelines or departmental checklist. Design and adoption of the guidelines as an aide memoire to write notes were made with aim of correcting various areas of weaknesses that were found in post operative notes which were used for past research (25). Good Surgical Practice from Royal College of Surgeons (RCOS) is the guidelines commonly used when designing checklists. It was written with the collaboration of different surgical organizations and first edition was published in 2002. It is made of standards which are used by a wide range of surgeons to maintain their good practice. It contains important items: date and time,

elective/emergency procedure, names of the operating surgeon and assistant, name of the theatre anesthetist, operative procedure carried out, incision, operative diagnosis, operative findings, any problems/complications, any extra procedure performed and the reason why it was performed, details of tissue removed, added or altered, identification of any prosthesis used, including the serial numbers of prostheses, and other implanted materials, details of closure technique, anticipated blood loss, antibiotic prophylaxis (where applicable), DVT prophylaxis (where applicable), detailed postoperative care instructions, signature. These items are expected to be found in a post-operative note and are regularly used in audits, to assess the completeness of PON. A study done in a hospital in Thailand concluded a favorable opinion on quality of PON after medical records of 232 patients were reviewed. Three items from 14 required were found to be missing in some of the notes. These include incision details (absent in 10.3% of notes), closure technique (absent in 12.9% of notes), name and signature of the surgeon which were absent in less than 10% of PON (26).

Apart from RCOS Guidelines, other options with almost the same similarity are available. These are specific units designed checklists(17,27–30). They mostly concern surgical branches where the classic guideline does not achieve the entire expected goal in writing notes. These checklists can be designed within a unit, with the help of specialists and consultants. It is then implemented, and audits done after a specific time to assess the level of compliance. Results were conclusive in Baranas India University where 57 cases were evaluated based on a specific checklist containing the items: indication of c/s, anesthesia type, operative steps, findings, uterine closure, suture used for closure of rectus sheath, post-operative orders. Very high quality of record maintenance, as all the items were found in the notes (16).

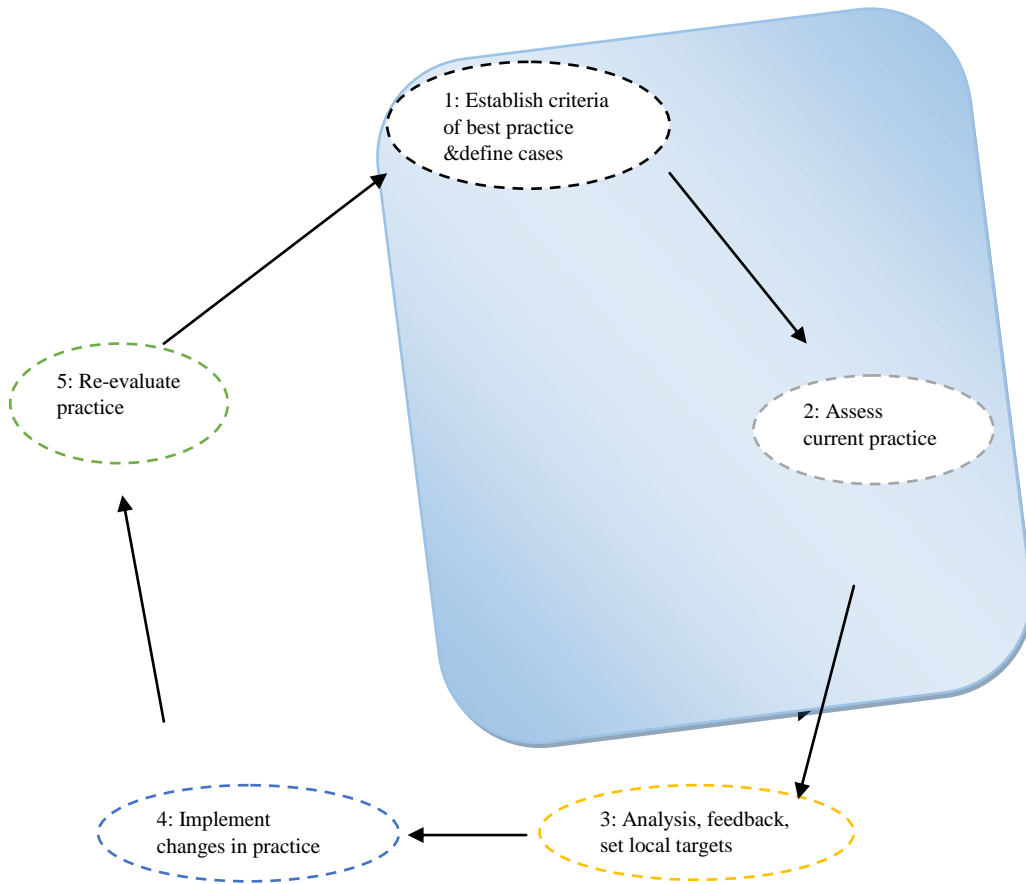
Evaluation of the quality of information present in a PON cannot be done without assessing the legibility. Baigrie et al observed in 1994 that details of approximately 70% of written PON were not able to be read and understood. Poor handwriting was also associated with high percentage of incompleteness of notes, in terms of altered information required for the follow up of the patient (31).



Suggestions about electronic designed templates have been made in several studies. This is said to be a better way of documentation as it allows continuation of care after handover of patients. It also provides resources for audit and future research (32). Electronic templates can be a solution to the issue of readability of handwritten notes, as the information become clear and accessible to all health personnel. Many notable weaknesses about this suggestion are to be noted. Implementing an electronic template will require training of surgeons and other medical staff on how to use the software (33). Other challenges, especially in developing countries are the lack of finances, which will be needed for buying, installing and routine maintenance of all the equipment. For this reason, handwriting notes remain for now the best option.


Teaching how to write good post operative notes can be of great help, but no literature for teaching is currently available in our setting. Therefore appropriate PON can be used as samples for training. It has been proved that Only one brief session of operative dictation significantly improve the quality of subsequent written PON (34). This is important because junior medical staffs usually do not have sufficient knowledge and skills in that area. That is reflected in audits, where majority of poor operative notes originate from them (27).

A clinical audit aims at a continuous improvement of healthcare provision. Through assessment of process, areas of weakness can be identified, corrected and evaluation of improvements is regularly assessed. In a London hospital, 80 % of PON were found with multiple omissions of one or more items. Implementation of the checklist followed by an audit two years later noted a significant improvement in writing PON following caesarean section (35). Clinical audit is usually done in cyclical steps, form criteria establishment to re-evaluation of practice. At the end of a cycle (figure 1), results bring out deficiencies present in the system. Reasons for these deficiencies are identified, that can include: insufficient care organization, less knowledge, inadequate skills and unsuitable attitudes (36–38).



**Figure 1: The clinical audit cycle showing steps involved**

**KEY**

 Steps 1 up to 3 were involved in this study.

## **PROBLEM STATEMENT**

Caesarean section is a surgical procedure with a constant increased rate (39). With the increment, comes the issue of immediate post-operative care and follow up for future obstetrical carrier and other surgical and medical conditions, which are more or less, related to the procedure. For that reason, PON plays a major role. It creates a form of communication between medical staff (40). In case of inefficient or absence of information, patient care is at risk. For example, in a case of obstructed labor, lack of indication of when to remove urethral catheter exposes patient to an eventual fistula formation. The medico-legal implication of PON also reinforces the need of the quality of its content (41,42).Completeness of PON is not known in our setting, as no previous studies have ever been done. Patient treatment may be affected by the content of these notes.

## **RATIONALE**

Completeness of written PON is important. It helps in post-operative management of the patient, provides information for long term patient care. A good written operative note is a professional and legal requirement. No previous evaluation of these operative notes has ever been done in our setting. A research to be done in this area is important and will help in detecting areas of weakness that will be corrected. All this aims at continuous quality care improvement for a better outcome of post caesarean deliveries cases. It will also provide data that will be used for subsequent studies and implementation of an appropriate checklist containing the important items, intended for improvement of post-operative care.

## **RESEARCH QUESTION**

Do PON following C/S meet the pre developed criteria needed to effect subsequent care of patient?

## **OBJECTIVES**

### **Broad objectives**

To evaluate the completeness of operative notes of patients undergoing caesarean section at Muhimbili National Hospital.

### **Specific objectives**

1. To determine the proportion of PON from C/S meeting the pre developed criteria.
2. To compare contents of PON written by registrars/residents and specialists.

## **METHODOLOGY**

### **Study design**

This was a cross sectional study done at Muhimbili National Hospital. Data were collected over a period of 5 months from 22<sup>nd</sup> December 2016 to 21<sup>st</sup> of May 2017. 1200 PON following caesarean deliveries were reviewed.

### **Study setting**

The study was conducted at Muhimbili national hospital (MNH). It is a National Referral Hospital and a University Teaching Hospital with a bed capacity of 1,500. The hospital attends 1,000 to 1,200 outpatients per day, admitting 1,000 to 1,200 inpatients per week. Three hundred doctors and 900 nurses currently work at MNH. It is one of four large consultant hospitals in the United Republic of Tanzania. MNH has a total of 25 departments and 10 specialized care units. Department of obstetrics and gynecology is one of the largest among the clinical departments. It is composed of 2 maternity blocks. The first block has 5 obstetric wards, one labor ward (18beds), and one ICU ward (13beds). The second block consists of antenatal clinic and post-delivery ward for mothers who have been previously assessed and are stable. Mothers with sick babies admitted in neonatal units, mother and babies on Kangaroo care program are also admitted in that same block. Approximately 9,000 deliveries are conducted every year at MNH.

Patient are admitted through labor ward, and then directed to a respective ward, depending on the diagnosis, plan of management or delivery. There is always an available medical team on call who attend to all patients, with a priority to emergency cases, followed by stable ones. The medical team on call is composed of one intern, 3 registrars/residents, one specialist and a consultant. Two shifts of nurses are always allocated to labor ward, each comprising of six midwives. Each shift lasts 12 hours. Care is also given in the other wards by a group of midwives/nurses as per instruction of doctors reviewing patients. In case decision of delivery by C/S is taken, preoperative preparation is done using a checklist. Consent is signed by the patient or relatives after proper counseling, and she is sent to theatre. There is an obstetric theatre with two rooms for operations. An average of 10 caesarean sections are performed

every day by registrars/residents and specialists on call. After caesarean section, patient is moved to theatre recovery room, where she will be monitored for an hour or more, then transferred back to maternity ward once she has been declared stable after review of the doctors on call. Management will continue in the ward based on PON, and also from daily plan made by medical staff after service or major ward round.

There is a daily morning meeting conducted in the department. The medical team on call the previous day reports all emergency cases, deliveries, neonatal and maternal deaths if there happened to be one. A weekly mortality meeting is also organized where discussion of cases is made, conclusion and recommendation taken with the aim of improving knowledge and routine medical services.

### **Study population**

The study population comprised of all PON written after a caesarean section at MNH.

### **Inclusion criteria**

All operative notes after C/S.

### **Exclusion criteria**

Post-operative notes that were written by the investigator.

### **Sample size**

The sample size was 1248 study participants who had caesarean section done. This sample size was derived from the formula:

$$N = (Z_{\alpha} + Z_{\beta})^2 * (p_1(1-p_1) + p_2(1-p_2)) / (p_1 - p_2)^2$$

Where,

N is the sample size;

$Z_{\alpha}$  (the critical value of the Normal distribution at  $\alpha$ ) = 1.96 for 95% confidence level;

$Z_{\beta}$  (the critical value of the Normal distribution at  $\beta$ ) = 0.84 for a power of 80%;

$p_1$  (proportion of PON written by registrars/residents) = 30% is the estimated prevalence of PON considered as complete written by registrars/residents;

$P_2$  (proportion of PON written by specialists) = 25% is the estimated prevalence of PON considered as complete written by specialists.

### **Sampling procedure**

Convenient sampling was done where all PON within the study period were reviewed.

### **Development of criteria for assessment of post-operative notes**

There is no available protocol for appropriate writing of post-operative notes after caesarean section. For the purpose of the study, a protocol was developed. Numerous tools were used for that design, including GSP 2014, WHO-FIC, Pocket Guide to the Operating Room (28), Surgical Notes – A Pocket Survival Guide for the Operating Room (29) and journal publications on post-operative notes (16,27,17). The protocol contained a total of 27 items expected to be found in post-operative notes. It was presented at a first meeting to doctors and nurses/midwives in the department for discussion and additions. A final draft was then made and distributed to specialists at MNH. The aim was for each specialist to categorize the items into what he/she considers important to appear in the PON. The choice of items by each specialist was determined by the direct impact of each of them to the immediate care of the patient and future obstetric carrier. Compilation of the findings was made and results were presented at a second meeting. Conclusion and agreement were taken that, a post-operative note was to be considered as of acceptable quality if it will contain all the items as per agreed with the specialists in the department. This was the starting point for defining and putting a clear picture on what should be considered in post-operative note.

The final result of the pre developed criteria was composed of: Indication for the C/S, name and grade of the surgeon type of anesthesia, washing and draping, type of skin incision, type of uterine incision, baby's gender, baby's weight, Apgar score of the baby, sponging of uterine cavity, type of uterine closure, suture used for uterine closure, appearance of ovaries and fallopian tubes, swab count, instruments count, type of suture used for rectus sheath, estimation of blood loss, intravenous antibiotics, intravenous fluids, pain management, monitor vitals, monitor vaginal bleeding.

**Data collection**

The files of all patients who underwent C/S were identified the next day after the procedure by the investigator or research assistants. Information from the PON was extracted by the investigator or the research assistant, using a checklist that was prepared for the purpose. The checklist comprised of information on groups of variable (patient's data, indication of the procedure, technical aspects on the operation, findings, patient's outcome, post-operative management). The data collected by the research assistants were reviewed by the investigator on the same day. The information was compared and if any dissimilarity was found, discussion and consensus was reached immediately.

**Data analysis**

Collected data were assessed in opposition to the agreed criteria. Quality of post-operative notes between registrars/residents and specialists was analyzed by comparing the information present in each of the respective notes. Aim was also to determine whether the grade of the surgeon is likely to affect the content of the notes.

Data were entered to the computer using EPI Info version (3.5.4), and were transferred to Statistical Package for Social Sciences (SPSS) version 20 for analysis. Data were scrutinized for the completeness and it was summarized using frequency distribution. Contents of PON were also compared between the cadres, and summarized using cross tabulation.

**Ethical consideration**

The ethical clearance was obtained from Muhimbili University of Health and Allied Sciences (MUHAS) Senate Research and Publications (SRP). Permission to conduct the study was sought from Executive Director of Muhimbili National Hospital and head of department Obstetrics and gynecology. There was no consent sought from patients, as only the PON were needed during collection of data. Request for waiving consent was approved by the MUHAS SRP committee. The confidentiality was assured and maintained whereby no name of the patient appeared on the check list or analysis. The clinical review was non-judgmental. Names of surgeons, other medical and nursing staffs who were part of the team during the operation were not mentioned in any of the reports.



**RESULTS**

A total of 1275 procedures were done during that period. One thousand two hundred of them were caesarian section, and the remaining divided into hysterectomies (19), repair of burst abdomen (16), repair of perineal tears (15), manual removal of placenta (10), cervical cerclage (10) and exploratory laparotomy (5). Out of 1200 caesarian sections, 833 (69.4%) were emergencies and 367 (30.6%) were elective cases. All post-operative notes after caesarian section were included in the study. Four post-operative notes (0.3%) were complete.

**Table 1. Indication of caesarean section (N=1200)**

Indications	Frequency (N)	Percent (%)
Previous scar	314	26.2
CPD/ Obstructed labor/big baby	210	17.5
Fetal distress	184	15.3
Mal-presentations	95	7.9
Failed induction	78	6.5
Placenta previa	49	4.1
BOH	35	2.9
Previous myomectomy	32	2.6
Unfavorable cervix	29	2.4
Oligohydramnios	28	2.3
Cord around the neck	23	1.9
Abruption placenta	21	1.7
Previous perineal tear	15	1.2
Cervical dystocia	15	1.2
Preeclampsia/eclampsia	14	1.1
Elderly primigravida	11	0.9
IUGR	10	0.8
Malignancies in pregnancy	9	0.7
Previous fistula	8	0.7
Other indications <sup>a</sup>	20	1.6

<sup>a</sup>Other indications include: hydrocephalus (5), lower segment myoma (4), vulval edema (4), scar tenderness (4), neuropathy(1),gastrochisis(2).

The table revealed that the first indication of caesarian section in terms of number was previous scar 314 (26.2%), followed by CPD/obstructed labor/big baby 210 (17.5%). IUGR 10 (0.8%) and previous fistula 8 (0.7%) were the least indications for caesarian section (**table 1**).

**Table 2. Outcomes of babies from caesarean section (N=1228)**

<b>Characteristics</b>	<b>Frequency (N)</b>	<b>Percent (%)</b>
<b>Birth weight</b>		
<1500gm	21	1.7
1500gm – 2500gm	242	19.7
>2500gm	953	77.6
Not mentioned	12	1
<b>Gender</b>		
Female	603	49.1
Male	619	50.4
Not mentioned	6	0.5
<b>Apgar at minute 1</b>		
<3	8	0.6
3 – 7	276	22.5
>7	930	75.7
Not mentioned	14	1.14
<b>Apgar at minute 5</b>		
<3	1	0.08
3 – 7	91	7.4
>7	1122	91.3

A total of 1228 babies were delivered, this includes 1172 singleton deliveries and 28 twin deliveries. Majority of the babies, 953 (77.6%) weighed above 2.5kg. Two hundred and forty two (19.7%) babies weighed between 1.5 kg to 2.5kg. Twenty one (1.7%) babies weighed below 1.5kg.

Six hundred and nineteen (50.4%) babies were male, 603 (49.1%) were female and 5 (0.4%) babies had their genders not mentioned in the post-operative notes.

Apgar score was present in 1214 of PON. At minute one, 930 (75.7%) babies scored above 7. Two hundred and seventy six (22.5%) babies scored between 3 to 7 and 8 (0.6%) babies scored below 3. At minute 5, Apgar score was noticed to have improved as 1122 (91.3%) babies scored above 7, 91 (7.4%) babies scored between 3 to 7 and 1 (0.08%) scored below 3 (table 2).

**Table 3. Proportion of post-operative containing each item (N=1200)**

<b>Audit criteria</b>	<b>Frequency (N)</b>	<b>Percent (%)</b>
Indication for the C/S	1200	100
Name and grade of the surgeon	1182	98.5
Type of anesthesia	1168	97.3
Washing and draping	624	52
Type of skin incision	1198	99.8
Type of uterine incision	1193	99.4
Baby's gender	1195	99.5
Baby's weight	1188	99
Baby's Apgar score	1186	98.8
Uterine cavity sponging	457	38.1
Type of uterine closure	928	77.3
Type of suture used for uterine closure	85	7.1
Appearance of fallopian tubes and ovaries	807	67.2
Swab count	606	50.5
Instruments count	606	50.5
Type of suture used for rectus sheath	24	2
Estimation of blood loss	1088	90.7
Intravenous antibiotics	1200	100
Pain management	1200	100
Intravenous fluids	1200	100
Monitor vitals	767	63.9
Monitor vaginal bleeding	200	16.7

Post-operative notes were assessed based on 22 criteria, from indication of C/S to monitoring of vaginal bleeding. Four criteria (indication of C/S, intravenous antibiotics, pain management and intravenous fluids) came out to be present in all PON. These were followed by type of skin incision 99.8%, babies' outcome 99.7% and uterine incision 99.4%. Type of suture used for the closure of rectus sheath was the criteria least mentioned in the notes, accounting for 2% of PON (**table 3**).

**Table 4. Comparison of contents of post-operative notes written by registrars/residents and specialists (N=1182)**

Criteria	Total	Surgeons				P-value
		Registrars/residents (N=822)		Specialists (N=360)		
		Number	Percent (%)	Number	Percent (%)	
Indication for the caesarean section	1182	822	100	360	100	*
Name and grade of the surgeon	1182	822	100	360	100	*
Type of anesthesia	1150	800	97.3	350	97.2	0.904
Washing and draping	612	461	56.1	151	42	0.000
Type of skin incision	1180	820	99.7	360	100	0.819
Type of uterine incision	1175	818	99.5	357	99.1	0.889
Baby's gender	1179	819	99.6	360	100	0.707
Baby's weight	1177	820	99.7	357	99.1	0.536
Baby's Apgar score	1173	815	99.1	358	99.4	0.929
Uterine cavity sponging	448	327	39.7	121	33.6	0.090
Type of uterine closure	913	672	81.7	241	67	0.000
Suture used for uterine closure	84	71	8.6	13	3.6	0.019
Appearance of fallopian tubes and ovaries	800	532	64.7	268	74.4	0.000
Swab count	602	386	46.9	216	60	0.000
Instruments count	602	386	46.9	216	60	0.000
Suture used for rectus sheath	24	21	2.5	3	0.8	0.238
Estimation of blood loss	1070	737	89.7	333	92.5	0.210
Intravenous antibiotics	1182	822	100	360	100	*
Pain management	1182	822	100	360	100	*
Intravenous fluids	1182	822	100	360	100	*
Monitor vitals	758	536	65.2	222	61.6	0.267
Monitor vaginal bleeding	199	124	15.1	75	20.8	0.048

\*No statistics are computed. The criterion is a constant.

Table 4 shows comparison of PON meeting the criteria between registrars/residents and specialists. It was based on a sample size of 1182 PON, as 18 of the notes lacked name/rank of surgeon. Eight hundred and twenty two (68.5%) notes were written by registrars/residents and 360 (30%) by specialists. A significant difference appeared to be present on 6 criteria: washing and draping, type of uterine closure, suture used for uterine closure, swab and instrument count, appearances of fallopian tubes and ovaries and monitor vaginal bleeding. Five of the criteria could not be compared (Indication for the caesarean section, Name and grade of the surgeon, Intravenous antibiotics, Pain management, Intravenous fluids) because their values were constant.

## **DISCUSSION**

After assessing PON, we found that very few (0.3%) met all pre developed criteria. Out of 22 criteria, 4 of them were present in all PON (indication of C/S, intravenous antibiotics, pain management, intravenous fluids). Eight criteria were present in PON at a rate of 90% or more, and the remaining were least met.

The little proportion of PON containing all criteria shows the deficiencies in documentation of the procedure. This could be explained by the attitude and commitments of doctors towards record keeping. Lack of supervision from senior colleagues or administration can also have a negative impact on the process of PON writing. Each PON differs from another, and therefore can affect its assessment. This may be due to differences in indication of C/S. These differences in indications point out the issue of care of each patient after surgery. For instance, in a case of obstructed labor, doctors, when reviewing a patient will look at the comments on appearance of bladder and whether or not removal of urethral catheter was mentioned after a certain number of days. In this case, a criteria based audit will be more reliable if it focuses on a specific indication.

Similar conclusion of few proportions of PON meeting the agreed criteria was also found in some studies. It was a general observation based on the percentage of the different parameters that were deficient during analysis. Studies in Pakistan (43) and in United Kingdom (35) found an overall inadequacy of PON, as minimum requirement was not met. On the other hand, the findings of this study are different from study by Pandey et al in India, who found that PON documentation after C/S was adhered to all the elements assessed (16). The difference of results with this study may be caused by the Hawthorne effect (16,44). There could have been a change of conducts of surgeons, in response to their knowledge about the study that was going on. Each of the surgeons was provided a copy of the standards that guided them in writing notes. Therefore, the measure of current practice was compromised and affected the results. In this case, the design should have worked retrospectively. Many previous studies have shown that PON were frequently below the set standards. However, it has been proved in several occasions that highlighting these findings, associated with

implementation of standard guidelines led to significant improvements of notes documentation (17,35,45,14).

Half of our criteria showed a higher adherence ( $\geq 90\%$ ). These could be due to the role they play in potential patient's safety implications. They constitute a vital element of written communication between medical team. Indication of C/S is the principal key. It gives the information on the reasons of the procedure. Type of uterine incision allows planning of subsequent pregnancy and mode of delivery. Babies' findings are always important. It can help to cross check information and avoid confusion in case of contest of gender or weight. Post operative instructions (antibiotics, intravenous fluid, and pain management) are mandatory after each surgery. Prevention of infections and comfort of patient require their prescription.

Six criteria from our study (indication, name and grade of the surgeon, incision type, findings, type of closure, suture used, post operative instructions) were found to be identical to those of operative notes guidelines developed by Royal College of Surgeons in Ireland (RCSI) (30). Jawaid et al audited operative notes after general surgery in Pakistan and found almost similar results to ours. There was a high adherence in some criteria: indication, surgeon grade, findings and post operative instructions. Suture details and type of closure scored less (27). Findings of this study are almost similar to ours. This shows how similar can be general attitudes of doctors towards documentation, regardless of countries or surgical specialties.

Ten criteria were less mentioned (washing and draping, uterine cavity sponging, type of uterine closure, suture used for uterine closure, adnexal check, swab/instruments count, suture used for rectus sheath, monitoring of vitals and vaginal bleeding), serious omissions that can affect, for some of the criteria continuous care of patients. Omission can also be due to the fact that operation was uneventful, and therefore did not prompt the need of reporting some of the elements from the procedure. However, it is judicious for some of these omitted criteria to be mentioned regardless of how tedious the procedure was. Swab/instruments count report reassure the operating team that nothing was left in situ during closure of the abdomen.



Regular vitals' and vaginal bleeding check after surgery can lead to an early reaction in case of any complication such as post partum hemorrhage or internal bleeding.

There were number of differences between PON written by registrars/residents and those of specialists. Registrars/residents performed significantly better in terms of washing and draping, uterine closure type and suture used for uterine closure than specialists. Baigrie et al in England reported that on almost every criterion, residents scored higher than specialist(46). Mathew et al found some difference when assessing PON from general surgery. In their study, registrars performed better than specialists in criteria: skin incision, indication, closure type and post operative orders. Specialists did well in one criterion, findings (47). There was no notification about inclusion or exclusion criteria in that study. In a case where data collection included PON written by the principal investigator, results would be affected depending on its rank. With years spent on the field, seniors tend to master the art of producing notes' summary, with only relevant information intended for patient's care. That could be the reason why finding was the criterion mostly found in PON of specialists.

Post-operative notes from specialists in this study were significantly better in criteria like adnexal check, swab/instruments count and monitoring of vaginal bleeding. Ten criteria showed no differences between the cadres. Rogers et al concluded a high accuracy in surgery description and completion of post operative instructions from specialists(48). Kawu et al in a study done in Nigeria also reported a high proportion of PON from specialists meeting the standard criteria. Specialist's surgeons significantly scored higher than assistant surgeons in 4 criteria identical to this study (indication, skin incision, suture used and intravenous fluids) (49). There was no clear definition of who were the assistant surgeons. We do not have any idea whether they were residents, registrars or intern doctors. That may have influenced the outcome, as each of them don't have the same level of knowledge and experience on surgical procedure and the process of writing the notes.

The differences of results in some of the criteria between the two cadres in this study may be explained by the experience of one group over another. Considering that each criterion has its own value that can more or less affect the patient care, Specialists were more inclined to

mention key criteria. This can be noticed from PON written by them where some criteria (Findings, adnexal check, swab/instruments count and monitoring of vaginal bleeding) were more present. Post operative notes from Registrars/residents nevertheless comprised of some criteria (washing and draping, suture used for closure) that did not much affect post surgery follow up of patients.

A limitation to this study is that we could not confirm whether the data taken from PON represented the actual events that occurred during surgery. The different steps of a C/S were most probably followed, but record was not made. Given the fact that not documented not done applies; attention should be drawn to all surgeons on the importance of documentation. Another limitation was assessment of PON based on a specific indication of C/S. It could not be achieved due to several challenges like the sample size for one indication that was small for the study period. It would have also required an adaptation of the pre developed criteria to suit each indication.

**CONCLUSION**

Few PON met the agreed pre developed criteria. Differences of contents of the notes between registrars/residents and specialists were noted in some of the criteria, but general improvement needs to be made.

**RECOMMENDATIONS**

1. Use of checklist attached to operative sheets or present in operating theatre that will guide the surgeon on what is required to be present in the notes. Or designing of an operative sheet in a tic box format, with a little space left below to add any important information related to the procedure or the post surgery management of the patient;
2. There is a need for a standard national guideline for documenting operative notes;
3. Implementation of these criteria can be done and evaluation done regularly to assess adherence.

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**APPENDIX****Checklist**

DATE OF COLLECTION	
1. Age	
2. Parity	P.....L.....
3. What was the indication for c/s?	<input type="checkbox"/> ..... <input type="checkbox"/> not mentioned
4. Grade of the surgeon who wrote the note?	<input type="checkbox"/> Registrar <input type="checkbox"/> resident <input type="checkbox"/> specialist <input type="checkbox"/> not mentioned
5. Type of anesthesia mentioned in the post-op note?	<input type="checkbox"/> Spinal anesthesia <input type="checkbox"/> General anesthesia <input type="checkbox"/> Not mentioned
<b><u>SKIN PREPARATION AND INCISION</u></b>	
6. Washing and draping mentioned in the note?	<input type="checkbox"/> Yes <input type="checkbox"/> No
7. What solution was used for washing?	<input type="checkbox"/> ..... <input type="checkbox"/> Not mentioned
8. What was the incision type?	<input type="checkbox"/> Pfannenstiel <input type="checkbox"/> SUMI <input type="checkbox"/> Other..... <input type="checkbox"/> Not mentioned in the note

<b><u>UTERINE INCISION</u></b>	
9. What was the type of uterine incision?	<input type="checkbox"/> Lower segment incision; <input type="checkbox"/> Classical; <input type="checkbox"/> Others..... <input type="checkbox"/> Not mentioned
<b><u>BABY'S FINDINGS</u></b>	
10. Gender of the baby	<input type="checkbox"/> Male ; <input type="checkbox"/> Female; <input type="checkbox"/> Not mentioned in the note
11. Weight of the baby	<input type="checkbox"/> .....kgs <input type="checkbox"/> Not mentioned
12. Apgar score	<input type="checkbox"/> ..... <input type="checkbox"/> Not mentioned
<b><u>UTERINE CLOSURE</u></b>	
13. Was uterine cavity sponging mentioned in the note?	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. What was the uterus closure type?	<input type="checkbox"/> Single layer <input type="checkbox"/> Double layer <input type="checkbox"/> Not mentioned
15. What was the suture used for uterus closure?	<input type="checkbox"/> ..... <input type="checkbox"/> Not mentioned in the notes
16. How was appearance of fallopian tubes and ovaries noted?	<input type="checkbox"/> Normal <input type="checkbox"/> Abnormal..... <input type="checkbox"/> Not mentioned in the notes

<b><u>COUNT</u></b>	
17. swabs count	<input type="checkbox"/> correct <input type="checkbox"/> not correct <input type="checkbox"/> not mentioned
18. instruments count	<input type="checkbox"/> correct <input type="checkbox"/> not correct <input type="checkbox"/> not mentioned
<b><u>RECTUS SHEATH</u></b>	
19. Suture used for rectus sheath closure	<input type="checkbox"/> ..... <input type="checkbox"/> Not mentioned
<b><u>SKIN</u></b>	
20. Suture used for skin closure	<input type="checkbox"/> ..... <input type="checkbox"/> Not mentioned
<b><u>POST OPERATIVE ORDERS</u></b>	
21. What was the amount of blood loss?	<input type="checkbox"/> .....Mls <input type="checkbox"/> Not mentioned in the note
22. What were the antibiotics prescribed?	<input type="checkbox"/> I.V. Ceftriaxone <input type="checkbox"/> I.V. Metronidazole <input type="checkbox"/> Others..... <input type="checkbox"/> Not mentioned in the note
23. What were the drugs prescribed for pain management?	<input type="checkbox"/> inj. Pethidine <input type="checkbox"/> inj. Diclofenac <input type="checkbox"/> Others..... <input type="checkbox"/> Not mentioned in the note

24. Intravenous fluids prescribed	<input type="checkbox"/> NS <input type="checkbox"/> DNS <input type="checkbox"/> RL <input type="checkbox"/> Not mentioned in the note
25. Monitor vitals mentioned?	<input type="checkbox"/> Yes <input type="checkbox"/> No
26. Monitor vaginal bleeding mentioned?	<input type="checkbox"/> Yes <input type="checkbox"/> No

**MANUSCRIPT**