# Improving the Quality of Inpatient Medical records Documentation using DMAIC Methodology

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# Introduction

- The Medical Record is an orderly written report of the patient's history, physical, laboratory findings, treatment and hospital course and when completed contains sufficient data to justify the diagnosis and treatment and to record the results of the care rendered.
- The record is valuable to the patient, hospital, doctors, research and education, public health agencies, responsible organization for healthcare claims and play a vital role when it comes to maintaining the received accreditation.
- They are a written collection of information about patients health care and essential for his or her present and future care. Information contained in medical records is also used for the management and planning of health care facilities and services; for medical research and the production of health care statistics. Doctors, Nurses and the other health care professionals write in medical records so that they can use the information again when the patient returns to the hospital.

# Problem statement

- Ill-legible Documentation of patient care provided in Medical records is a vital component for non-compliance against JCI standards and maintaining accreditation status
- Medical record documentation errors could result in incorrect treatment decisions, expensive, painful, and/or unnecessary diagnostic studies
- Ill-legible documentation leads to unclear communication between health care providers thus compromising care of patient, continuity of care and increasing risk to patient safety.
- The consequences of altered, incomplete, or nonexistent records can be legally and personally catastrophic leading hospital to get involved in legal actions,  personal injury suits, criminal cases, disability determinations and claims of negligent or improper healthcare (medical malpractice), and is generally admissible at a trial.

# Objectives

- To understand and analyse the existing documentation compliance to patient medical records.
- To  analyze the error in patient’s medical record and interpret it.
- To define the problem concerned with the documentation error of inpatient medical records.
- To measure the documentation error of IP records on the basis of considered parameters.

# Study design and methods

- **Type of study**: Retrospective study, using DMAIC six sigma over a period of two months for improving the quality of inpatient medical records documentation errors .
- **Location of study**: Thumbay Hospital Fujairah, UAE.
- **Study subjects**: Medical records of the In-patients who were admitted at Thumbay Hospital Fujairah, UAE. .
- **Sample size: A** sample size of 183 (i.e.) 50% of the total 367 inpatient medical records for January 2018 till February 2018 will be determined at 95% confidence interval and 5% margin error.
- **Sampling method**: Stratified random sampling.
- **Data (information) to be collected**: Inpatient medical records.
- **Data collection tools**: Medical Record Audit Checklist based on important parameters considered in each form, Hospital Information Management System of Thumbay Hospital Fujairah, Root cause analysis (fish bone analysis), Cause and Effect Matrix and Microsoft Excel.

**Ethical considerations:**

While reviewing the patient records the names of the patients, pharmacy details, diagnosis and plan of treatments where not be recorded. The consent of the management was taken before collecting the data by signing a non-disclosure agreement pertaining to medical records by signing confidentiality form with the human resource department of Thumbay Hospital Fujairah.

# An Introduction of DMAIC Methodology

The six sigma process of Define, Measure, Analyse, Implement and Control (DMAIC) is a data driven process and each step in the cyclical DMAIC Process is required to ensure the best possible results. The six sigma approach consists of the five step DMAIC approach. Each step of this process can be explained as follows:

**1. Define:** Problem selection and benefit analysis

1.1. Identify and map relevant processes.

1.2. Identify stakeholders.

1.3. Determine and prioritize customer needs and requirements.

2. **Measure:** Translation of the problem into a measurable form, and measurement of the current situation

2.1. Determine operational definitions for the problem selected.

2.2. Validate measurement systems

2.3. Assess the current process capability.

2.4. Define objectives

**3. <u>Analyse</u>:** Identification of influence factors and causes that address the problems

3.1. Identify potential influence factors.

3.2. Select the vital few influence factors

**4. <u>Improve</u>:** Design and implementation of adjustments to the process to improve the performance

4.1. Quantify relationships between output and input variables.

4.2. Design actions to modify the process or settings of influence factors in such a way that the input variables are optimized.

4.3. Start collecting baseline data from improvement actions.

**5. <u>Control</u>:** Empirical verification of the project's results and adjustment of the process and to ensure the improvements are sustainable

5.1. Determine the new process capability.

5.2. Implement control plans.

# Parameters for Medical Record Audit

After understanding the required standards to be followed in the medical record documentation done by the clinical and non-clinical staff (physician, nurses, PAD, MRD, pharmacist, dietician, ICN and ICD) & after auditing the set of estimated (183) medical records comprised of forms in which parameters where considered, total compliance percentage of documentation was calculated for clinical and non- clinical staffs separately.

In medical record documentation (by all staffs) is done on a specific set of forms, names of which are being mentioned as follows:-

- Pre-admission form
- MRD Checklist
- Admission authorization form
- Discharge authorization form
- Admission discharge record

- In house transfer form
- Initial assessment form (Surgery, OBG, endoscopy, pediatrics, cardiology, medicine, ophthalmology, ENT, orthopedics)
- Doctors progress notes
- Physician order sheet
- General orders
- Medication order sheet
- IV fluid orders
- Medical Reconciliation form
- Integrated care plan
- Patient identification checklist
- Consent form for surgery/special procedure/informed consent form

- Pre-operative preparation checklist
- Pre-anesthesia /sedation evaluation/PAC FORM
- General consent form
- Anesthesia record
- Surgical safety checklist
- Operation notes
- Recovery notes
- Nurses observation chart
- Intake output record
- nurses progress notes
- Nursing handover sheet
- Nursing adult/pediatric initial assessment form
- Discharge checklist

- Discharge summary
- Discharge planning risk assessment-
- LAMA
- Nutrition care plan
- Valuable consent form
- Clinical pharmacist intervention form
- Nursing fall assessment form
- Nursing fall re-assessment form

In different forms the documentation is done by staffs (clinical and non-clinical) individually as well as in combination according to their assigned set of space.

In every form parameters were decided on the basis of importance of sections to be documented based on policies and standards of THFUJ. For example – **In admission – discharge record** to be documented by physician, the parameters considered were-

- Final diagnosis
- Discharge status
- Signature, seal, Date & time
- Full form  of abbreviations
- Approved abbreviation
- Eligible handwriting
- Over-writing with error mark and sign
- Operations/ procedure
- Provisional diagnosis

For example **– In admission – discharge record** parameter to be taken care by **nurses** was -

- Patient identification sticker shall be pasted

The same pattern follows in all forms according to parameters. So, on the basis of documentation errors in each form which is calculated according to the considered parameters, the compliance percentage is ruled out and on the basis of it graphs were being depicted in analyse phase for all form for better understanding the gaps present in the medical record documentation which is estimated according to the policies followed by THFUJ based on standards set by (JCI) which is 100% compliance.

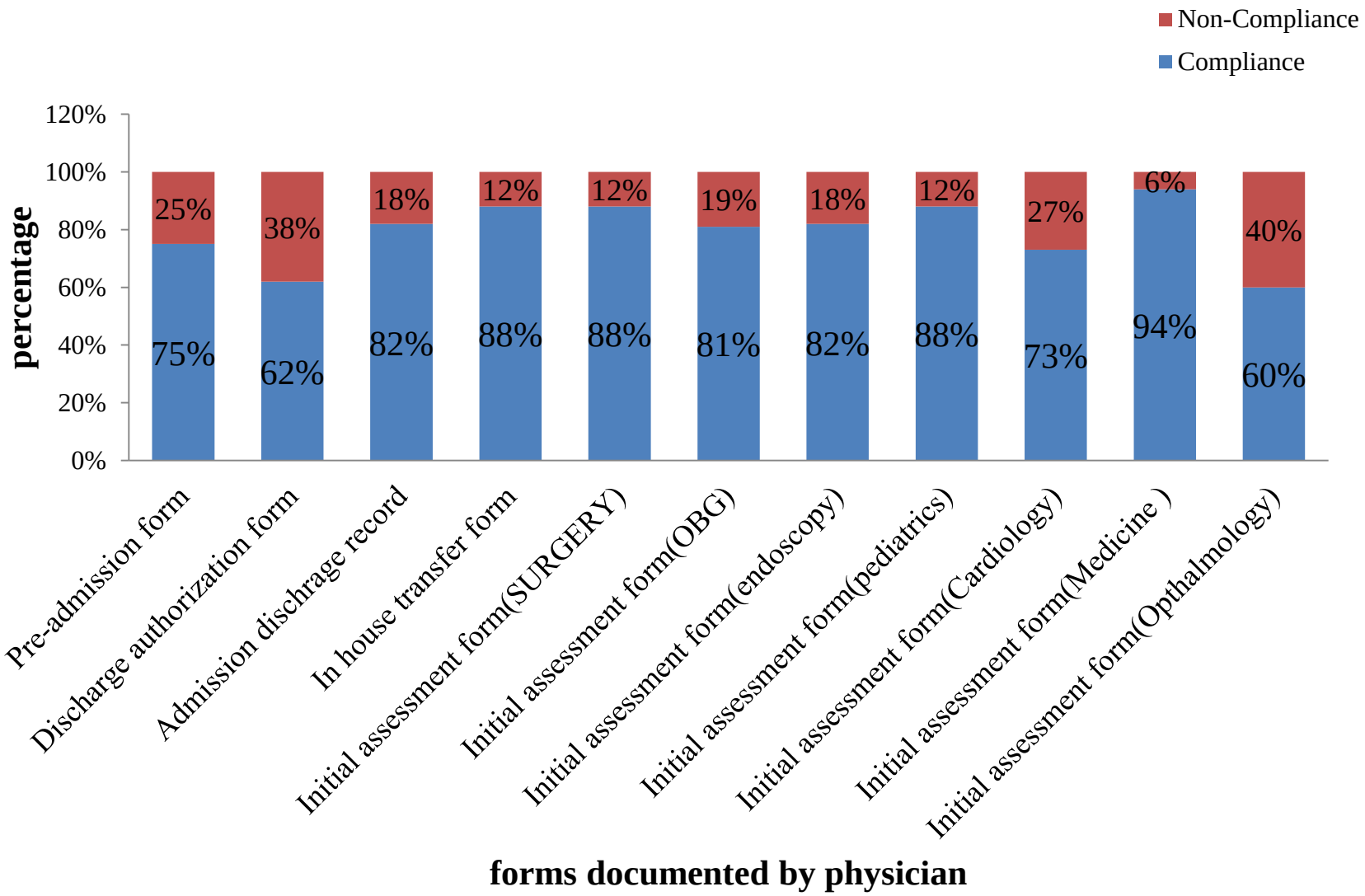
# Implementation Of Six Sigma For The Process For Maintaining The Quality Of Medical Record Documentation

## Define Phase

- The study was carried out at Thumbay Hospital Fujairah UAE. This teaching hospital has a bed capacity of 60 beds.
- The key stakeholders for the study was both clinical and non-clinical staffs & thumbay hospital fujairah as well.
- The primary goal of this study was to improve the quality of the documentation of the inpatient medical record.
- Another goal was to improve the stakeholder's knowledge towards documentation of their respective section according to the standards and policies.
- Last goal was to improve the compliance of the completeness of the inpatient medical records for the better outcomes.
- The key output variables of the study was reducing/improving the documentation error in inpatient medical records, which was identified from the inpatient medical records from medical record department.
- The target unit, Thumbay Hospital Fujairah's inpatient medical records.

**Measure Phase**

- The first step was data collection plan, through random inpatient medical records from different departments which was acquired from medical record department.
- The next step in this phase was to identify the process being followed while documenting each form (in medical records)of inpatient departments by calculating the compliance percentage of the medical records.
- The data gathered on the basis of auditing January 2018 till February 2018 given me an exposure regarding the present status of the medical record documentation by clinical and non-clinical staffs.
- An average 367 of the total number inpatient records (i.e) 183 was taken, determined at 95% confidence level and 5% margin of error.
- The gathered data was compared according to the standards/policies of the Joint commission international to rule out the loop holes.




**Graph 1(a)-Total compliance percentage of all forms based on the parameters, which is being documented by physician:**

Pre-admission form ,n=183

Discharge authorization form ,n=174

Admission discharge record, n=44

In-house transfer form, n=183

Initial assessment form(surgery), n=20

Initial assessment form(OBG),n=30

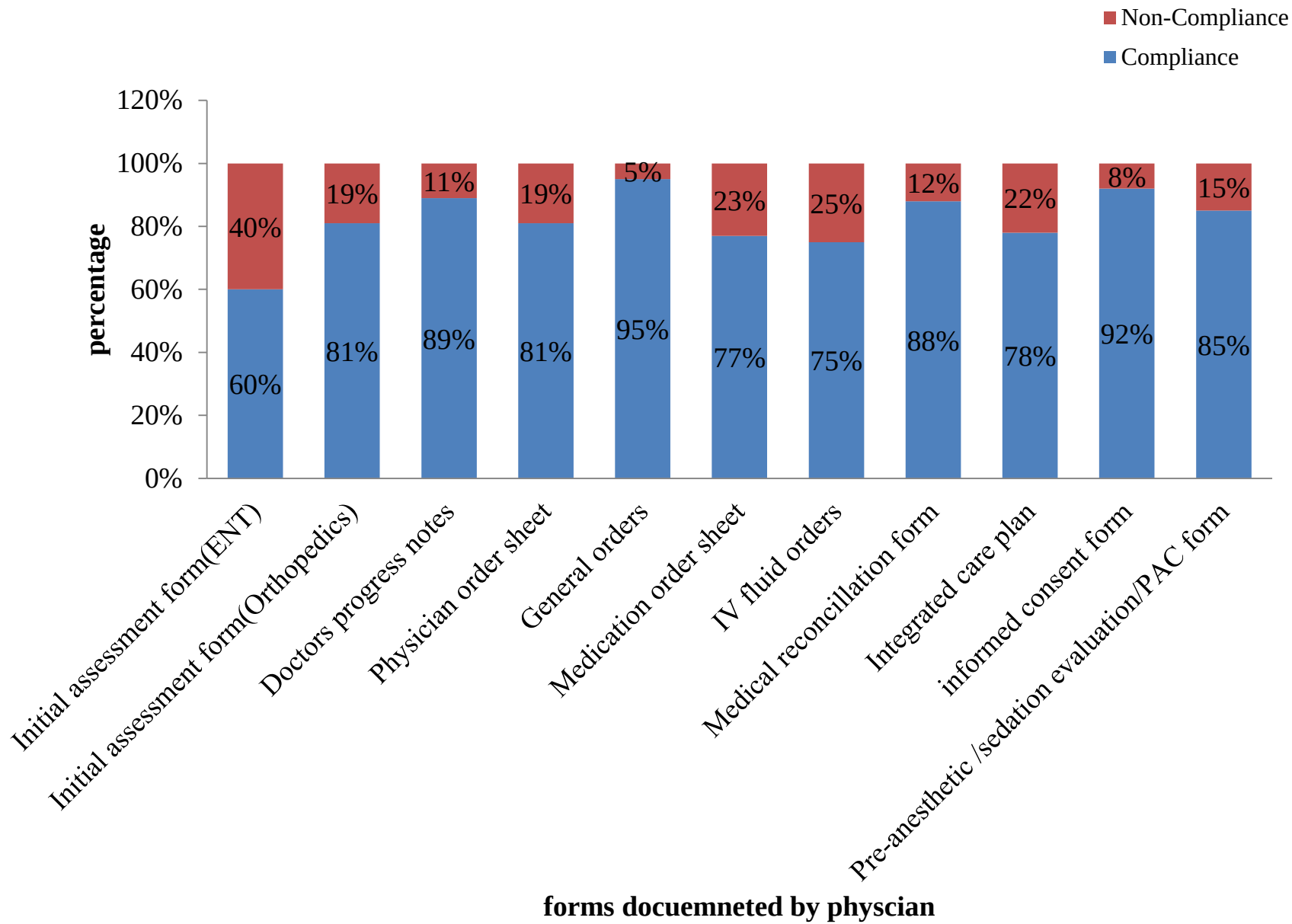
Initial assessment form( endoscopy), n=20

Initial assessment form (paediatrics), n=20

Initial assessment form(cardiology),n=20

Initial assessment form(medicine), n=40

Initial assessment form(opthalmology), n=10




**Graph 1( b)-Total compliance percentage of all forms based on the parameters, which is being documented by physician:**

Initial assessment form(ENT), n=20

Initial assessment form(orthopedics), n=13

Doctors progress notes, n=183

Physician orders sheet, n=183

General orders, n=183

Medication order sheet, n= 183

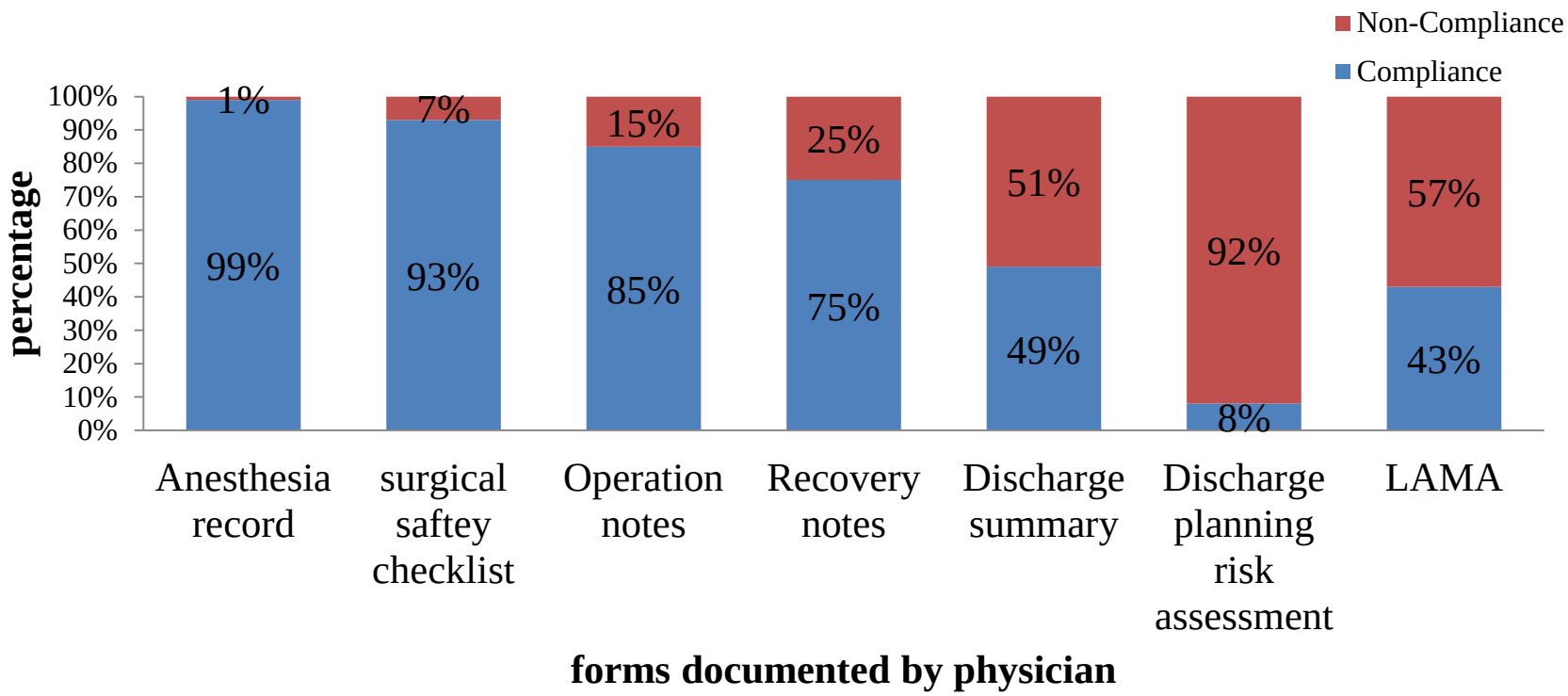
IV fluid orders, n= 183

Medical reconciliation form, n=183

Integrated care plan, n =183

Informed consent form, n =183

Pre-anesthetic/sedation/PAC form, n=70




**Graph 1(c)-Total compliance percentage of all forms based on the parameters, which is being documented by physician:**

Anaesthesia record, n=111

Surgical safety checklist, n=69

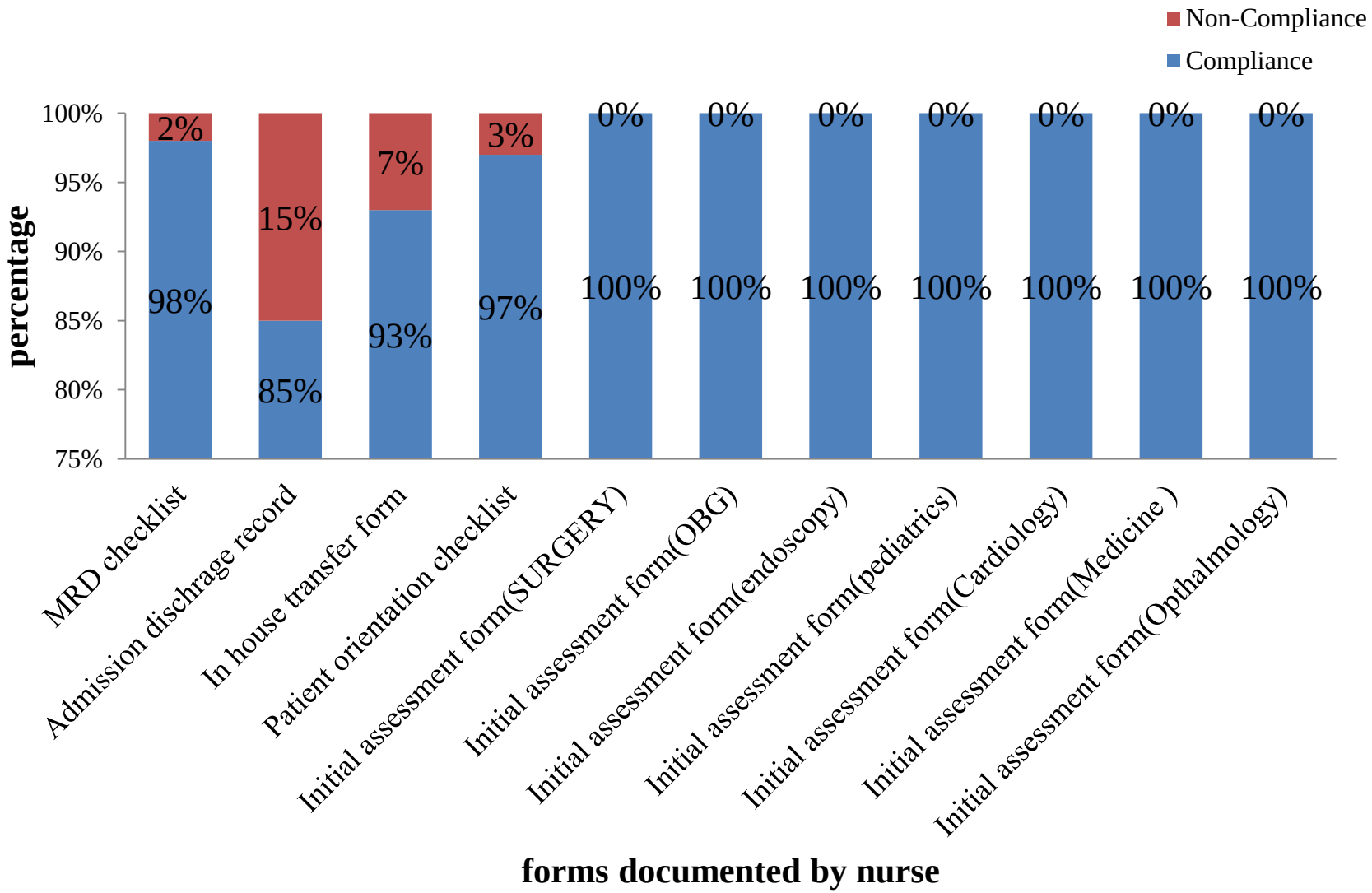
Operation notes, n=75

Recovery notes, n=75

Discharge summary, n=183

Discharge planning risk assessment, n=183

LAMA, n=21




**Graph 2(a)-Graphical representation of the total compliance percentage of all forms which was being documented by nurse:-**

MRD checklist ,n=183

Admission discharge record, n=44

In-house transfer form, n=183

Patient orientation checklist, n= 183

Initial assessment form(surgery), n=20

Initial assessment form(OBG),n=30

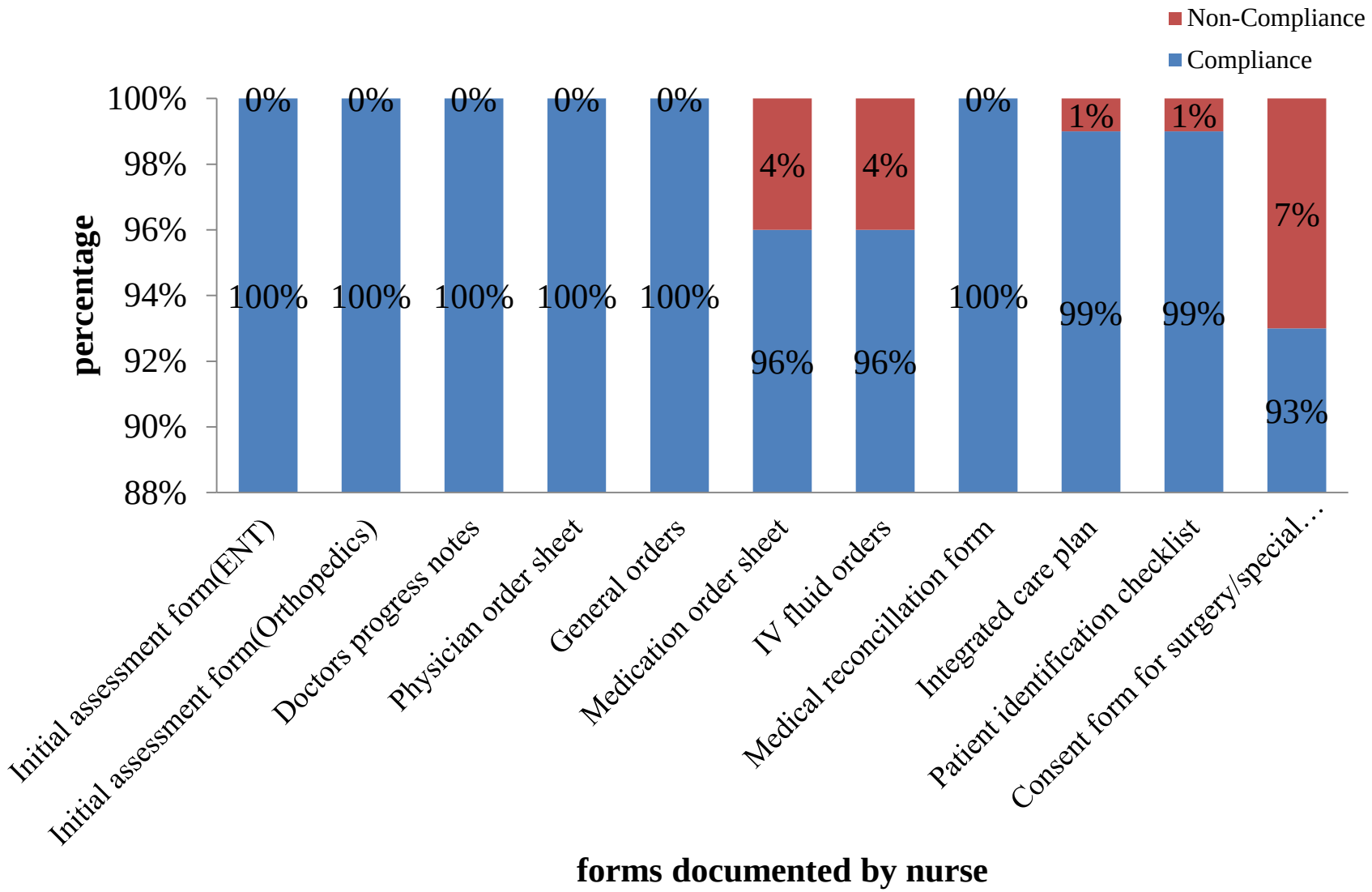
Initial assessment form( endoscopy), n=20

Initial assessment form (paediatrics), n=20

Initial assessment form(cardiology),n=20

Initial assessment form(medicine), n=40

Initial assessment form(opthalmology), n=10




**Graph 2(b)-Graphical representation of the total compliance percentage of all forms which was being documented by nurse:-**

Initial assessment form(ENT), n=20

Initial assessment form(orthopedics), n=13

Doctors progress notes, n=183

Physician orders sheet, n=183

General orders, n=183

Medication order sheet, n= 183

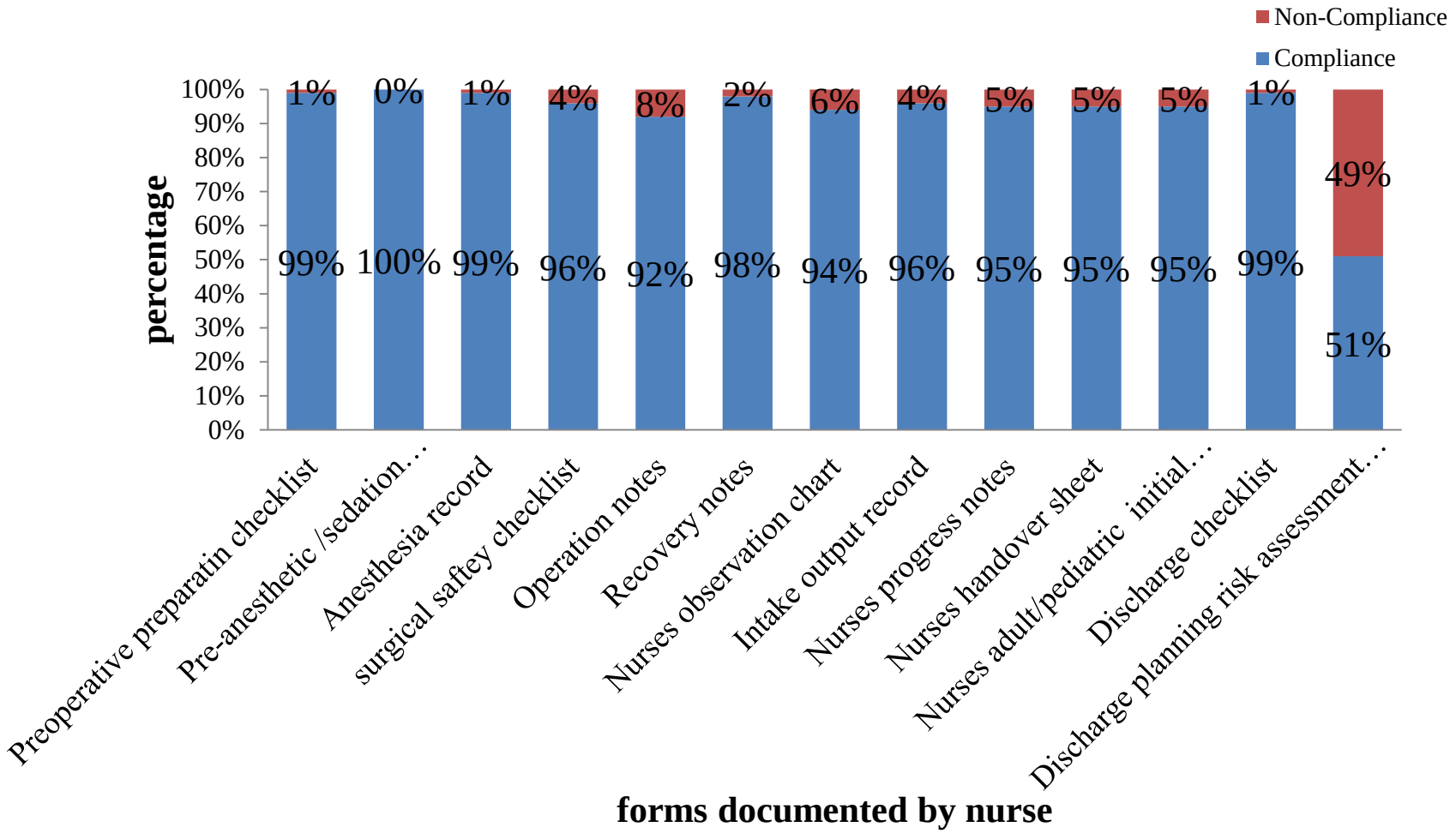
IV fluid orders, n= 183

Medical reconciliation form, n=183

Integrated care plan, n =183

Patient identification checklist, n=183

Pre-anesthetic/sedation/PAC form, n=70




**Graph 2(c)-Graphical representation of the total compliance percentage of all forms which was being documented by nurse:-**

Preoperative preparation checklist, n=70

Pre-anesthetic /sedation evaluation, n= 70

Anaesthesia record, n=111

Surgical safety checklist, n=69

Operation notes, n=75

Recovery notes, n=75

Nurses observation chart, n=181

Intake output record, n=135

Nurses progress notes, n=183

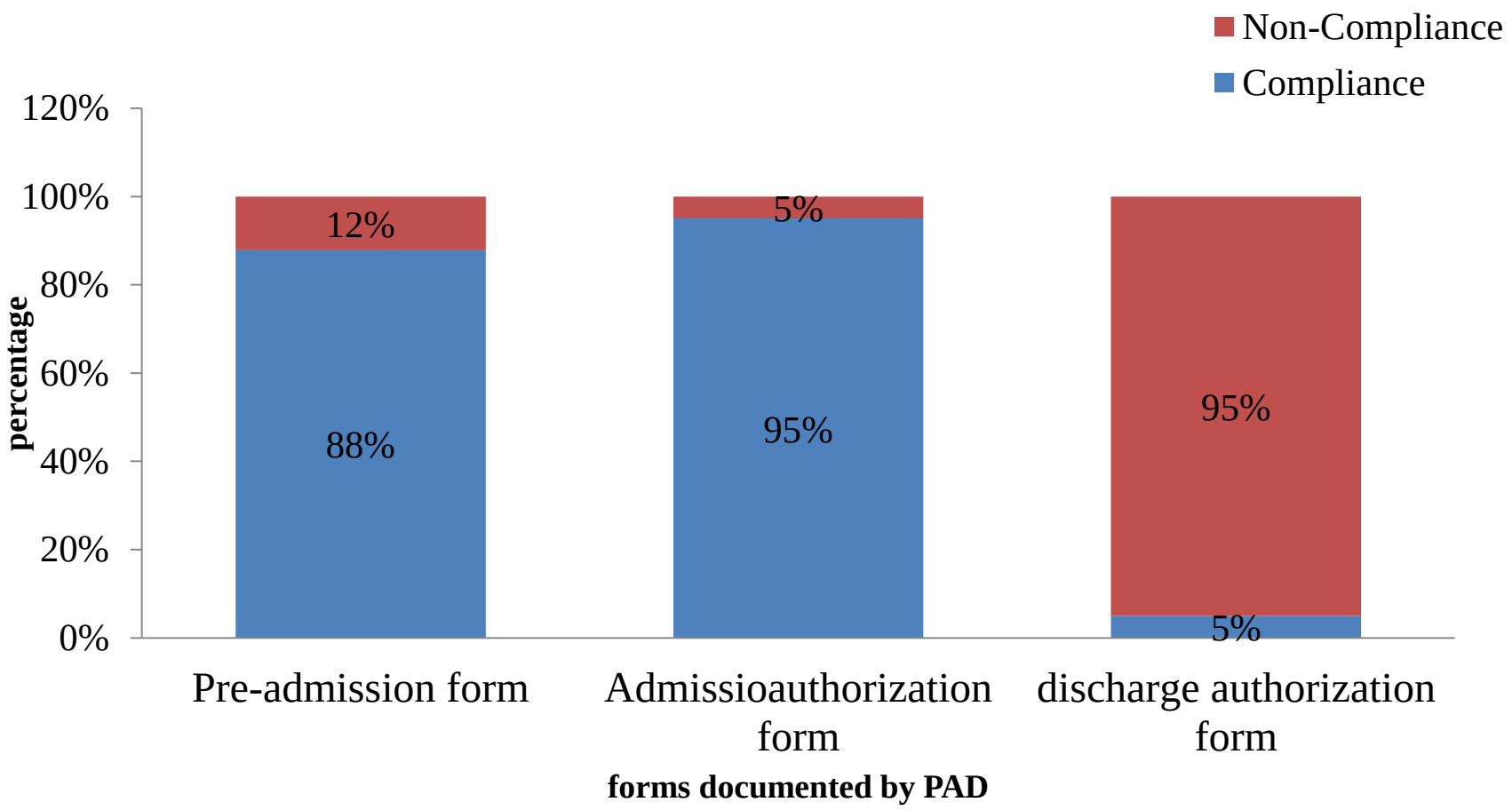
Discharge summary, n=183

Nurses handover sheet, n=183

Nurses pediatrics/adult initial assessment form, n=183

Discharge planning risk assessment, n=183

Discharge checklist, n=183

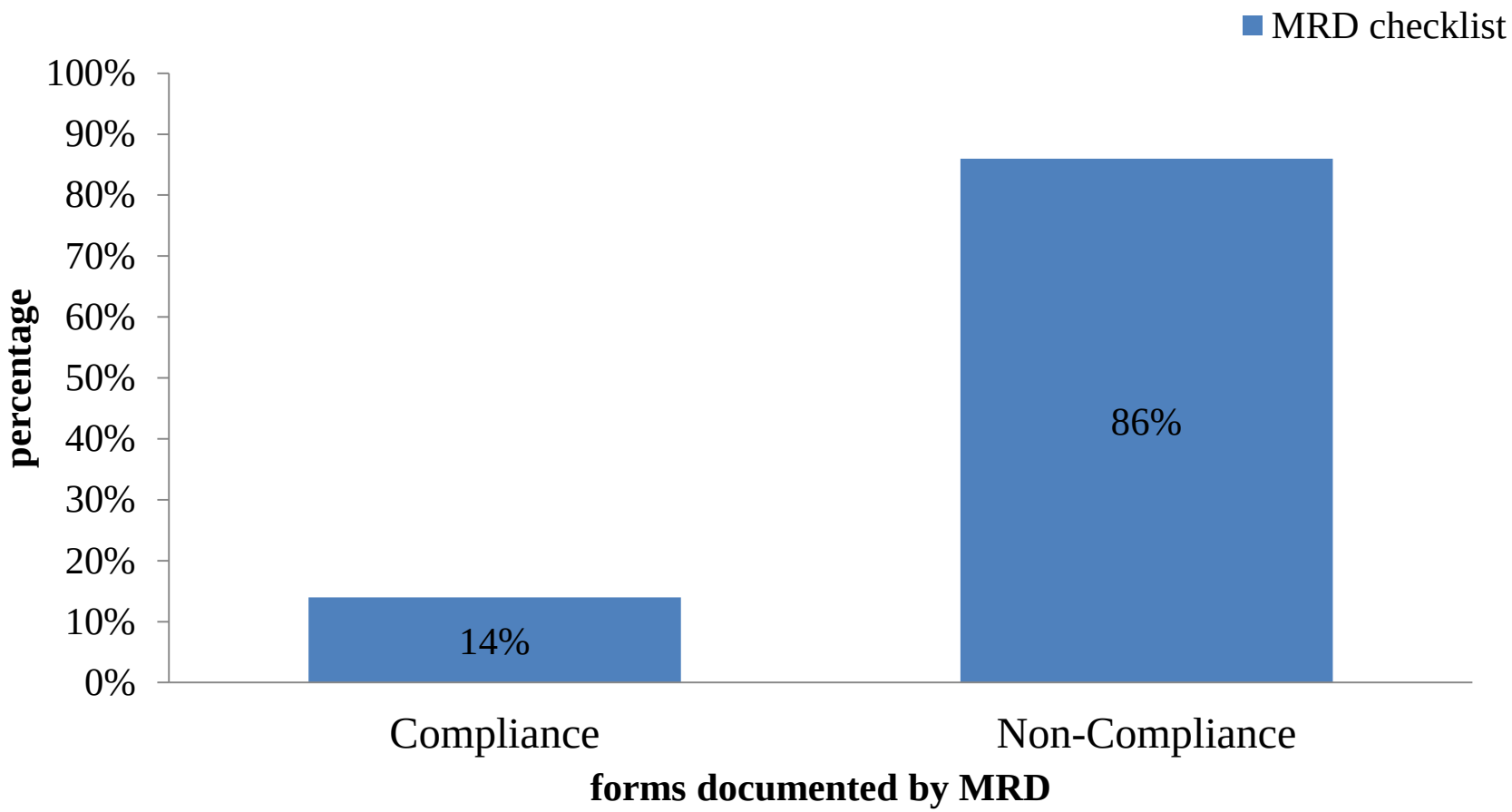



**Graph 3-Total compliance percentage of all forms based on parameters, which was being documented by PAD :-**

Pre-admission form, n=183

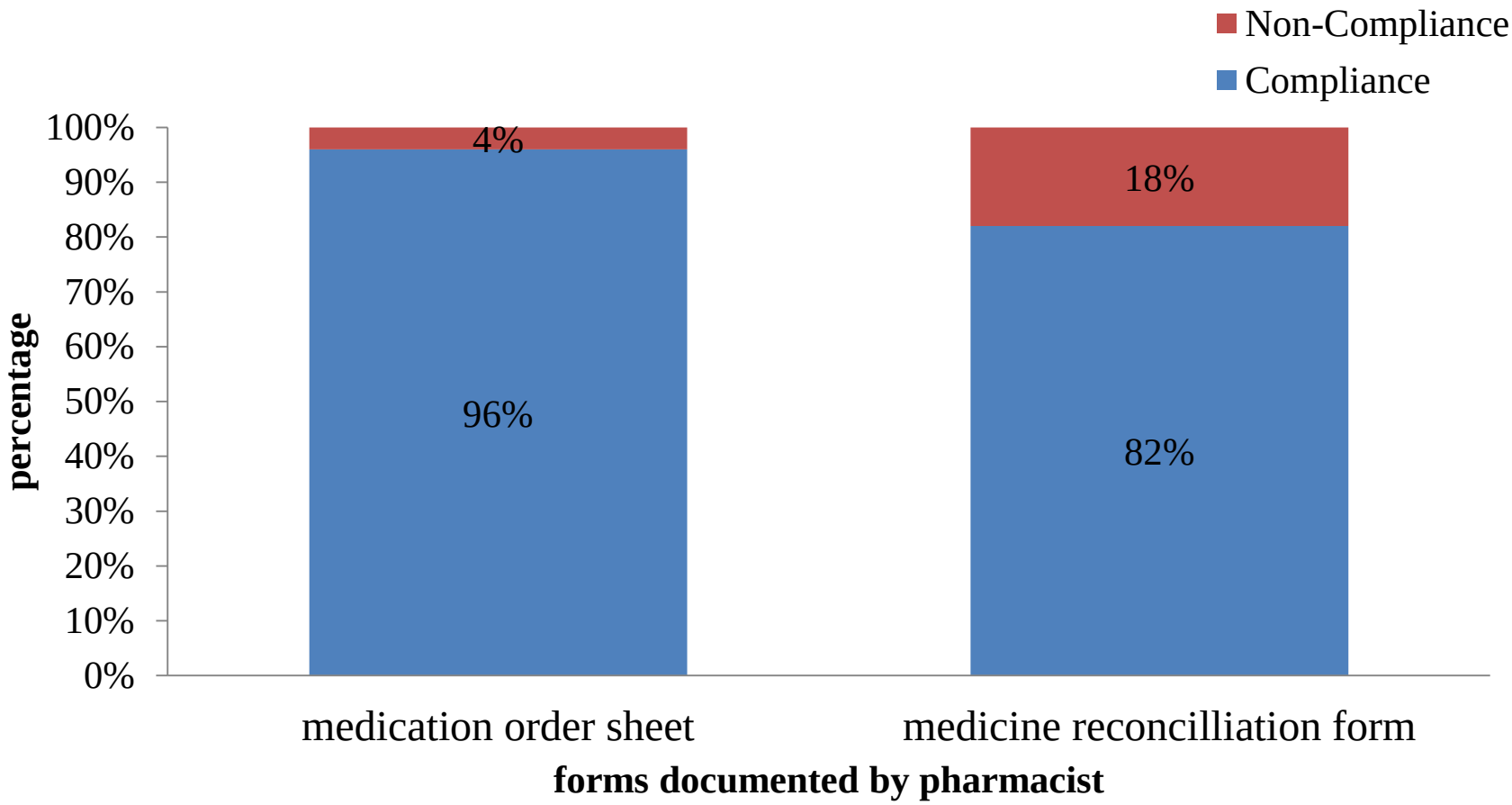
Admission-authorization form, n=183

Discharge authorization form, n= 174




**Graph 4-Total compliance percentage of all forms based on parameters, which was being documented by MRD :-**

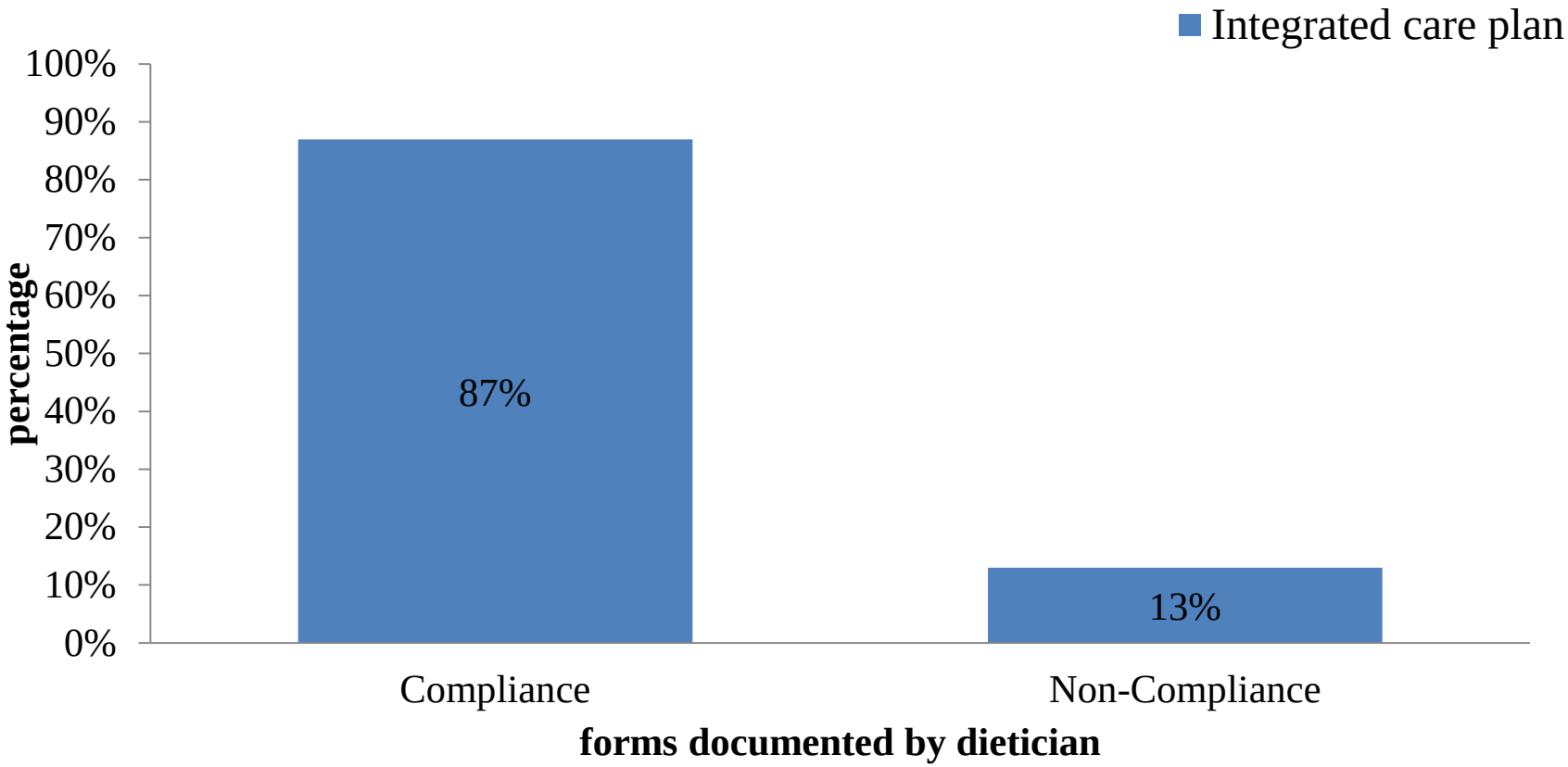
MRD checklist, n=183




**Graph 5- Total compliance percentage of all forms based on parameters, which was being documented by Pharmacist:-**

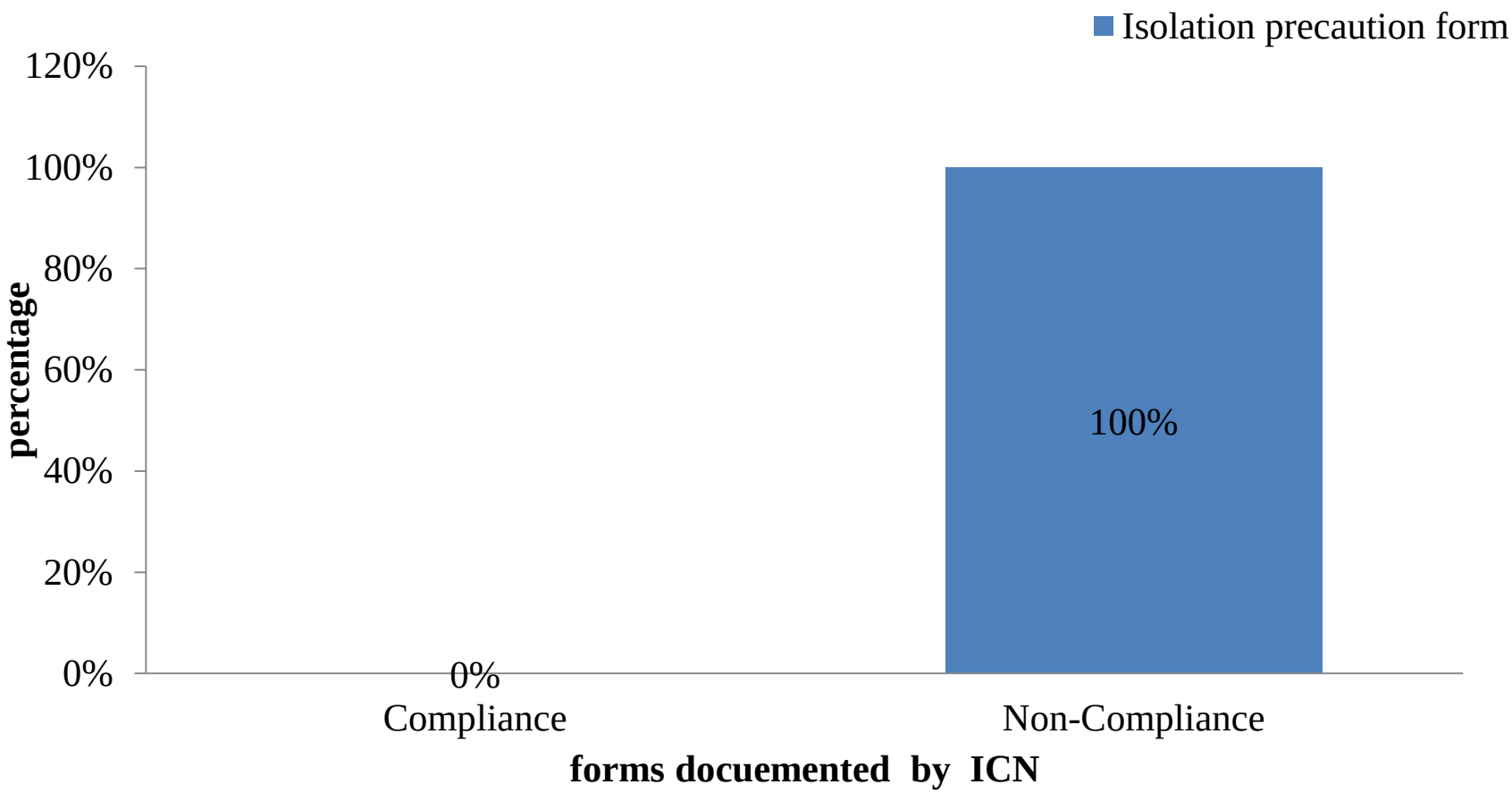
Medication order sheet, n=183

Medicine reconciliation form, n=183



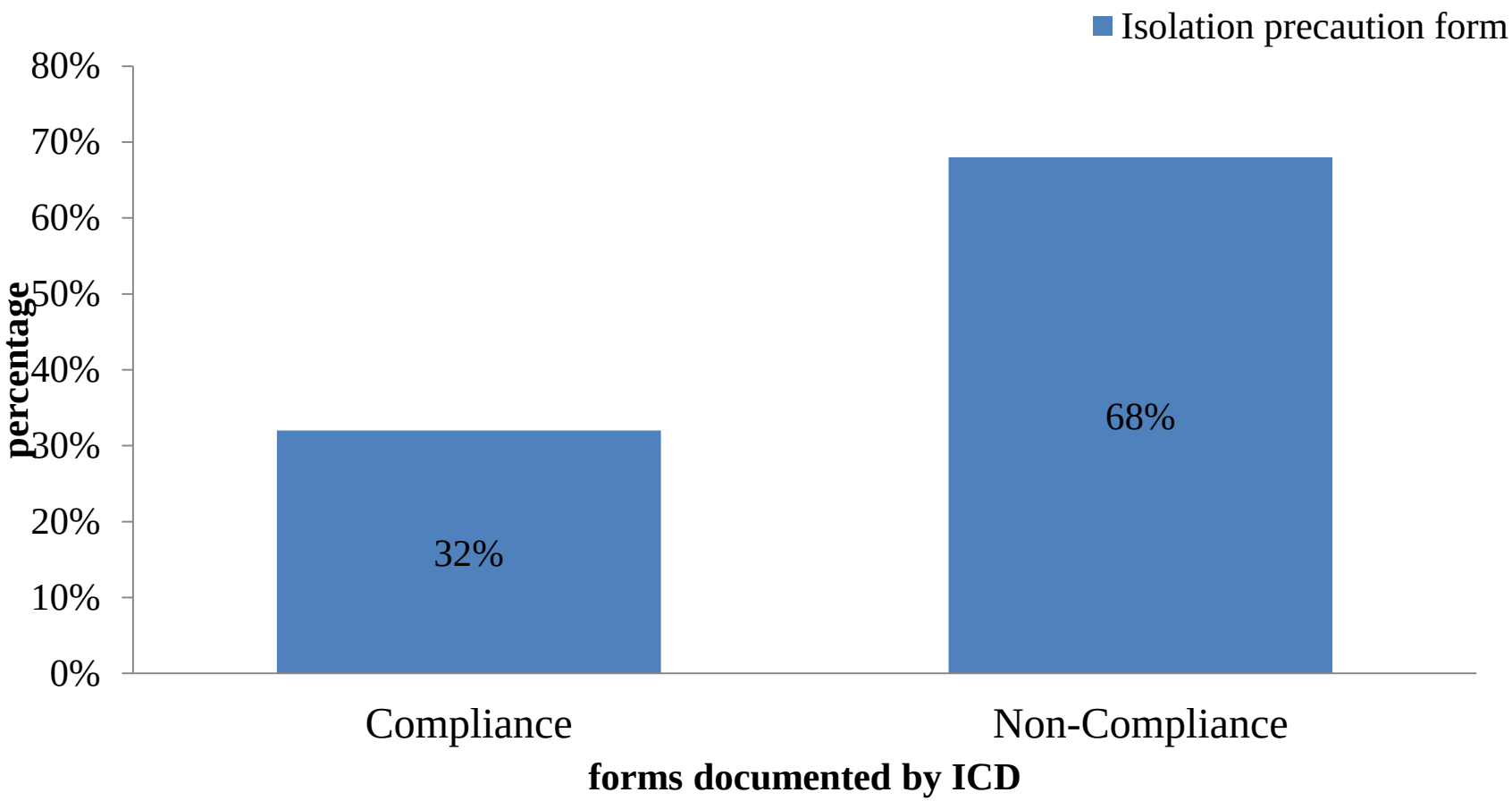

**Graph 6- Total compliance percentage of all forms which was being documented by Dietician :-**

Integrated care plan, n=183




**Graph 7-Total compliance percentage of forms based on parameters, which was being documented by ICN:-**

Isolation precaution form, n=22

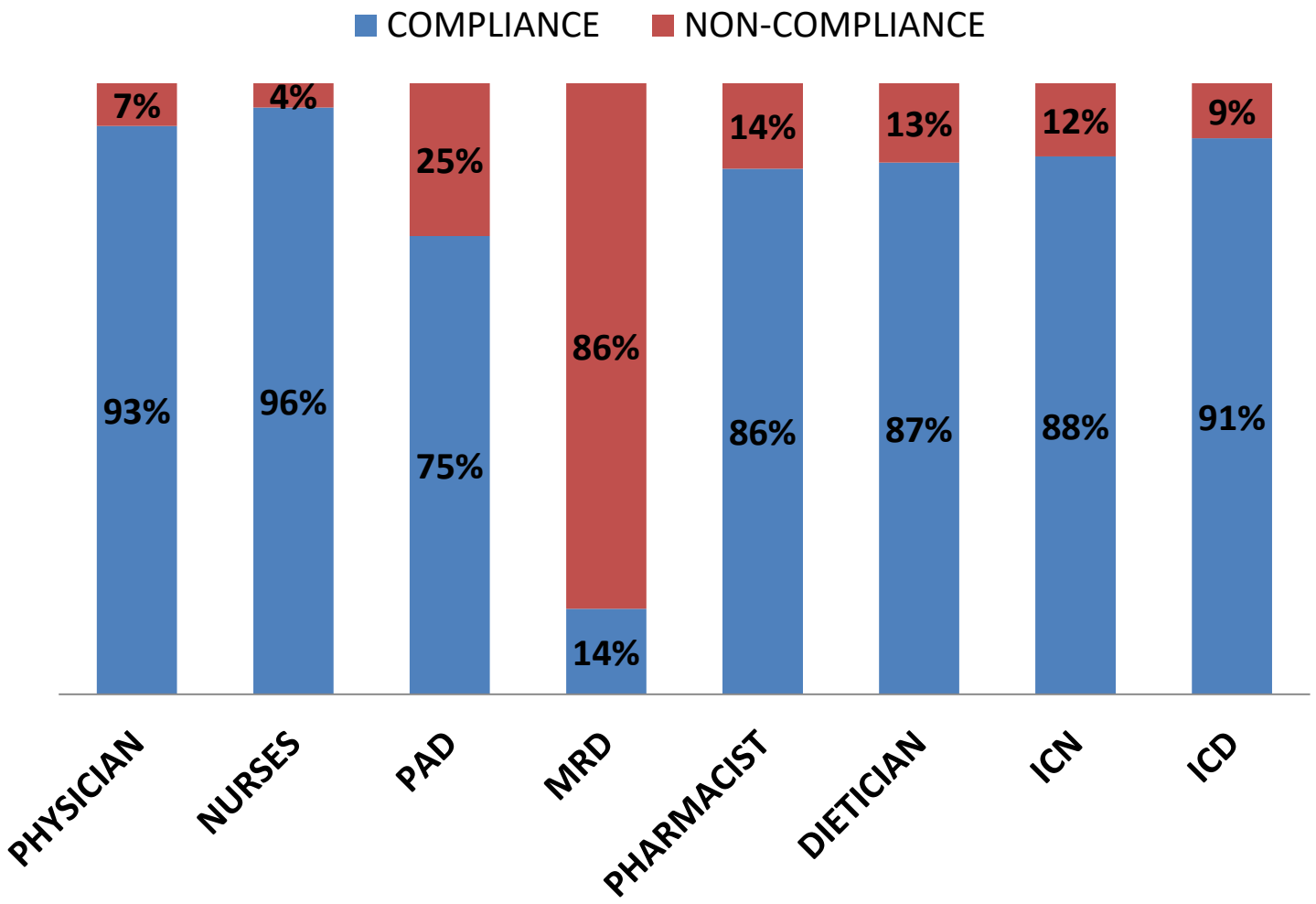



**Graph 8- Total compliance percentage of all forms based on parameters which was documented by ICD:-**

Isolation precaution form, n=22

| | PHYSICIAN | NURSES | PAD | MRD | PHARMACIST | DIETICIAN | ICN | ICD |
|---|---|---|---|---|---|---|---|---|
| COMPLIANCE | 93% | 96% | 75% | 14% | 86% | 87% | 0% | 32% |
| NON-COMPLIANCE | 7% | 4% | 25% | 86% | 14% | 13% | 100 % | 68% |

**Table 1 The total compliance of inpatient medical record documentation based on parameters by all the clinical and non-clinical staff involved in the documentation.**




**Graph 9- Total compliance percentage of all forms based on parameters, which was being documented by all (clinical and non-clinical staffs) :-**

## Analyze Phase

- Identified the gaps (i.e.) the errors/deficiencies/findings in the inpatient medical record documentation of its current performance in with comparison with the goal performance.
- A brainstorming session was held with the clinical and non-clinical staff engaged in the documentation of medical records and a root cause analysis (Fish bone analysis of reducing the IP medical record documentation error is prepared).Figure-1
- In the define phase, the key output variables (KOVs) were identified as reducing/improving the documentation error in inpatient medical records. Thus the analyze phase involves developing a list of key input variables (KIVs) or finding the number of solutions/initiatives on the basis of their effect with the “KOVs”. The “KIV” are selected on the basis of how these variables can improve over all compliance of the “KOV”. Table-2

**Analyze Phase**

- The “KIVs” was selected using a cause-and-effect matrix related to reducing the compliance percentage of documentation error in the inpatient medical record; the C&E matrix will be selected as analysis method to open up possibilities for improving the quality of documentation of inpatient medical records.
- A list of possible initiatives and activities related to improving the quality of documentation of inpatient medical records where taken and on the basis of importance the rating is done on scale of (1–10, where 10 being rated as highest importance to the improve documentation error). After identifying the initiatives or activities a list of possible changes or improvements to the issues was identified.)

- In the next step correlations was established between the factors needed to improve the documentation error of inpatient medical records and the proposed change/initiatives were estimated.
- If perceived that the changes had a high impact on the factors, a high correlation was assigned. For example, for Improving the knowledge of staffs (clinical & non-clinical) regarding documentation & its importance and it was concluded that Aggressive training /awareness /knowledge enhancing program for documentation will help cater to this improvement, a correlation of > 9 will be assigned.
- On the other hand, if a change would not affect an improvement, low correlations were estimated. For example, by Inclusion & improvement of patients/clinical/non-clinical staff in self-review of documentation still the overall improvement is not taking place. Therefore, a correlation of > 1 will be assigned.

# Root Cause Analysis
# Causes Of the Documentation Error In The Inpatient Medical Records

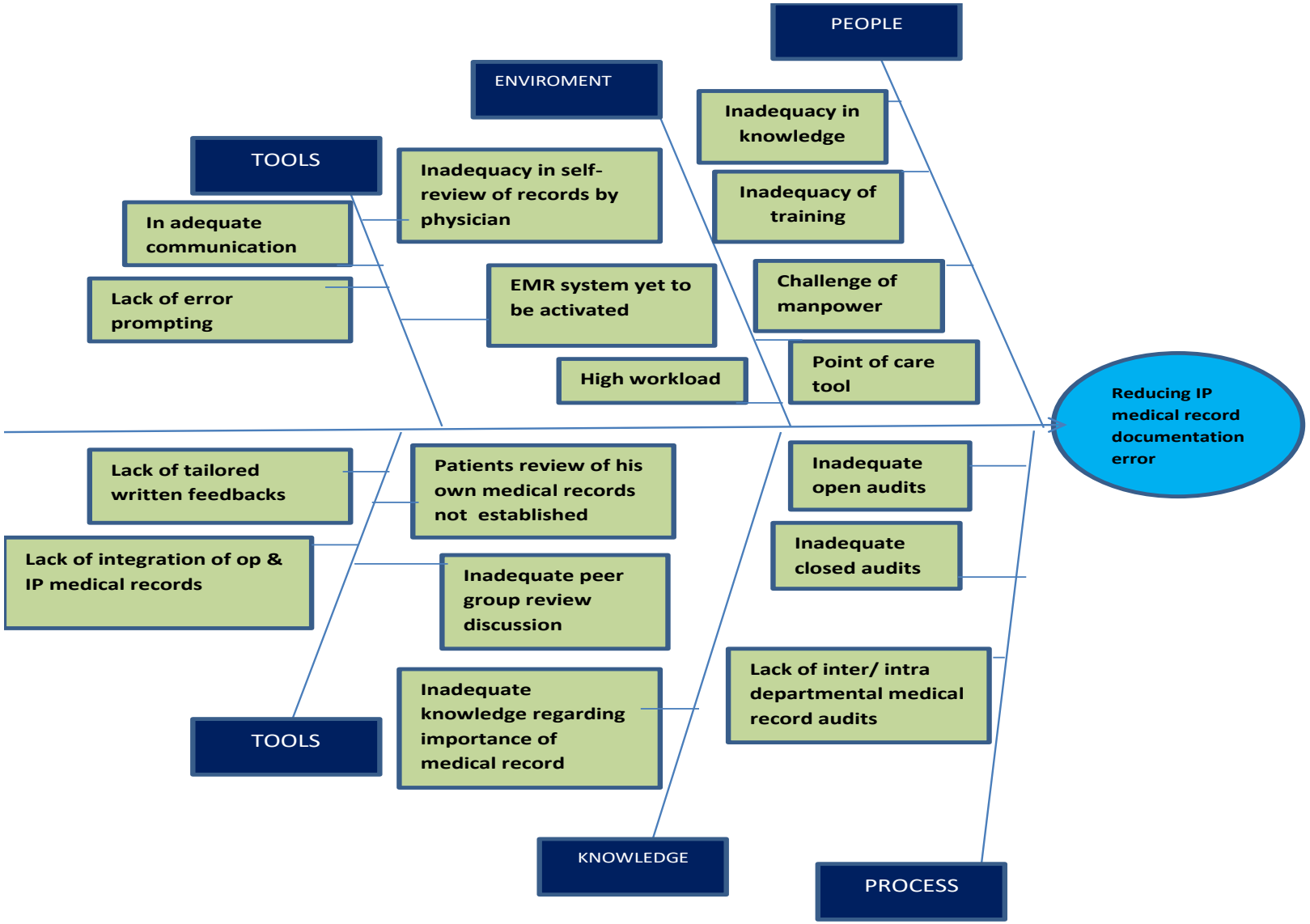



**Figure 1:- Fish bone analysis for reducing the IP medical record documentation error**

# Table 2- cause and effect matrix

| | s.no | Process inputs(initiatives or activities)→ | Aggressive training /awareness /knowledge enhancing program for documentation | Open audits | Closed audits | Reducing work load(new GP,nurses etc) | Peer group review(case discussions) | Enchancing IT infrastructure( EMR,Online portal,softwares,point of care tools etc) | Motivating to openess to discuss/suggestion |
|---|---|---|---|---|---|---|---|---|---|
| RATING ON BASIS OF IMPORTANCE | | Process outputs (what we want to Improve)↓ | | | | | | | |
| 10 | 1 | Improving the knowledge of staffs (clinical & non-clinical)regarding documentation & its importance | 9 | 9 | 9 | 0 | 9 | 9 | 9 |
| 6 | 2 | Improving the shortage of manpower | 3 | 0 | 0 | 9 | 0 | 9 | 3 |
| 7 | 3 | Improving technical competency | 3 | 0 | 0 | 1 | 0 | 3 | 1 |
| 5 | 4 | Improving inter/ intra departental commmunication mechanism | 3 | 1 | 1 | 3 | 3 | 9 | 9 |
| 4 | 5 | Improving the feedback providing/receving mechanism | 3 | 9 | 9 | 1 | 9 | 9 | 9 |
| 3 | 6 | Inclusion & improvement of patients/clinical/non-clinical staff in self review of documentation | 1 | 3 | 3 | 0 | 1 | 9 | 3 |
| 8 | 7 | Timely corrections | 9 | 9 | 9 | 9 | 9 | 9 | 1 |
| 9 | 8 | Improving the auditing mechanism for documentation | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| | | Total | 309 | 293 | 293 | 233 | 297 | 426 | 294 |
| | | Impact/Implementation score | 1 | 2 | 2 | 3 | 2 | 1 | 2 |

**Correlation rating:**

- > 0 = the process input is not correlated to process output.
- > 1 = the process input is remotely correlated to process output
- > 3 = the process input is moderately correlated to process output
- > 9 = the process input is direct and strongly correlated to process output

| | Impact | |
|---|---|---|
| Implement | High | Low |
| Easy | 1 | 2 |
| Hard | 3 | 4 |

1= Top priority, immediate attention
2= Complete when convenient
3= Long term objective, need to keep it persistently active
4= Low priority, shelve until all other options are completed

**Gap Analysis of the Process:**

To access the areas of improvement in the quality of inpatient medical records documentation gap analysis is done.

The following points where considered as gaps for documentation error, which are the following:

- Inadequacy of knowledge / awareness of staffs (clinical & non-clinical) regarding documentation & its vital connection with legal aspects.
- Unaggressive training sessions and inability to maintain the previously held training session’s persistently.
- Challenges of manpower which is leading to workload.
- Infrequent open, closed and tracer audits by quality team which is also acting as a contributing factor in negligence / ignorance from staff in documentation.

- Inattentiveness by staff & lack of responsibility.
- Timely corrections of audited medical records not done by the responsible staff.
- Lack of inter & intra departmental medical record documentation.
- Lack of communication patterns between staffs, for correcting the error when rectified.
- There is no EMR system being activated so far for the documentation of inpatient medical records also there is no error prompting mechanism followed technically.
- There is no online portal so far where the patient could review his own medical records and also there is no self-review mechanism of medical records done by physicians as well.
- Lack of rewards and recognition program for best medical record documentation.

**Improve Phase**

- In the improve phase, the results of the analyze phase are used to make tentative change in design. These recommendations are then piloted, confirmed, and institutionalized in the control phase.
- For example if the clinical staffs are not documenting what is being required than focused trainings identified to be conducted by emphasizing on the needs and importance of its documentation factors.
- Manpower increase by appointing GP, nurses was considered to solve problem for legible documentation in condition of workload, review of medical records done by senior physicians, preparing discharge summaries for timely dispatch with patient.
- The same way frequent open and closed audits was identified as step taken on a frequent basis as well as tracer audits which will empower the medical staff to understand its importance.
- The same way auditing committee should be established with experts who audit time to time comprising of quality staffs and experienced doctors.

- Technological intervention by implementing EMR system was considered to improve documentation for inpatient medical records.
- Statistically significant evidence that the new system improved key output variables (KOVs) was not available until the control phase. However, during the implementation/improvement phase the immediate anecdotal feedback was positive.
- Due to the limitation of time baseline data for the control phase could not be a part of the study. The documentation of the same is in process and will be recorded.

# Suggestions And Conclusions

**On the perspective of Staff**

- Focused training sessions focused on(Individual and grouped sessions on documentation)
- Tracer audits (to explain and rectify the documentation mistakes done by staff on spot/on the heat of moment when documentation is going on).
- Self-review of medical records by staffs (junior nurses should complete the documentation of patient's record whom they are attending and the same shall be reviewed by the nursing in charge) before sending it to MRD.
- If in MRD and quality closed audits its found that the medical record still have errors, responsible staff along with nursing in charge of respective department shall be called and discussed, if still the problem persist than on weekly meetings the errors shall be discussed in presence of nursing superintendent /medical director.
- Peer group discussions inter / intra department on medical records documentation involving Head of departments, experienced doctors, nursing superintendent, MRD staff and quality department staffs.

- For physicians whose documentation was full of errors and not legible, weekly meetings with medical director to discuss the cause and effect of it should be conducted with strict instructions.
- Recruiting new staffs to decrease the workload so that prompt documentation could be done.
- Conducting timely suggestions competition to improve the medical record documentation error shall be done, as this way the staffs will feel enthusiasm to be a part of process in improvement and this way we can get an overview of their understanding towards medical record documentation and new ideas can be in discussed and implemented, accordingly training sessions can be improvised.
- A new system should be introduced where the staffs (clinical and non-clinical) should maintain a record of the hospital number of cases along with the count of errors(names) which happened by them (which will come in front by self-review/ rechecking) & this case files along with the maintained records will be reviewed by quality team to analyze the improvements happening because of self-review.

**On The Perspective Of Documentation**

- Frequent Open inpatient medical record audits
- Frequent Closed inpatient medical record audits
- Trial runs of records (Inter / intra departmental inpatient medical record audits by staffs interchangeably)
- EMR system implementation for inpatient medical records
- Online portals where patient/relatives could review their own medical records during stay and could question based on their understanding and knowledge.
- Timely corrections after quality audits.
- Using bright colored stickers having a arrow mark in it or stickers used for denoting high risk and high alert medication in crash cart shall be sticked in essentially important sections where documentation is necessary and after documentation these stickers could be removed.
- Placing the sticker so that they are not obscured by other objects or documents.

- Empowering IT infrastructure to operate various tools for error prompting mechanism, for example- point of care tool, online portals for patients & staffs
- Changing the color of forms which is essentially needed to be documented in any condition, like admission and discharge record have colored format.
- For physicians, for example: wherever it is mandatory to put sign seal date and time those sections border color could be changes as an indication.
- Rewards and recognition program for better quality documentation

# Conclusion

- Documentation errors is one of the important factor to be considered when it comes on improving the quality of inpatient medical records, as it impacts directly on the efficiency to sustain the acquired accreditations, coordination and continuity of care, reinforces decision-making capacities, augments staff accountability and in achieving more accurate vital statistics. The quality of medical record is considered important to be in the setting of JCI, NABH and HAAD etc. according to its policies and guidelines. Each provider must meet a maximum of 100% compliance with medical record guidelines.

- Hence improving the quality of inpatient medical records documentation should be implemented, through this study improvement is targeted through
  - Open inpatient medical record audits
  - Closed inpatient medical record audits
  - Inter / intra departmental inpatient medical record audits
  - EMR system implementation for inpatient medical records
  - Timely corrections after quality audits
  - Online portals
  - Using bright colored stickers or stickers (crash cart)
  - Changing the color of forms
  - Empowering IT infrastructure

# Thank you