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Original Article

# Application of lean management after audit of Medical Records Department in a COVID19 dedicated center during the COVID pandemic

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ARTICLE INFO

*Article history:*
Received 21 December 2021
Accepted 26 April 2022
Available online xxx

*Keywords:*
Medical record department
Medical audit
Lean management
Medical records
Process improvement

ABSTRACT

*Background:* The Medical Record (MR) contains the information which is needed to plan, provide, and evaluate the care given to the individual. It also serves as a pivotal tool for communicating information to all the health personnel who manage the patient, and it contributes to the continuity of patient care. There is an unmet need of identifying and correcting the issues faced with MR and Medical Records Departments (MRDs) so that higher efficiency can be achieved. This study was conducted to study the deficiencies and discrepancies found in MRD files during COVID management and to correlate the deficiencies with the facilities available and the workflow. Later Lean Management (LM) was applied to ensure compliance and efficiency in the system.

*Methods:* An observational study was done on the audit of COVID 19 patient files and facilities in the care centres. Process mapping was done. The data for LM were collected by brainstorming, observation, interview, and workflow review of several processes, values, number of wastes, and suggestions were documented the MRD staff.

*Results:* Area available was 400 $m^2$ which is adequate against the norm of 350 $m^2$. The existing staff of 30 was adequate as per norms. Deficiencies were observed in physical examination, history, radiology, and laboratory reports. The findings showed that the MRD units had 13 current processes, 26 wastes, and 10 values were identified. In addition, they were offered a total of 25 comments on eliminating the waste.

*Conclusion:* Staff and equipment were adequate. Recommendations include regular staff training and usage of electronic medical records, focus on deficiency check by specific MRD staff on regular basis monitored by the administration and supported by the medical audit committee. The study also recommends that suggestions applied after LM should be implemented in letter and spirit and a repeat study of LM is advisable after regular intervals to maintain the quality standards and to maintain or further improve the efficiency.

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https://doi.org/10.1016/j.mjafi.2022.04.015

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Please cite this article as: Garg R et al., Application of lean management after audit of Medical Records Department in a COVID19 dedicated center during the COVID pandemic, Medical Journal Armed Forces India, https://doi.org/10.1016/j.mjafi.2022.04.015

## Introduction

The medical record (MR) is a document of paramount importance and defined as a scientific, clinical, legal, and administrative document relating to a patient's treatment sequence, or in other words his/her "journey in course of illness" in the healthcare setup. This document helps to establish the chain of events or the course of diagnosis and management of the ailments and the end results.[1,2] These MRs play a pivotal role in various epidemiological studies and research work also; therefore, they assume importance and hence are a valued asset. In bigger health care establishments, often the MR and medical records department (MRD) is neglected and not much importance is given to them. Though, the unmet need of identifying and correcting the issues faced with MR and MRDs to achieve efficiency is always observed; however, in most scenarios, only a medical audit is performed in healthcare organizations.[3] Similarly, there is also lack of published studies where researchers have performed audits in operational domains. Hence this study was performed, where process mapping (using lean management (LM)) was done primarily to ensure the overall efficiency and efficacy in MRD.

Lean management (LM) is a management tool which helps in achieving customer satisfaction by eliminating the waste and improving the processes.[4] A process will be effective only when properly selected, designed, and executed.[5] Lean eliminates waste by taking out unnecessary processes and redirecting human efforts toward value-added operations.[6] Womack et al, claimed that better products produced by better processes should lead to happier customers.[7] LM is defined as an approach to managing an organization that supports the concept of continuous improvement, a long-term approach to work that systematically seeks to achieve small, incremental changes in processes to improve efficiency and quality.[7] LM is a way of thinking about creating needed value with fewer resources and less waste. LM is a practice consisting of continuous experimentation to achieve a perfect value with zero-waste. In the hospital industry, LM is useful for clinicians, administrators, and hospital managers to guide workers in the improvement of workflow and productivity.[4,7] Process mapping is **a tool that graphically shows the inputs, actions, and outputs of a process in a clear, step-by-step map of the process**. Process mapping specifies the tasks within the function and also shows the interaction between functions or departments.[6,7] In LM, "waste" is commonly defined as **any action that does not add value to the customer**. Essentially, waste is any unnecessary step in a process that does not benefit the user; hence it is always desirable to remove wastes from the process. Some of the common wastes are **Inventory, Motion, Over-Processing, Overproduction, Waiting, Transport, Defects, and Human potential.**

## Aim of the study

The aim of this study was to perform a process audit on the MRD of a super specialty teaching hospital especially during the COVID19 pandemic, to understand the deficiencies found in the documentation of patients' MR. Later, LM was introduced in the MRD to improve the work process. It was done by first identifying the processes and wastes and then by eliminating these wastes and thus improving the processes of the MRD.

The reason for performing these audits during the pandemic was based on the rationale that the department was overwhelmed with work superadded with staff shortages/high attrition/inexperienced new team members, and a lot of complaints were being received by the hospital administration. Also, the hospital administration wanted to have a comparison of the completeness of MRD files of patients with COVID19 and non-COVID19.

## Objectives of the study

The following objectives were derived for the study by the research team.

1. To identify deficiencies in MR of patients (both COVID19 positive and COVID19 negative) being treated in the health care facility during the COVID pandemic and to scrutinize the MR and processes for process audit.
2. If any lacunae were identified during the audit, then the same will be rectified for ensuring efficiency for the department, by involving the principles of LM and repeated training of the staff.

## Materials and methods

This study was performed in a teaching hospital attached to a medical college. An audit was performed to understand the lacunae in MR and to understand the challenges faced by the MRD. Further, the clients (internal and external) were identified, their challenges were evaluated, and then the flow process was mapped to understand the wastages.

This study was undertaken in the MRD of 900 bedded tertiary care hospital attached to a medical college, out of which 300 beds were reserved exclusively for patients with COVID19. The data for LM were collected by brainstorming, observation, interview, and workflow review of the MRD staff.

A fast facility audit was also conducted as a preliminary study to understand the existing infrastructure which includes inspection of the facility, security, and safety of the area from theft, unauthorized access, and natural or manmade calamities like floods, termites, fire, and so on. After the building management and facility management inspection was done, stress was given to the staffing pattern, workload evaluation and processes followed during the document preservation and indexing/archiving. The broad division of MRD was done into **Admission, Collection, Coding, Statistics, and Archiving**, along which the process mapping was performed by the research team. The process map has been demonstrated in Fig. 1.

After the process mapping, the evaluation of existing Standard operating procedure (SOPs), checklists, and grievance handling mechanism by the hospital administration was scrutinized. Also, feedback collected previously by the quality department and suggestions for better functionality and

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further augmentation of the MRD were taken from the faculty members, visitors, and other stakeholders including residents and patients.

A list of prerequisites required for a MR in a MRD was prepared considering the MCI norms, norms of the Ethical committees at AIIMS (New Delhi) and PGI Chandigarh, JCI, NABH, and other quality standards. Further 600 MRs of patients with COVID19 positive admitted from September 2020 to April 2021 and a similar number of 600 files from patients with COVID19 negative were taken for the audit process. The criteria of file selection were based on a random lottery system, where all files from the date of admission were numbered, and with a lottery number, a random file was chosen for the audit.

The study was presented before the ethical committee of the institute and approval and clearance were obtained for the study and publishing of the results. Patient consent for inclusion in study was also obtained.

## Results and discussion

### *Physical facilities: space and facility Management*

The total area of MRD was found to be nearly 4000 square feet (400 Sqm), divided into office (1400 square feet) and storage area (2600 square feet). The total area available in the MRD was 400 Sqm which is more than the statutory requirements of 350 Sqm (according to minimum standard requirements for the Medical College for 250 admissions annually, MCI regulations 1999).[8,9]

### *Manpower*

In total, 30 staff members were working in the department, out of which 10 were earmarked for the dedicated COVID care center. They were allotted sub-departments of receipt of files, assembling of documents, coding as per International Classification of Diseases (ICD) norms, indexing of files, filing, storage in compactors, and retrieval of case sheets. For coding the ICD, ICD-10-CM was being followed. 10 percent of the staff members had resigned during the first wave of COVID19 pandemic and three new interns were hired in their place.

### *Staff optimization and COVID safety protocols*

In addition to the medico-legal cases (MLC) of which the numbers were quite less, death registration and certificates divisions were bundled together to overcome the staff constrain. Daily Census updating to various nodal agencies, Deficiency checklist team, and mortality meetings coordination was done by the Medical Records Officer (MRO) and Jr MRO. Hospital statistics and all MR were monitored by MRO and the office of the Medical Superintendent along with residents and faculty in charge from the department of Hospital administration.

### *Workflow*

The MR of a patient started with the entry of the demographic data at registration counters. After diagnostics and consultation, the patient was admitted. Only in some serious cases, the admission to the Intensive care units/or wards from emergency was done prior to carrying out necessary investigations. But in those cases also owing to the centralized registration facility, the process flow was found to be uniform.

It was observed that once the patient is admitted in the hospital, the patient usually undergoes various other tests or treatment modalities and therapies, thus the MR gets voluminous with numerous sheets and charts. After the discharge, the patient's MRs were sent to the MRD. In case of an uneventful recovery, the patient discharge sheet prepared by the treating doctor was attached to the file and in case of a death, the death certificate was provided after registration by the MRD.

Once the MR are received in the MRD, assembling and deficiency checks are carried out and incomplete MR are sent for review to the respective clinical departments. Once the MR are verified for correctness, then coding and indexing is done and the records are sent for filing and storage. During coding if any discrepancies are found in the files, then they were again sent to the department of hospital administration for completion.

During the audit of files retrieved from the storage compactors, following deficiencies were observed which have been tabulated in Tables 1 and 2.

### *Data analysis and interpretation*

During our study, it was found that on an average, 70% of the files had complete **examination records**, whereas, in 30% of the files, **examination records** were either incomplete or missing. Number of files with incomplete records was more in patients with COVID19 positive (59%) than patients with COVID19 negative, where only 19% of the files were found to be incomplete. This can be due to rush of the patients and poor staff patient ratios in wards/ICU. In a study conducted by Chamisa et al,[10] it is documented that 61% of the files had **examination details**. In another study done by Osei-Kufuor et al,[11] it was revealed that 61% had no detailed **examination reports**.

In 80% of COVID positive and 85% of Covid negative files, case sheets audited by our team had availability of **diagnostic records** against 65.3% documented by Arotiba et al.[12]

Further, on examining and analyzing further, it was observed that 79% of **treatment details/progress reports** were mentioned and completed in every form as per the ethical committee of MCI against 51% found by Gleeson et al,[13] in their studies where as Arotiba et al[12] study had quoted 66.5% of the MR having progress reports. The set criteria of bold letters, signatures with date, time, and use of generic medication were looked for in the prescriptions audit. The number was similar in patients with both COVID19 positive and COVID19 negative, probably to the fact that residents were trained and oriented toward updating and completeness of files.

**Discharge summary** of the patients was found attached in 98% of the MRs in COVID positive cases and around 95% in COVID negative cases. However, as per the study by Arotiba

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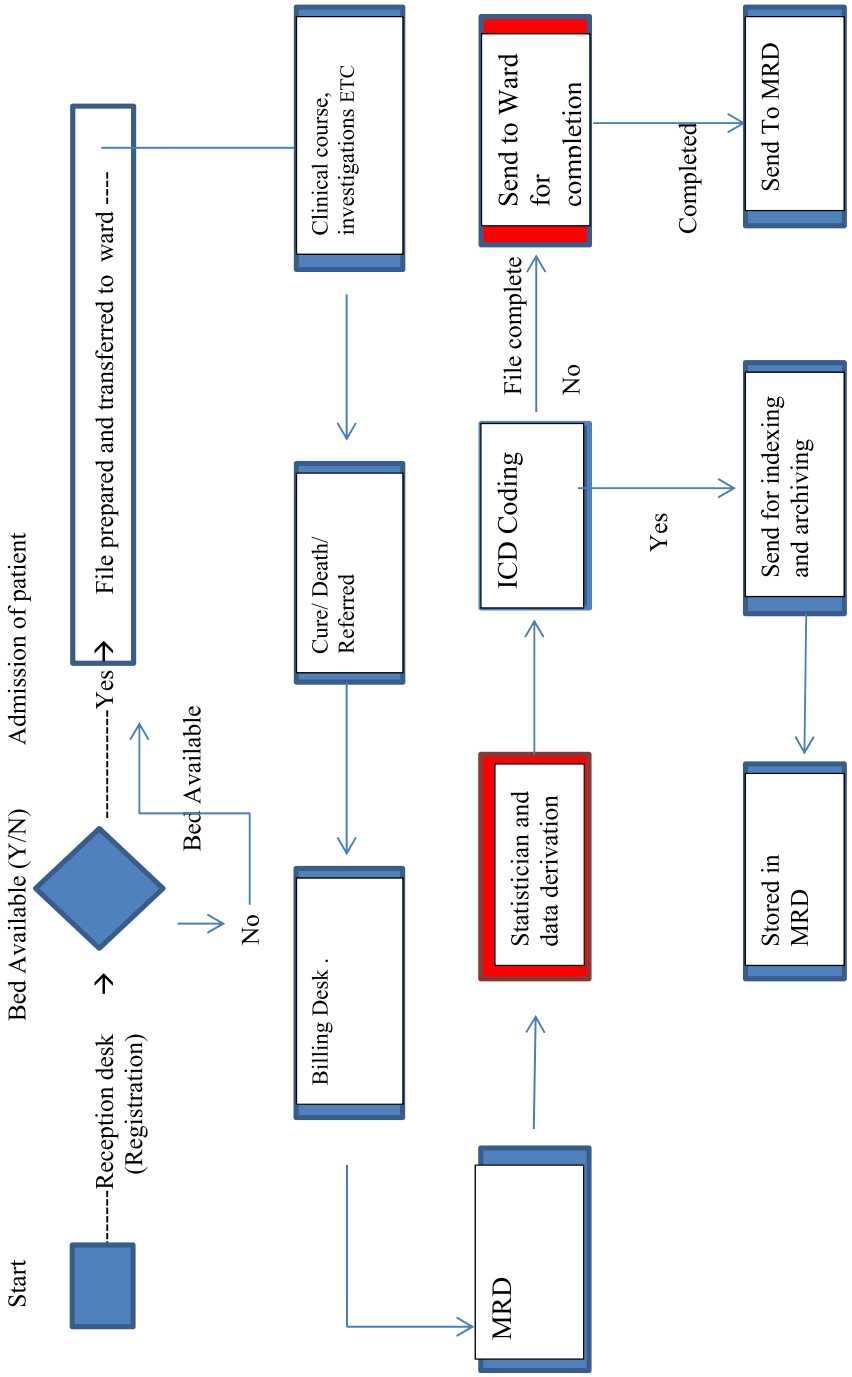


**Fig. 1 – Depicting the process flow of MRD (the red indicate areas with errors during the mapping).**

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**Table 1 – Deficiency check list in the files of patients who were COVID19 positive.**

| S. no | Availability of record forms | Yes (%) | Percentages |
|---|---|---|---|
| 1 | Admission record forms | 594 | 99% |
| 2 | Discharge summary | 558 | 93% |
| 3 | History sheet | 511 | 85% |
| 4 | Physical examination sheet | 354 | 70% |
| 5 | Doctors order form | 498 | 83% |
| 6 | Doctors progress notes | 475 | 79% |
| 7 | Laboratory reports | 480 | 63% |
| 8 | Radiology reports | 482 | 60% |
| 9 | Nurses/TPR chart | 540 | 90% |
| 10 | Intake/output chart | 582 | 97% |
| 11 | Consent form | 585 | 97.5% |
| 12 | Anesthesia record/intubation records | 572 | 95.3% |
| 13 | Cause of death/death certificate/discharge summary | 588 | 98% |

**Table 2 – Deficiency check list in the files of patients who were COVID19 negative.**

| S. no | Availability of record forms | Yes (%) | Percentages |
|---|---|---|---|
| 1 | Admission record forms | 588 | 98% |
| 2 | Discharge summary | 570 | 95% |
| 3 | History sheet | 480 | 80% |
| 4 | Physical examination sheet | 486 | 81% |
| 5 | Doctors order form | 510 | 85% |
| 6 | Doctors progress notes | 474 | 79% |
| 7 | Laboratory reports | 510 | 85% |
| 8 | Radiology reports | 509 | 85% |
| 9 | Nurses/TPR chart | 552 | 92% |
| 10 | Intake/output chart | 571 | 95% |
| 11 | Consent form | 594 | 99% |
| 12 | Anesthesia record/intubation records | 576 | 96% |
| 13 | Cause of death/death certificate/discharge summary | 570 | 95% |

et al, it was found to be only 29%.[12] The variation of discharge summaries patients with COVID19 positive and COVID19 negative can be attributed to the strict reporting of death and discharges to the nodal agencies, in COVID19 positive cases.

Consent for intubation or any medical procedure like Foleys/central lines was obtained from 97% of the patients as per the MR in our present study in patients with COVID19 positive, and 99% in patients with COVID19 negative, whereas on the other hand, it was 63% in the studies conducted previously by Arotiba et al.[12]

### *Process mapping and LM application in MRD*

During the LM session, waste and valuable activities were determined and suggestions were proposed to remove the wastes (Tables 1 and 2). The summary has been summarized in Table 3 where several processes, values, number of waste, and suggestions were documented.

### *Waste processes identified at the MRD were*

- Lack/incomplete/repetition of Diagnostic reports (which includes missing Lab reports/incomplete radiology reports) (Time, waiting, and information waste)
- Lack of Diagnosis/history sheet/Progress sheet in 30% sheets (defects, information waste, data safety, and data errors)
- Repeated calculations done by the statisticians after completion of the file where the values are different from the ones calculated earlier (process waste)

**Table 3 – Number of processes, number of waste, and number of values identified and suggestions offered by the research team.**

| | Number of processes | No of wastes | No of values | Suggestions |
|---|---|---|---|---|
| Admission | 1 | 7 | 4 | 2 |
| Collection and Coding | 9 | 3 | 1 | 10 |
| Statistics | 1 | 3 | 1 | 8 |
| Archiving and retrieval | 2 | 13 | 5 | 5 |
| Total | 13 | 26 | 10 | 29 |

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- Lack of complete documentation causing improper coding (information waste, data safety, and data errors)
- Wrong coding due to wrong data entry in MR (information waste, data safety, and data errors)
- No designated person for handling MR in wards or their delivery to MRD dept (physical environment waste—Transport waste)
- Wrong entry of demographic details at registration counter (information waste and data errors)
- Lack of unity and the presence of conflict among final diagnosis in the same record of a patient (information waste, data safety, and data errors)

### *Suggestions to eliminate waste processes at the MRD*

After understanding the wastes, 25 suggestions were proposed, out of which the important ones are as follows:-:

- In case of a missing diagnostic report (radiological, pathological, or biochemistry), instead of returning the file to the respective ward or the department, the MRD staff can print it from the hospital information system (HIS) and the same can be attached to the MR to complete the file.
- Receiving of MRs and sheets from various ward personnel should be stopped. Only a cadre of particularly authorized personnel should be allowed to submit these MR to MRD, and after depositing the MR, they should fill a logbook kept at the MRD.
- In general, any requisition to seek the MR should be presented via a formal application to hospital administration.
- The summary of incomplete files sent by any resident should be documented in their academic and personal files in the institute. The MRD should report their activities to the attending physicians, and the HODs.
- The errors or incompleteness of files can be discussed with the consultant during monthly meetings or yearly appraisal meetings.
- The statistics to be prepared by an automated process and with the help of data from HIS, not by manual entry and calculation.
- The correct and standard methods of documentation should be taught to residents in orientation class/lectures when they start their training in the hospitals. The accuracy of the documentation can be given extra marks/incentives in form of books or rebates.

After identifying the wastes, the processes were identified which were documented.

- In the indexing area, for record retrieval, the introduction of a uniform permission form, this would be signed by the unit head and then by the medical superintendent, before any archived record will be given for the research project
- Training and orientation for residents, doctors, and staff.
- MLC documents are to be labeled with a red stamp and are not to be issued to anyone except with the written approvals from hospital administration.
- Files whose copies have been provided to either relatives/authorities should have a note mentioning the same on the cover page or should be tagged.
- The forms which also include consent forms, should be made as uniform as possible.
- Diagnosis should be uniform and mentioned at the required places.
- No one other than the patient should be allowed to enter MRD. In case of the patient, his ID would suffice; in case of a relative, an authority letter should be made mandatory.

The wastes activities were identified and the process was redefined to improve the overall system.

The study reviewed MR of both patients with COVID19 positive and negative. As the hospital authorities were laying more stress on the management of patients with COVID because of high mortality and complications, it was hypothesized that the resident doctors and clinicians were more sensitized toward updating the MR of patients with COVID to avoid any litigations and medico-legal liabilities in future.

The MRs are being manually scavenged and analyzed, however, if the MR had been available in the digital format, the workload of audits could be reduced to a mere click of a button. Hence the digitalization and implementation of electronic MRs were suggested to reduce the requirement of time, space, and person.

Digital records can also be customized to close a bed status/patient file only when the records have been completed in every aspect hence reducing the need for physical audits. Thus a lot of manpower can be saved and a total quality management with quality assurance and quality control can be implemented.

Being a teaching hospital and a college, the infrastructure was as per the statuary provisions and norms, however, a record analyzing room, where clinicians can comfortably collect the data required for research purposes or epidemiological studies can be developed, thus in a way reducing or obliterating the need for physical movement of files.

## Conclusion

The efficiency of the MRD lies in complete and accurate record keeping of the patients. This can be achieved by a robust counter-check mechanism, of course with the support of all departments in the hospital, which can be monitored by the MRs officer and administration. Suggestions applied after LM should be implemented in letter and spirit and a repeat study of LM is advisable after regular intervals to maintain the quality standards and to maintain or further improve the efficiency.

Department-wise and specialty-wise audits are the need of the hour for future improvement in the quality of patient care and outcomes.

## Disclosure of competing interest

The authors have none to declare.

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