Turnaround Time of IP Pharmacy, Monitoring Medication Errors and Material Management of Central Store, OT Store and Pharmacy.

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Abstract: Medication turnaround time can be defined as the time in between when a medication indent is composed, either hand written or electronically recorded, and the time medications are delivered to the nursing unit. Medication error is defined as any preventable event that may lead to inappropriate medication usage or harm to patient while the medications are in the control of the health care professional.

The aim of the study is to assess the turnaround time in in-patient pharmacy, to identify the various types of medication errors and material management of central store, operation theatre store and in-patient pharmacy.

A cross sectional study was done in in-patient pharmacy at a multispecialty hospital in Bhilai, Chhattisgarh. A sample size of 500 indents and 154 patient files were taken by using non probability convenient sampling method. Interview of staff, checklist and observation of pharmacy indents and patient files was done as a study technique. Microsoft excel was used for data analysis.

Keywords: Medication Turnaround Time, Delay in In-patient pharmacy, Medication errors, Central store management, OT store management, Turnaround time.

1. Introduction

The major expectation from the in-patient pharmacy department in the hospital is to make right drugs available at the right time. The delay in delivering of drugs and medical consumables interfere in the smooth functioning of pharmacy. Reducing the medication turnaround time can improve efficiency, patient safety and quality of care.

Turnaround time (TAT) is the total time taken in between the submission of a process/task for execution and the return of the complete output to the customer/user. Turnaround time is one of the metrics used to evaluate operating system scheduling algorithms.

Medication error is defined as any preventable event that may lead to inappropriate medication usage or harm to patient while the medication are in the control of the health care professional. There are four types of medication errors:

i. Prescription errors
ii. Transcription errors
iii. Administration errors
iv. Dispensing errors

Medication errors are a common occurrence and continue to be a major issue in the hospital sector. Medication errors may be nobody’s baby, but when it occurs, it could definitely turn out to be everyone’s worry. The reasons for medication errors range from very minute to downright serious.

Common reasons of medication errors are incorrect diagnosis, wrong prescription of drug, not proper knowledge of drug-drug reactions, drug dose miscalculations, incorrect drug administration and lack of patient education. Other factors that can cause medication errors are job-related stress, improper training or education of staff and sound-alike lookalike packaging of medications.

The in-patients may experience delays in medication administration. Delays can cause serious issues, the effects can be disastrous in terms of mortality and morbidity, so hospitals requires continuous monitoring of the procedure, dedication and coordination between the staff is required for smooth functioning of the process of pharmacy. For example, delays in prophylactic administration of antibiotics can have a severe effects on patient health outcomes.

Many studies have shown that electronic processes for medication ordering and drug dispensing are more efficient than paper based systems because they are:

(1) Instantly delivered to the pharmacy as compared to hand written prescriptions by the physician.
(2) They are easier to read when compared to copies of physician’s handwriting.
(3) The required fields are all completed.
(4) It is clearer to the pharmacist, reducing the need for verification by phone calls to the physician who prescribed the drug.

Studies have shown that there was 64% of reduction in turnaround time when electronic processes are used. [1]
2. Materials and Methods

The study is a cross sectional study. The study areas included were central store, in-patient pharmacy, operation theatre store, wards (general ward 1, general ward 2, general ward 3, and semi-private, private), ICUs (Medical, Surgical, Cardiac, and Neonatal). The sampling method chosen was non-probability convenient sampling method. Sample size of 500 indents were taken to observe the turnaround time of in-patient pharmacy, and to note the medication errors. 154 patient files were observed in a 28 days study. Study techniques involved taking interview of the staff of the respective departments, preparing a checklist and observation of the pharmacy indents and patient files. For collections of data interviews and observation of the staffs of all the departments and concerned areas was carried out after taking authorization from concerned authorities of these departments. Data analysis and interpretation was done using Microsoft Excel 2013.

3. Results and Discussion

3.1. Pharmacy process: The process starts from the nurse:

1. Electronically indenting patient medicines in the hospital management information system.
2. Indent received in in-patient pharmacy.
3. Printing of the indent in the pharmacy department.
4. Time taken in collection of drugs, checking of drug name, patient name, medical record number, checking the date of expiry of medicine.
5. Keeping the collected drugs on the respective wards boxes.
6. Verification of the collected drugs and dispatching.

The average medication turnaround time per day of in-patient pharmacy came out to be 2 hours and 24 minutes whereas the normal medication turnaround time is of 30 minutes, which showed that there is a huge gap in the turnaround time of the in-patient pharmacy which need to be corrected. Some of the reasons for the delay in medication dispensing were:

i. Negligence of employees.
ii. Staff shortage on some days.
iii. Out of stock medicines.
iv. Software issues.

The employees seem to neglect the indents being received in the department and do their own work rather than clearing out the indents being received in the department. On some of the days it was noticed that there was a shortage in staff because of illness and other personal reasons of the staff which lead to a delay in the medication dispensing. There were also some issues in the software of the department which caused to a lot of delay since the indents were not being received in department and the nurses themselves had to come to the pharmacy department along with the patient indent.

3.1.1. Graph of Average TAT of IP pharmacy.

The above graph shows the turnaround time taken for 500 indents.

There was another major issue which was of medicines being out of stock which needed to be solved at the earliest, as it could lead to severe complications to a chronically ill patient.

All of the four types of medication errors were noticed in the hospital with varying measurement:

1. Prescription Errors: On observing 154 patient files following for prescription errors it was observed that 25% prescription sheets were not...
logible, 1% did not have date mentioned in them, and 42% did not have time mentioned in them.

### PRESCRIPTION ERRORS

<table>
<thead>
<tr>
<th>Legible</th>
<th>Dated</th>
<th>Timed</th>
<th>Signed</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>1%</td>
<td>42%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### TRANSCRIPTION ERRORS

The standard medication sheets should have the name of the medicines mentioned in capitals only, dose of the medicine, route of the medicine, frequency of administration, date, time and sign or initial of the nursing staff providing the medicine.

On observing 154 patient files for transcription errors, it was found that 16% of the medication sheets did not contain medicine names in capitals, 25% of the medication sheets did not contain dose of the medicine, 19% did not contain route of the medicine, 10% did not contain frequency of administration of the medicine, date was mentioned in all of the medication sheets, 1% did not contain the time at which the medicine has been administered, and 8% of the medication sheets was not signed by the nursing staff after administering the medicine to the patient.

### MEDICATION SHEET ERRORS

<table>
<thead>
<tr>
<th>Capitals</th>
<th>Dose</th>
<th>Route</th>
<th>Frequency</th>
<th>Date</th>
<th>Time</th>
<th>Signed</th>
</tr>
</thead>
<tbody>
<tr>
<td>16%</td>
<td>25%</td>
<td>19%</td>
<td>10%</td>
<td>0%</td>
<td>1%</td>
<td>8%</td>
</tr>
</tbody>
</table>

### DISPENSING ERRORS

The graph shows the following percentages:

- Wrong: 2%
- Wrong quantity: 3%
- Wrong size of: 3%
- Drugs of: 5%

### 3.1.2. Graph of Prescription Errors.

- Transcription Errors: The standard medication sheets should have the name of the medicines mentioned in capitals only, dose of the medicine, route of the medicine, frequency of administration, date, time and sign or initial of the nursing staff providing the medicine.

- Dispensing Errors: On observation of 500 indents, it was seen that 3% of the wrong medicine or instrument was dispensed from IP pharmacy, 3% wrong quantity of the medicine has been dispensed, 3% of wrong sizes of the instruments have been dispensed, and 5% of the drugs and instruments were not dispensed from pharmacy.

### 3.1.3. Graph of Transcription Errors.

3. Dispensing Errors: On observation of 500 indents, it was seen that 2% wrong medicine or instrument was dispensed from IP pharmacy, 3% wrong quantity of the medicine has been dispensed, 3% of wrong sizes of the instruments have been dispensed, and 5% of the drugs and instruments were not dispensed from pharmacy.

### 3.1.4. Graph of Dispensing Errors

4. Administration Errors: On observation, it was found that 13% of the administration error resulted was of wrong dose administered to the patient. Some of the reasons for this error were:
   i. Illegible handwriting.
   ii. Negligence of the nursing staff as they are in a hurry to administer the medicines because of delay in reception of the medicines from pharmacy.

On observing the goods receipt number in central store, it was observed that there was 100% generation of goods receipt number and no theft or misplacement occurred. The standard average number of goods receipt number being generated was 18. The goods receipt number generated in the central store of the hospital on receiving of the medical consumables and medications from the vendor was 340.

The entry of materials received in in-patient pharmacy should be done immediately after its reception, if not done immediately it may cause an issue in the quantity of the goods and may even result in the misplacement if the materials. The material entered into the hospital information system is 0% immediately after the reception of material in the department, 18% within 1-2 hours, 11% within 2-3 hours, 29% within 5-10 hours, 14% within 10-12 hours, 14% within 24 hours, and 14% within 24-48 hours.

The material entry was being done in OT store is 68% immediately after the reception of material in the
According to the standards the look a-like and sound a-like drugs should be kept in different shelves in order to avoid any kind of confusion between the drugs at the time of dispensing. 100% of the times the look a-like and sound a-like drugs were stored in the same shelf in central store, 100% of the times the look a-like and sound a-like drugs were stored in the same shelf in in-patient pharmacy, and 100% of the times the look a-like and sound a-like drugs were stored in the same shelf in operation theatre store.

According to standards the look a-like and sound a-like drugs (LASA) and high alert medications (HAM) should be kept in different color coded boxes. Look a-like drugs should be kept in blue colored boxes and sound a-like drugs in pink colored boxes and HAM in red colored boxes, LASA and HAM are not kept in color coded boxes in in-patient pharmacy and central store, HAM and high alert medications are kept in color coded boxes in operation theatre store.

The narcotics drugs were stored in a separate cupboard with a lock and the key of the cupboard was with the in-charge of narcotics drug in all of the respected departments. A register was maintained in all of the departments for keeping the record of number of issued narcotics per day.

The standard number of look a-like and sound a-like drugs and high alert medications according to the list provided by the hospital should be:

1. Look a-like drugs – 44
2. Sound a-like drugs – 30
3. High Alert Medication – 22

In central store the number of look a-like medication was 6, number of high alert medication was 19 and number of sound a-like medication was 2.

In in-patient pharmacy the total number of look a-like and sound a-like medications were 4 and high alert medications were 12.

In operation theatre store the total number of look a-like medications were 2, sound a-like medications were 2 and high alert medications were 17. This observation of the number of medications available in the respected departments showed that there needs to be effective management of the stock of medication in the pharmacy especially high alert medications.

Out of 20 indents observed per day 3 indents showed wrong MRP. The first indent showed a difference of 100 rupees which was not corrected and charged to patient. The medicine with wrong MRP was Mucotroy. The second indent showed a difference of 13 rupees. The medicines with wrong MRP were:

i. Vitak Injection
ii. Normal saline

The third indent showed a difference of 60 rupees which was not charged to patient. The medicine with wrong MRP was:

i. Moxiblue drop 0.50%

This shows the negligence of staff in making the entry of the indents and charging the patient which results in overcharging of the patients.

Some of the other findings in central store were:

- Near expiry and expiry medications are not being dispensed in the given time.
- A syringe with expiry date Dec-2015 was found.
- Many medications are kept in different alphabet shelf.
- Injections were kept out of their boxes.
- Syringes not in their correct size boxes.
- Some syringes were kept outside the boxes.
- Chemotherapy drugs were kept in shelf marked with the label of high alert medications.
- Medications not dispensed from central store since the staff didn’t recognize the composition of the medicine.

Some of the other findings in in-patient pharmacy were:

- 2 Dextrose Injections with expiry date Dec-2015 was found in in-patient pharmacy.
- Many of the medications were not arranged alphabetically.

4. Recommendations

The drugs can be dispensed in the bags with the tag of respective patients so that at the nursing unit, less time will be consumed in segregation of the medications. Items for urgent indents should be immediately dispatched after collection of medications and not be kept in rack for a long period of time. For dispensing of medications immediately, manpower of the department should be checked and priority should be given for urgent cases. The nursing staff ordering drugs for patient should indent the complete order at once, instead of indenting numerous incomplete orders again and again. There should be CCTV camera installed at the back side of the department in both in-patient pharmacy and central store. Regular store checking should be done in order to take out the near expiry and expiry medications which are not being removed and regular checking of the storage of medicines should be done. Training for hospital
information system should be taken for staff since some of the staff are not able to use the hospital information system. Drug labels to be marked according to NABH standards which will also help in segregating near expiry and expiry medication. The staff waits to receive the phone call from respective department to deliver out the medication which are ready, the attendants should deliver the medications as soon as they are ready to dispense.

After the collection of drugs, it is kept in the rack for long time, though it is ready to be dispensed. Major reasons for the delay in dispensing were:

i. Lack of manpower in the department.

ii. Attendants who are supposed to deliver medicines to the respective wards are busy in dispensing the drugs, or are on leave.

iii. Once the attendants go out for dispensing the medicines they take a lot of time to return to the pharmacy for dispensing the next batch of medicines.

For storing sound a-like drugs if color coding is not possible a part of the medicine name can be written in uppercase letters to help distinguish sound a-like medications from one another to avoid medication errors. Example – epSOLIN Injection and epiDOSIN Injection. Both LASA drugs should be stored separately to avoid confusion in different color coded boxes. LASA drugs and HAM should be stored in their respected shelves.

Training of nursing staff (general wards, ICU’s) is required so that they are more careful in writing the medicines in medication sheets and administering the drugs to patient. Training of employees in central store and in-patient pharmacy regarding pharmacology should be undertaken since some of the employees are not aware for the composition of drugs which results in delay of medicine dispensing. In the monitoring of pharmacy delay, when nursing staff sign the order of medications, it should be signed with time and employee ID so that the time of medicines reaching the wards can be calculated and the person receiving the drug is known in case of any errors.

5. Conclusion

Patient safety needs to be ensured in every step of the process, from choosing the medication, to writing prescription, to dispensing the medication. On a management level, the results of this study can be used to improve and strengthen administration and nursing, physician support. From this study, we can obtain information about management of in-patient pharmacy. After the study there were some considerable improvements, training sessions were undertaken for the nurses and staff and proper dispensing of medication was tried to maintain. The results of this study will benefit in improving turnaround time and patient care of the hospital. From this study, we were able to obtain information about ordering practices and the information could be useful for training requirements within the departments of the organization.

6. Acknowledgement

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7. References


[4]. NABH standards and guidelines.