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Original Research Paper

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REQUISITION FORMS AND REPORTS-'GARBAGE IN GARBAGE OUT' – SIGNIFICANCE OF CLINICAL DATA IN MICROBIAL CULTURE & ANTIBIOTIC SUSCEPTIBILITY TESTING OF SURGICAL SAMPLES

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ABSTRACT

OBJECTIVES: The pre-analytical phase of laboratory testing is an important component of testing process. Laboratory requisition forms(LRF) for microbial culture and antibiotic susceptibility testing for pus, exudate, aspirate, tissue and swabs were analysed in our study following a noncompliance identified during a National Accreditation Board for Testing and Calibration Laboratories(NABL) Surveillance Audit.

METHODS: LRFs were analyzed between June-August 2019 for various components in this prospective study.

RESULTS: Of the 424 LRFs, 35 % were from outpatients and 65% from in-patients. 100% of the forms had patient identifiers of patient name, age, unique hospital identification number. 97.6 % of the LRFs had sample type mentioned. 95.5 % did not mention who collected the sample. 95.7 % did not mention the time of collection. 79.2 % had clinical findings mentioned but 22.4 % did not mention the site of infection. Only 8 % had history of antibiotics mentioned and 1.4 % had previous culture reports mentioned. 5.6% had no name of the requesting physician mentioned and 3.5 % were illegible abbreviations. 6.1% did not have signature of the requesting doctors, 0.4 % had illegible signatures. 4.2 % had no date on LRFs.

CONCLUSION: Our root cause analysis helped us in identifying the factors for incomplete LRFs based on which we recommend proper categorization of samples with test codes on requisition forms, use of information & technology to integrate electronic data entry to reduce transcription errors, periodic training of doctors on pre-analytical phase of testing, stringent sample rejection and acceptance criteria and regular audits of LRFs.

KEYWORDS : Laboratory Requisition Forms, Pre-analytical Phase, Culture & Susceptibility Testing, Clinical Data, Sample Processing

INTRODUCTION:

Pus, exudate, aspirate, tissue and swabs are important samples for microbiological culture and antibiotic susceptibility testing to diagnose a plethora of skin and soft tissue infections [1]. From a clinical microbiologist's perspective, the analytical phase of processing the sample is an important part of the testing algorithm. However, an important component is the pre-analytical phase of collecting and transporting the right specimen with the right clinical details which is solely dependent on the clinician requesting the investigation (Figure 1) [2-6].

The pilot study was designed for a root cause analysis of possible lacunae in the existing system of requesting a test for microbial culture processing and (AST) following a major noncompliance identified in the recent NABL Surveillance Audit in our microbiology laboratory.

"The lab receives swab samples for culture with no indication from which site the swab is taken which makes the interpretation of the result irrelevant. (for e.g. if a vaginal swab is processed as a pus swab)" -as per ISO 15189:2012, clause 5.4.3.c.

This study was designed with an objective for an in-depth analysis of the requisition forms received from different departments and wards of the hospital in microbiology section for pus, exudate, aspirate, tissue and swabs processing for culture and sensitivity to determine the relevance, correctness, completeness and consistency. This study would in turn measure the overview of the data quality, accuracy of the pre-analytical component of the testing process for surgical samples for microbial culture and antibiotic susceptibility testing (AST).

MATERIAL & METHODS:

Lab requisition forms (LRF) submitted to the Microbiology Section of Central Laboratory of St. Martha's Hospital, Bangalore between June 2019 and August 2019 for pus, exudate, aspirate, tissue and swabs were evaluated for completion of all items on the forms. Performance in the following domains were derived as a composite percentage:

1. Patient identifiers
2. Type of sample
3. Sample collected by
4. Time of collection
5. History of medications
6. Clinical findings and diagnosis
7. Site of sample collection
8. Previous culture
9. Name of the requesting doctor
10. Signature of the requesting doctor
11. Date of requisition

Inclusion criteria: LRFs for pus, exudate, aspirate, tissue and swabs during the three-month period for culture and susceptibility testing in microbiology laboratory.

Exclusion criteria: LRFs for other samples like sputum, urine and body fluids etc.

RESULTS:

Of the 424 LRFs evaluated, 35. % (150/427) were from outpatient department and 65 % (274/424) from in-patients (Figure 3). 100% of the LRFs had patient identifiers of patient name, age, unique hospital identification number. 97.6 % (414/424) of the LRFs had sample type mentioned. 95.5 % (405/424) did not mention who collected the sample. 95.7 % (406/424) did not mention the time of collection. 79.2 % (336/424) LRFs had clinical findings mentioned but 22.4 % (95/424) LRFs did not mention the site of infection (Figure 4).

Only 8 % (34/424) forms had history of antibiotics mentioned

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and 1.4 % (6/424) had previous culture reports mentioned. 5.6% (24/424) had no name of the requesting physician mentioned and 3.5 % (15/424) were illegible abbreviations. 6.1% (26/424) of LRFs did not have signature of the requesting doctors, 0.4 %(2/424) had illegible signatures. 4.2 %(18/424) had no date on LRFs (Figure 4).

DISCUSSION:

Of the various components of the requisition forms, patient identifiers were filled, possibly because of the availability of barcode labels with the details, the ease of use of the same would have facilitated the process [7]. The time of collection and the person collecting the sample was not mentioned in most of the forms, the delay in processing sample after collection and any clinical discussion with the relevant staff or clinician is not possible in such a situation[8,9]. The details were often collected during culture plate reading by the microbiologist and technician adding to their workload.

The GIGO Concept-(Garbage in Garbage out) used in the field of computer science is much applicable here (Figure 2). The output of reports is entirely dependent on the input i.e. sample quality and the clinical data provided [10]. Clinical findings and site of infection are important components without which it is difficult to analyze the microbial growth on culture plate. For example, a scanty growth of Multi drug resistant (MDR) *Klebsiella pneumoniae* in a swab sample without knowing the site, a heavy growth of Methicillin Resistant *Staphylococcus aureus* (MRSA) in pus without clinical history cannot be opined upon. Their pathogenicity or clinical relevance become a big concern to the laboratory physician and in turn to the clinician.

History of antibiotics and previous culture are another important component which were poorly filled in our study although patients were prophylactically and empirically treated with antibiotics [10]. While the names of the requesting doctors were short abbreviations, a few of them were illegible with no date. On root cause analysis it was found that most of the requisition forms were filled by the resident doctors in the respective units who signed for their respective in-charges during consultations and ward rounds. Shortage of time in the outpatient setting, high load of patients, increased paperwork, lack of strict sample rejection criteria by the laboratory, lack of awareness of significance of clinical data were important contributing factors for the noncompliance. Based on this root cause analysis we recommended the quality management system of the laboratory the following measures:

- Periodic training of resident doctors on pre-analytical phase of testing
- Proper categorization of samples with test codes on requisition forms
- Use of IT Department to integrate electronic data entry to reduce transcription errors
- Stringent sample rejection and acceptance criteria in the laboratory
- Periodic audits of requisition forms

CONCLUSION:

Our findings emphasized the need to formulate and implement policies that would enhance accuracy and compliance with the necessities of laboratory request form completion and thereby ensure patient safety. While all pre-analytic variables cannot be eliminated, clinicians need to be made aware of the many variables that can impact laboratory testing accuracy for microbial culture & susceptibility testing before treating infections. The laboratory staff should provide guidance in addressing potential critical outcomes in the pre-analytical phase of testing especially the data in laboratory requisition forms [12].

While hospital information systems should aim at providing solutions and reduce the paperwork in the hospital , the clinical information that needs to be shared between the treating physician and diagnostician should be facilitated by the hospital administration with a strong hospital information system.

CONFLICT OF INTEREST: None to declare.
SOURCE OF FUNDING: Nil.

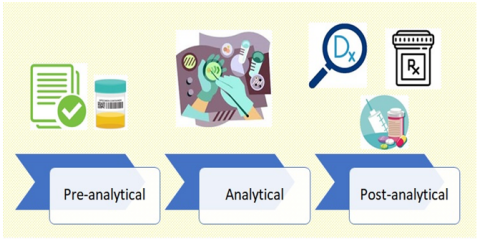

Figure 1: Phases of laboratory testing process

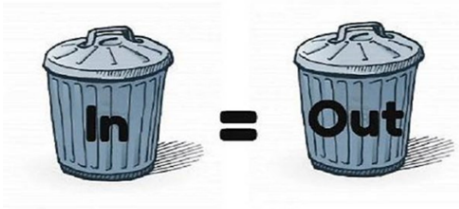

Figure 2: GIGO Concept-Garbage In Garbage Out (Image Source: https://databubble.info/data-cleaning-investment-or-cost/)

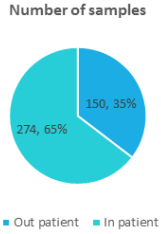

Figure 3: Total number of outpatient and inpatient samples

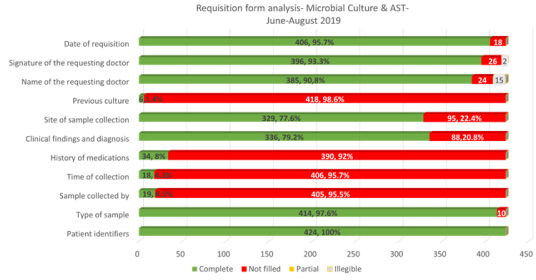

Figure 4: Analysis of requisition forms

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