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Chapter 1 : Managing the Pre- and Post-analytical Phases of the Total Testing Process

The pre-analytic testing phase occurs first in the laboratory process. This phase may include specimen handling issues that occur even prior to the time the specimen is received in the laboratory. Important errors can occur during the pre-analytic phase with specimen handling and identification.

This article has been cited by other articles in PMC. However, greater appreciation of the prevalence of errors in the pre- and post-analytical phases and their potential for patient harm has led to increasing requirements for laboratories to take greater responsibility for activities outside their immediate control. There are a variety of free on-line resources available to aid in managing the extra-analytical phase and the recent publication of quality indicators and proposed performance levels by the International Federation of Clinical Chemistry and Laboratory Medicine IFCC working group on laboratory errors and patient safety provides particularly useful benchmarking data. Managing the extra-laboratory phase of the total testing cycle is the next challenge for laboratory medicine. By building on its existing quality management expertise, quantitative scientific background and familiarity with information technology, the clinical laboratory is well suited to play a greater role in reducing errors and improving patient safety outside the confines of the laboratory. The clinical laboratory has a leader in the field of healthcare quality management with a focus on analytical quality born of its scientific background and was one of the first areas to use quantitative statistical control methods. However laboratories are now being asked to widen their focus to consider activities outside their immediate control. Accreditation agencies are increasingly requiring laboratories to go beyond analytical quality and take responsibility for the pre- and post-analytical or extra-analytical phases where most errors arise. These new challenges are a change from the traditional laboratory-based activities with which many laboratory staff is comfortable and this new role can cause some unease and discomfort. This article outlines the different phases of the total testing process, discusses laboratory accreditation requirements for the extra-analytical phase and describes some of the resources available for laboratories in managing this unfamiliar area. The total testing process TTP The total testing process or total testing cycle is based on the original brain-to-brain loop concept described by Lundberg [1 , 2]. These activities have traditionally been separated into three phases pre-analytical, analytical and post-analytical. There is some evidence that these steps are more error-prone than other pre- and post-analytical activities [3 - 8]. However, the definition and use of such terms is not universal. Indeed the definition of even basic terms such as pre-analytical, analytical and post-analytical can vary between authorities. Error rates are often described using the sigma concept, which refers to the number of standard deviations that lie between the process mean and the specification limit. As the process standard deviation becomes smaller, more standard deviations will fit between the mean and the specification limit, increasing the sigma number and decreasing the likelihood of items exceeding the specification limit. Using this measure, healthcare performs at a sigma level, which compares poorly with non-healthcare industries such as airline baggage handling approximately 4 sigma [9]. Performance varies in different areas of healthcare, with values of 1 sigma e. Higher error rates can be expected in institutions under pressure to increase revenue, lower costs and operate close to or over full capacity [10]. The analytical phase of laboratory medicine is arguably the best performing sector in healthcare with close to 5 sigma performance 0. This is more than 3, times lower than the rates of infection and medication errors and reflects the standardised quantitative nature of much of laboratory medicine testing, which is well suited to statistical quality control measures [12]. However, the accomplishments of laboratory medicine drop when errors in all phases of the total testing process are considered [13 , 14]. The proportion of errors associated with the two extra-analytical phases is times that seen in the analytical phase, with the pre-analytical phase consistently representing over half of all errors in published studies [12 , 15 - 19]. Given the high volumes of laboratory tests performed globally, even a low prevalence of errors translates into significant absolute numbers of occurrences and opportunities for adverse patient outcome. Although some laboratories have developed mechanisms to detect errors and

improve pre- and post-analytical quality, there remains significant room for improvement in the quality of the extra-analytical testing phase [21 - 23]. The commonest causes of errors in the total testing process as compiled by Plebani are shown below [22]. These lists illustrate the use of the pre-pre- and post-post-analytical categories - note, for example, that Plebani includes choice of container, collection, handling and transportation as pre-pre-analytical activities, resulting in most errors being categorised as pre-pre-analytical rather than pre-analytical. The lack of standardisation in such taxonomy accounts for some of the variation seen in reported error rates and can complicate discussions [24]. Errors in healthcare are of concern when they lead to actual or potential adverse outcomes for patients. Given the complex nature of healthcare and the difficulty in assessing the effect of a specific laboratory error on patient management, the prevalence of proven patient harm is difficult to assess. Obvious extreme errors in qualitative results with clear links to therapy or management decisions e. Such difficulties mean that present measurements probably significantly underestimate the size of the problem in light of the high volume of quantitative testing performed in clinical laboratories. A review of the available literature on laboratory errors found great heterogeneity in the studies where the data collection method appeared to be the strongest influence on error prevalence and type [19]. A recent study illustrating the dichotomy between the large potential for harm but the much smaller rate of actual harm describes a five-point scoring system for actual and potential adverse impact score elements [28 , 29]. Errors were classified as pre-analytical Classification and grading of quality failures in the clinical biochemistry laboratory showed that Although the importance of the pre- and post-analytical phase has been acknowledged for many years, laboratories have often overlooked this area in their quality management programmes, focussing instead on analytical quality and associated activities within their direct control. The main reason for this neglect has been governance issues due to the variety of the different physical locations and staff groups laboratory staff, clinicians, phlebotomists, porters involved in the total testing process. The variety of different terms used to define errors, including mistakes, blunders, defects, outliers, unacceptable results, quality failures, have not helped discussion [22]. The term "laboratory error" is defined in International Organization for Standardization ISO as "failure of planned action to be completed as intended, or use a wrong plan to achieve an aim, occurring at any part of the laboratory cycle, from ordering examinations to reporting results and appropriately interpreting and reacting to them" and is the preferred term [22 , 30]. A more recent and perhaps more useful description of laboratory error is "any defect from ordering tests to reporting results and appropriately interpreting and reacting on these" [31]. Recent changes to accreditation requirements are forcing laboratories to pay attention to this area. A series of publications in the US and UK between and subsequently led to greater requirements for active management of the extra-analytical phase of the total testing process [36 - 39]. While the first report highlighted the many American patients who die each year from medical errors, the second described six aims for patient care, specifically safeness, effectiveness, efficiency, equitability, patient-centeredness, timeliness, and rules for care delivery redesign. Medical errors were defined as the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim. The majority of medical errors was not the result of individual recklessness or the actions of a particular group but was caused by faulty systems, processes, and conditions that led people to make mistakes or fail to prevent them. Amongst the strategies proposed were the raising of performance standards and expectations for improvements in safety through the actions of oversight organizations and professional groups and the implementing of safety systems in healthcare organizations to ensure safe practices at the delivery level. These recommendations have been translated in new specific requirements to enhance patient safety by US-based accreditation bodies with similar provisions in other international standards. TJC is a United States-based not-for-profit organization that accredits over 19, healthcare organizations and programs in the United States while JCI accredits healthcare organizations in over 80 countries. Onsite inspections follow a three cycle. The purpose of the IPSGs is to promote specific improvements in patient safety. There are six goals, of which the first two specifically refer to the extra-analytical phase of the total testing process. The first Standard IPSG 1 requires the organization to

develop an approach to improve accuracy of patient identification and applies to the pre-analytical phase of the total testing process. Of all the pre-analytical processes, sample collection is arguably the most critical [42 , 43]. Identification errors can result in inappropriate treatment and mislabeling of blood specimens may result in hemolytic transfusion reactions from incompatible blood [44 , 45]. Up to 1 in 18 identification errors can result in an adverse patient outcome [50]. Identification errors are particularly common amongst inpatient samples [51]. Identification processes when giving blood, or blood products or taking blood and other specimens for clinical testing are specifically highlighted by JCI. Patients must be identified using at least two ways, such as name, identification number, birth date or bar-coded wristband. Evidence of implementation of this system for blood and blood product administration and clinical sample collection are amongst the measurable elements for this goal. IPSG 2 requires the organization to develop an approach to improve the effectiveness of communication among caregivers and applies to both the pre- and post-analytical phases of the total testing process. Verbal and telephone requests pre-analytical phase and the reporting back of critical test results postanalytical phase are specifically mentioned as areas for action. Critical values are defined as those which represent potentially life-threatening situations and in which reporting delays can result in serious adverse patient outcomes [52 - 57]. Policies or procedures are required for verbal and telephone orders that includes the writing down or entering into a computer of the complete order or test result by the receiver of the information; the reading back of the order or test result; and confirmation that what has been written down and read back is accurate. Although not all laboratories accept verbal or telephone requests, all will report critical results and thus need to comply with this requirement. The importance of pre-analytical processes and critical result communication are reiterated in AOP Assessment of Patients standard 5. More than 6, laboratories worldwide are CAP accredited. Inspections are carried out by teams of practicing laboratory professionals using checklists which cover general laboratory functions as well as specific disciplines. The checklist questions are explicit in their intent and the required evidence of compliance e. The Laboratory General Checklist specifically refers to the monitoring of extra-analytical quality and the CAP laboratory patient safety goals [59]. Post-analytical examples given include critical value reporting e. Turnaround time potentially encompasses all three phases of the total testing process and can be an excellent single measure of laboratory performance. The first goal requires the laboratory to improve patient and sample identification at specimen collection, analysis and result while the second refers to improvement of verification and communication of life-threatening or life-altering information regarding malignancies, HIV and other serious infectious diseases , cytogenetic abnormalities, and critical results. Again records of evaluation or monitoring of processes related to each of the patient safety goals are required. Other items in both the Laboratory General and discipline-specific checklists refer to pre- and post-analytical processes. For example, section 4. A list of 23 items for inclusion in the quality manual mentions transportation, collection, handling of samples, reporting of results and communications and other interaction with patients, health professionals, referral laboratories and suppliers in passing item 4. Monitoring of turnaround time as part of the management review is required item 4. Procedures and records of critical result handling are required items 5. This provides an opportunity to both customize critical value reporting to clinician needs and educate physicians in the concept of critical values [61]. The increasing recognition of the importance of the extra-analytical phases in laboratory medicine is seen not only in accreditation standards from outside authorities but also in the recent deliberations of laboratory quality experts. In May , a meeting of over 40 medical laboratory opinion leaders met to discuss issues and current challenges for laboratory medicine [62]. One working group looked at assessment of risk and control of sources of error in the laboratory path of workflow. They considered two recently published CLSI risk management guidelines relevant to extra-analytical quality concerns and examined two specific questions in this area [63 , 64]. The first question was "What factors, activities or conditions in the total testing process contribute to risk of harm to the patient? It was felt that the most problematic area in risk management is tackling the human factor in the process. The second question was "Because even one bad result issued by a virology laboratory or blood bank may compromise both patient health and laboratory credibility, how should

labs manage risk in these laboratories? Are there any specific special precautions? Both the laboratory quality experts and the accreditation authorities recognize that laboratory medicine is a complex process whose management requires careful integration between different physical sites, activities and occupational groups to minimize the risk of error occurrence. This is illustrated in the Swiss cheese model of error propagation of Reason [22 , 66]. A system is a series of processes which can be considered analogous to a stack of slices of Swiss cheese in which the holes represent opportunities for an error to pass to the next process in the system. Each slice is a defensive layer and can stop the error from propagating through the system. The vulnerability of the system is dependent on the number of defensive layers and their efficiency [67]. Errors can result in adverse patient outcome when all the holes line up and the system fails to detect and rectify the error. For laboratory medicine, the slices represent areas such as equipment, training, supervision and quality assurance procedures and there is a need to close the gaps and strengthen the defenses to minimize the likelihood of patient mishap. Management strategies should recognize both the human and the system factors that can lead to errors and should aim for a robust integrated system which provide timely intervention and correction of developing problems. The pre-analytical definitions are very similar but there are some differences in the post-analytical areas, with ISO These definitions illustrate the difficulties that can be encountered in discussions on extra-analytical phase errors and accounts for some of the variation in reported error rates.

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Chapter 2 : Quality in the Clinical Microbiology Laboratory | Clinical Gate

reduce errors in the clinical micro-biology lab. post-analytic. In , medical centers in Michigan, New Jersey, and transported to the microbiology lab for.

Email Pre-analytical variables play an important role in the quality of specimens that are obtained for laboratory testing. Offering reliable laboratory testing is essential for diagnosis, prognosis and patient care management. There are three phases to laboratory testing: The pre-analytical phase accounts for the majority of errors made in laboratory test results. Healthcare providers must recognize the importance of good specimen collection and processing and the effect it has on laboratory testing and patient outcomes. Understanding the principles of proper blood collection is critical to good laboratory practice and preventing potential laboratory test errors. In the total testing process, most errors occur in the pre-analytical phase, with a reported error rate of percent. Some ways to prevent pre-analytical errors are to use active and direct communication when identify a patient. A patient should be asked to spell their last name followed by their first name. A second identifier is required and it should be patient specific. Patient preparation is also important. The patient should be asked if they have had anything to eat or drink within the last 10 to 12 hours. All laboratory normal values are determined on a basal state. Many analytes that are measured require a fasting state. Proper venipuncture technique should include selecting the correct site and not leaving the tourniquet on for no longer than one minute. Prolonged tourniquet application causes hemoconcentration and hemolysis. Probing should be avoided, which again can cause hemolysis and poor specimen quality. When obtaining the specimens, the Order of Draw should be followed. Following the correct order will ensure that there is no cross contamination of additives in the blood drawing tubes. All blood collection tubes should be filled until the vacuum is exhausted. This ensures that the correct volume of blood to the additive ratio is accurate. In the final steps of venipuncture, all blood collection tubes should be mixed properly. The blood collection tubes should be inverted immediately after the draw. Poor mixing will produce specimens with clots. Vigorously shaking the tubes can also cause hemolysis. Blood collection tubes should be labeled after the blood is in them. Once the blood is collected, the blood should be sent to the laboratory in a timely manner for processing, handling and testing. Pre-analytical errors can be minimized or prevented to improve laboratory testing. Decreasing pre-analytical errors will increase test reliability and enable clinicians to have optimal clinical management for patient care. Post in Medical Biology. Her many years of clinical experience were at a small community hospital. She has 20 years of teaching in the disciplines of hematology, coagulation and phlebotomy. She currently is the chair of the Clinical Laboratory Sciences program and program director of the Phlebotomy Training Program. She also has published numerous articles and case studies in field related journals. Professor Finnegan has been an invited speaker at the local, state, national and international level. She also had the opportunity to teach phlebotomy in South Africa, Swaziland and Lesotho and to prepare learning units for Rwanda and Tanzania.

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POST ANALYTICAL PROCESSES. clinical interpretation of laboratory data, leading to errors in clinical decision-making.

If we consider all the errors in a consolidated manner, then the error rate for preanalytical variables in our clinical biochemistry lab was found to be 1. Discussion Advances in science and technology have led to many path-breaking innovations that have transformed laboratory diagnostics from manual, cumbersome testing methods to fully automated science, ensuring accuracy and speed. However, the laboratory cannot function in isolation. It is dependent upon other departments, mainly the clinical division for properly filled requisition slips and samples for analysis. Mounting evidence indicates that reliability cannot be achieved in a clinical laboratory through the mere promotion of accuracy in the analytical phase of the testing process. The phases before the sample reaches the laboratory preanalytical and the phase after the sample is analyzed post-analytical are equally important. The health care system must be more diligent in applying scientific knowledge to reduce the errors in this phase. This is imperative to curtail the dent on laboratory services that arise due to human errors. There has been varied information on the error rate within the whole lab testing procedure 0. Plebani and Carraro observed in their paper that the great majority of errors result from problems in the preanalytical or post-analytical phases. The introduction of vacuum tubes along with the closed system of blood collection has made blood collection efficient and easy. But lack of staff training engaged in phlebotomy is an impediment for expediting sample collection and transport. Hemolysis of samples occurs when blood is forced through a fine needle, shaking the tubes vigorously, and centrifuging the sample specimens before clotting is complete. Freezing and thawing of blood specimens may cause massive hemolysis. It also leads to a prolongated turnaround time TAT due to the need for fresh samples for processing the request. The frequency of hemolysis was more in the samples that were collected from the admitted patients as compared to the patients attending the OPDs 1. One plausible explanation for this phenomenon could be the systematic blood collection technique followed by the laboratory staff in the OPD. As a part of our endeavor to achieve accreditation for our laboratory services, we carry out regular in-house training sessions for our technicians to familiarize them with the standard protocols for sample processing. For this purpose, we have developed standard operating procedures SOPs for the different steps involved in ideal laboratory operations and ethics. Such training has facilitated in the adoption of ideal phlebotomy practices by our laboratory personnel. The samples are thereby transported to our laboratory from the collection center by our staff following the basic precautions that must be adhered to during transportation. Another factor leading to rejection of blood samples in our study was insufficient blood volume. The main reasons behind this anomaly are ignorance of the phlebotomists, difficult sampling as in pediatric patients, patients with chronic, debilitating diseases, and patients on chemotherapy whose thin veins are difficult to localize. Insufficient sample volume constituted the most frequent cause of test rejection in the samples collected in the OPD 0. Inpatient sampling with a frequency of 0. The difference is striking. This may be attributed to a number of factors. We have a centralized collection center where samples for clinical biochemistry, hematology, microbiology, and gastroenterology are collected simultaneously. Due to the paucity of manpower, the ratio of patients to phlebotomists is disproportionate, making sample collection difficult. This may hamper proper sample collection, leading to inadequate collection. The collection is carried out during fixed hours. Hence, this patient load combined with shortage of time may adversely affect proper sample collection in the OPD setting. Difficult sampling and patient non-compliance further aggravates this problem. Nevertheless, it is mandatory for the laboratory staff to practice a certain basic level of workmanship and skillful phlebotomy techniques to reduce such errors to a minimum. A total of 0. The same figure for OPD samples was 0. It has been observed that the clinicians often send incomplete slips with the samples. This could be due to excessive patient load or lack of awareness regarding patient information. Modern day diagnostics is not merely sample processing and preparation of reports. The laboratories are actively involved in disseminating information

about critical results to clinicians so corrective measures can be initiated at the earliest. Our laboratory staff could arrange the correct information about some of the patients admitted in the wards through their painstaking efforts. This leads to loss of precious time and is a labor-intensive activity. We followed a different protocol for these patients. Those tests were repeated with fresh samples and new requisition slips as and when the patients revisited the hospital for checkup. This is definitely inconvenient for patients, who have to undergo the same process of registration and consequent sampling. Such errors can be completely wiped out by persistence by the laboratories for complete information and sincere efforts by the clinicians to provide the same. This will facilitate speedy sample processing and report dispatch to the patients to initiate therapeutic interventions at the earliest. Lipemia accounted for rejection of 0. Lipemic samples can arise due to collection after heavy meals or the presence of some metabolic disorder hyperlipoproteinemias. This can be avoided by sample collection, preferably after an overnight fast. If the patient has a metabolic disorder, the same must be mentioned in the requisition slip. Lipemia interferes with optical reading by the instrument and can affect interpretation of electrolyte values. Hence, many patients give samples in non-fasting states leading to erroneous reporting. It is the responsibility of the clinicians and the phlebotomists to ensure that proper patient preparation is instituted before sample collection. These data are comparable to those provided by other investigators, which confirm that problems directly related to specimen collection are the main cause of preanalytic errors, especially hemolyzed, clotted, insufficient, and incorrect samples. It is clear from the above discussion that incorrect phlebotomy practices are the main reason behind preanalytical errors. The reason for incorrect phlebotomy practice includes lack of awareness or possibly a heavy workload. This is the reason phlebotomy has been considered a separate area of improvement for medical technicians in developed countries. Those of us in developing nations must adopt a similar approach toward phlebotomy and initiate steps for the inculcation of ideal phlebotomy practices among health care workers. The promotion of ideal phlebotomy practices and sample transport procedures is a pre-requisite for the efficacy of laboratory functioning. The dependence on accurate laboratory results for diagnostics makes it mandatory for labs to ensure accountability and accuracy of results to negate incorrect diagnosis as a consequence of faulty reporting. A practice of keeping a record of the errors at all stages of analysis and then devising corrective strategies for their prevention can gradually free a laboratory from such errors. To conclude, we would like to state that we as laboratorians need to adopt a holistic approach toward laboratory diagnosis and function in concert with the clinicians to provide effective services to the patients. Adoption of quality control in all the phases and not merely the analytical processes and regular appraisal and audits is necessary to safeguard patient interests and deliver our services to society.

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Chapter 4 : Search results - Biochemia Medica

INTRODUCTION. In recent years, there has been increasing interest in quality improvement and patient safety activities in healthcare. The clinical laboratory has a leader in the field of healthcare quality management with a focus on analytical quality born of its scientific background and was one of the first areas to use quantitative statistical control methods.

Advanced Search Abstract While many areas of health care are still struggling with the issue of patient safety, laboratory diagnostics has always been a forerunner in pursuing this issue. The concepts and practices of quality assessment programs have long been routine in laboratory medicine, and error rates in laboratory activities are far lower than those seen in overall clinical health care. Quality Standards Laboratory medicine sets high quality standards. The objective of the CLIA program is to ensure quality laboratory testing. This certification is based on a survey conducted by a state agency on behalf of CMS. All 3 phases of the total testing process can be targeted individually for improving quality, although it is well published that most errors occur in the pre- and post-analytical phases Table 1. Not processing a specimen properly prior to analysis or substances interfering with assay performance can affect test results in the analytical phase. Establishing and verifying test method performance specifications as to test accuracy, precision, sensitivity, specificity, and linearity are other areas where errors can occur in the analytical phase of laboratory testing. The laboratory has spent decades improving analytical quality by establishing internal quality controls IQC and external quality assessment EQA. The role of EQA and proficiency testing PT is to provide reliable information allowing laboratories to assess and monitor the quality status of internal procedures and processes, the suitability of the diagnostic systems, the accountability and competence of the staff, along with the definition of measurement uncertainty in laboratory results. Pre-analytical errors can occur at the time of patient assessment, test order entry, request completion, patient identification, specimen collection, specimen transport, or specimen receipt in the laboratory. A report by Bonini and colleagues found that pre-analytical errors predominated in the laboratory, ranging from For the inpatients, a pre-analytical error rate of 1. The variable receiving the highest frequency rating was specimen hemolysis at 1. For the outpatients, the error rate was 1. A comprehensive plan to prevent pre-analytical errors has 5 interrelated steps: Developing clear written procedures. Enhancing health care professional training. Automating functions, both for support operations and for executive operations. Improving communication among health care professionals and fostering interdepartmental cooperation.

Chapter 5 : Pre-Analytical and Post-Analytical QC - Westgard

Analytical errors rates has decreased significantly as a result of standardization, automation and technological advancement thus improving the analytical reliability of Laboratory tests.

There are more "P-errors" than "A-errors", therefore, many laboratories believe they should put a higher priority on pre- and post-analytical errors than on analytical errors. Ignoring problems is not a good thing. The source of this commonly accepted knowledge about laboratory errors is an abstract, not a peer-reviewed paper [see the complete abstract in an earlier discussion on this website]. This "Sources of Errors" assumption threatens to become an excuse to avoid Quality Control. If we refuse to confront our analytical errors, if we postpone improving them while we work on the "bigger" problems, we let the QC problem fester and grow. The longer we wait, the worse the problem gets. No one denies that there are pre- and post-analytical errors in healthcare. Nor can we, unfortunately, say that these errors are small or insignificant. However, we must challenge the notion that analytical errors are the "smallest" and therefore least important problems we face in the laboratory. We hope, by examination of the problem and by a few crude analogies, we can convince you of this. Whose Errors are More "Obvious"? An instrument with a systematic bias. A test result that gets reported on the wrong patient. Pre-analytical and Post-analytical errors tend to fall into the "obvious" categories. Perhaps we should unify the pre-analytical and post-analytical error categories. They fall into one bigger, more important category. The doctor can quickly identify when a pre- or post-analytical error has occurred, and find fault with those "responsible" for the error. Since doctors throw a lot of weight around a hospital, their complaints become the most important. This is probably why pre- and post-analytical are believed to be the "bigger" problems. When the doctor receives the test results from the laboratory, all he or she gets is the numbers. There is no way to know if those numbers are biased up or down because of method or instrument problems, or if there is some strange random fluctuations that are throwing off the result. Perhaps the doctor might suspect an analytical error, if the test results are extremely divergent from all the other symptoms the patient is showing, but even then the doctor can only guess and most likely, order more testing! For analytical quality, the doctors are completely dependent on the laboratory for the detection and correction of errors. Hospitals are strained by the amount of patient information that they must manage. Those kinds of problems likely occur throughout the healthcare process, including the examination and operating rooms. A Half-Baked Analogy In a crude sense, a laboratory works just like pizza delivery business. The pizza shack business can be broken down into three core processes: Getting the Order 2. Making the Pizza Order 3. Getting the Order - the phone jockey 2. Making the Pizza - the cook 3. Delivering the Pizza - the delivery person What kind of errors can occur in this situation? Getting the Order - an improper order different ingredients from those requested , an improper address 2. Making the Pizza - spoiled ingredients, faulty oven, improper baking time, improper handling of food dirty hands , etc. Laboratory tests are not pizzas. But I hope this little illustration gives you a clearer view of post-, pre-, and analytical errors. Which Errors are Worse? Another question raised by the coexistence of pre-, post-, and analytical errors is this: We think this is a triple dead heat. No error is worse than the other. They are all equally terrible. How can the doctor make a good decision with bad numbers? In many cases, the doctor is forced to run the tests against, or rely on his or her "judgment. In the end, all the errors are equally bad. No error is worse than another. How do you become the best pizza shack in town? You make sure you answer the phone promptly and courteously, get the order right, make the pizza that was ordered and deliver it hot to the right place with change as needed. Each of these three parts is important. In a similar vein, progress in the laboratory testing area needs to happen all at once. We must reject the notion that progress can only be come in one area at a time. The problems are too great to go slowly. We must make efforts on all fronts. Even if this means making small improvements in each area, a unified improvement effort will achieve better test results and better patient care than narrow efforts in either the pre-, post- or analytical area. Only in a few gourmet restaurants, on rare occasions, does the cook emerge from the kitchen to receive

the thanks of the patrons for all the fine food. When has that happened in a hospital? No patient asks to see the MT who ran the test. And our invisibility often makes our problems invisible to upper management. This is another simple question, but laboratorians give a wide variety of answers. The laboratory produces test results. You feed in samples, it feeds out numbers. The core job of a laboratory is to produce the correct test result. All three types of errors need to be addressed NOW. Each has different root causes and each may require a different approach to solve. Similarly many laboratories report data through a computer and it may take the Information Services folks to help with post-analytical errors. A random number generator would be more efficient and certainly cheaper. With the floor staff. With the IS team. Do you want anchovies on that?