Brief Communication

Pre-preanalytical error and patient safety: an important concern for diabetic care

Viroj Wiwanitkit, Bangkhae, Bangkok Thailand


Abstract

Laboratory investigation plays an important role in diabetic care. Laboratory results are required for diagnosis, monitoring and follow up of the diabetic patient. To have a good diabetic management, accurate and reliable laboratory tests are required. Based on the principle of laboratory medicine, quality management covering all phases of laboratory analysis; pre-analytical, analytical and postanalytical phases is very important. However, there are also other additional concerns. The pre-preanalytical management for diabetic laboratories is a good example. Basically, pre-preanalytical errors in diabetic testing are fairly common and this is an important issue in the area of patient safety. In this article, the author reviews and discusses pre-preanalytical errors and patient safety.

Introduction

Diabetes mellitus is the most common chronic endocrine disorder in general practice at present. Many million cases of diabetes mellitus are receiving medical care around the world. Laboratory investigation plays an important role in diabetic care. Laboratory results are required for diagnosis, monitoring and following up of the diabetic patient. Many laboratory investigations such as fasting blood glucose are available and routinely used in any medical settings around the world. To have a good diabetic management, accurate and reliable laboratory testing is required. Because the main pathology in diabetes mellitus is abnormal glucose metabolism that results in hyperglycemia, the determination of alteration of glucose biomarkers in blood stream is very important. It is not possible to see blood levels without laboratory investigation hence there is no doubt that diabetes testing is a very important part of clinical chemistry investigation in laboratory medicine.

Based on the principle of laboratory medicine, quality management covering all phases of laboratory analysis; pre-analytical, analytical and postanalytical phase is very important.
Errors, in the laboratory cycle can result in aberrant results. Those results can result in incorrect and inappropriate diabetic case management and in the worst case can even result in death. However, there are also other additional concerns. The pre-preanalytical management for a diabetic laboratory is a good example. Basically, pre-preanalytical error in diabetic testing are common and this is an important issue in the area of patient safety. In this article, the author reviews and discusses pre-preanalytical errors and patient safety.

**Pre-preanalytical phase, what is it?**

In general laboratory medicine principle, there are three main phases, pre-analytical, analytical and postanalytical phases. The Pre-analytical phase is the phase from specimen collection till laboratory analysis. Serum preparation before actual analysis is also part of this phase. The Analytical phase is the phase involving the actual analysis by laboratory techniques using laboratory tools. The Postanalytical phase is the phase after the analysis. The validation and reporting of results is part of this phase.

So the question is "what is the pre-preanalytical phase?" This means the phase before the pre-analytical phase. One can imagine that it is the phase covering laboratory requesting, patient preparation, sample collection and apparatus preparation. This is the actual starting point of the laboratory analysis. It is commonly believed that errors in laboratory analysis occur before the analytical phase. These errors can certainly be detected in the pre-preanalytical phase.

**Pre-preanalytical error and patient safety**

As already noted, pre-preanalytical errors are fairly common and these are the earliest possible errors in laboratory analysis sequence. Certainly, if there is an error in this phase, correct laboratory results cannot be expected and poor patient management can be the result. If the physician-in-charge makes a clinical decision based on the incorrect laboratory results, inappropriate clinical management is the outcome. This can result in a range of outcomes from no improvement of illness, deterioration of clinical status to death.

Hence, this is an important concern in patient safety management. Modern concepts in laboratory medicine stress the importance of the control of pre-preanalytical errors. There must be good systems in place to control and monitor pre-preanalytical errors in any medical setting.

**Pre-preanalytical management and diabetic care**

It is very important for every diabetic clinic to set up a good laboratory investigation system for diabetic care. The focus on pre-preanalytical error is very important. Here, the author will discuss the important aspects of the pre-preanalytical phase in the management of diabetic case.

1. **Laboratory requesting:** Laboratory requesting is an activity that is performed by the concerned physician. Basically, the request must be based on the good clinical practice, based on a sound rationale. The request must have a clear indication and no
contraindication. Inappropriate laboratory requesting in diabetic care is often seen and it is an area of concern in medical education. 

2. **Patient preparation**: Patient preparation for diabetic testing is usually problematic. Even the most basic test, fasting blood sugar can pose many problems. Inadequate patient preparation can result in skewed results. For example, if the patient has not fasted fully and does not disclose this fact to the laboratory technician and physician, incorrect lab results can be expected. The incorrect increased fasting blood sugar might lead to the inappropriate antidiabetic drug adjustment and this can result in unwanted antidiabetic drug effect such as severe hypoglycemia. On the other hand, sometimes the patient may have observed very strict fasting and may have to wait to get blood testing in the morning. This may result in hypoglycemia. Hence, the specimen collection unit must have the good system to monitor the signs of hypoglycemia among the diabetic patient waiting for diabetic testing.

3. **Sample collection apparatus preparation**: This means the preparation of tube, needle and etc. This seems a simple thing but there can be many procedural shortfalls resulting in errors. The standards of tube preparation and labeling are published and should be followed. The use of automated tube labeling could be helpful and should be considered to improve the quality and safety in specimen collection.

References