Quality Improvement in Pre Analytical Process

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OUTLINE

- Introduction
- Source of pre analytical error
- Step to minimize pre analytical error

Introduction

- Laboratory plays an important role in the patient centred approach to the delivery of healthcare services.

- 70% of clinical decision are based on laboratory test result.

Lab testing consist of 3 phases

- Pre analytical
- Analytical
- Post analytical

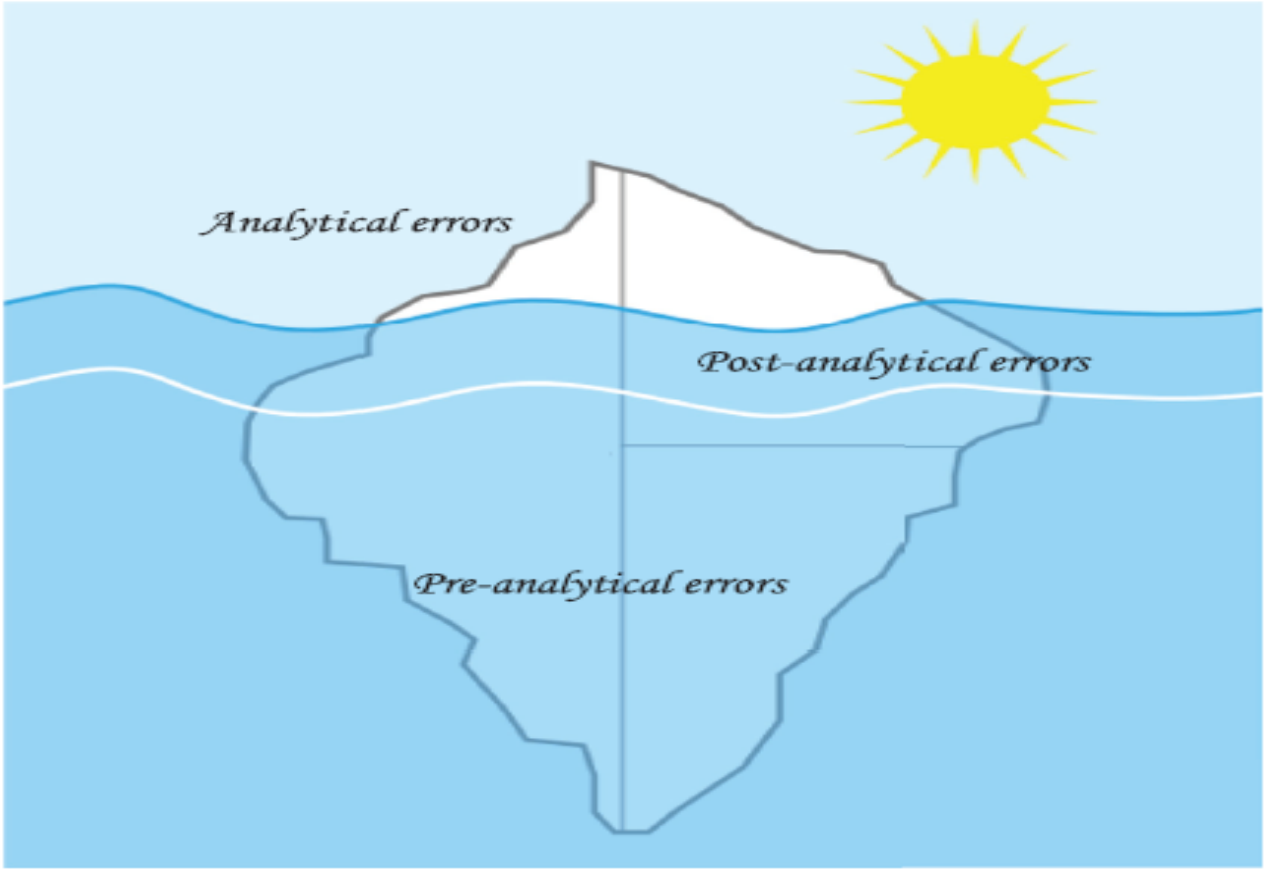


Figure 1 The iceberg of laboratory errors.

Source of Pre analytical error

- Before specimen collection

- Inappropriate test requested
- Patient identification error
- Inadequate patient preparation

Source of Pre analytical error

- During specimen collection

- Inadequate sample volume
- Inappropriate tube mixing
- Inappropriate specimen container
- Contamination from IV drip

Source of Pre analytical error

- After specimen collection

- Labelling error
- Improper specimen storage and transport

Possible consequences

- Erroneous lab result- inappropriate patient care
- Redraw
- Retesting

Step to minimize pre analytical error

- Education and communication
- Choosing appropriate specimen tube
- Adhering to standard guidelines
- Developing clear, written procedures
- Using appropriate technology e.g. HIL index
- Monitoring quality indicators in the lab

Education and communication

- Continous education to our client/ customer, phlebotomies. Regarding specimen collection technique.
- Website and handbook. Eg: Patient preparation, specimen tube
- Regular customer feedback and satisfaction survey.

Appropriate specimen tube

- Choose the appropriate specimen tube
- Which one to use?
- Verification of specimen tube
- CLSI- GP34-A protocol
- Physical and test result

Serum Vs Plasma

- Aim: to improve LTAT
- Serum- Advantages: free of cell, more stable. Disadvantage: needs to be clotted for 30 to 60 minute.
- Plasma- Advantage: Faster clotting time, Disadvantage: lower stability for certain analyte eg: enzyme.

Adhering to standard guideline

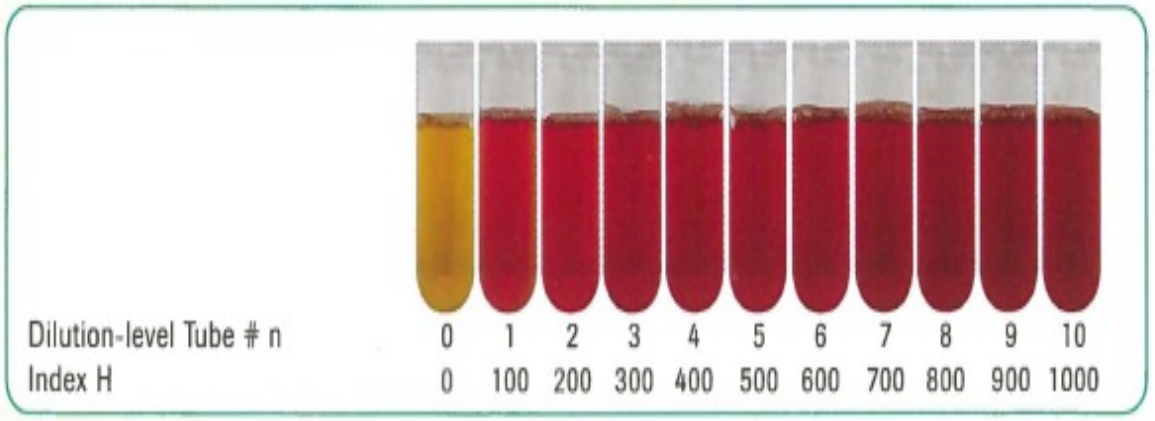
- Order of draw
- Aim: to prevent contamination
- Proper additive to blood ratio to avoid over filling and underfilling.

Standard operating procedure

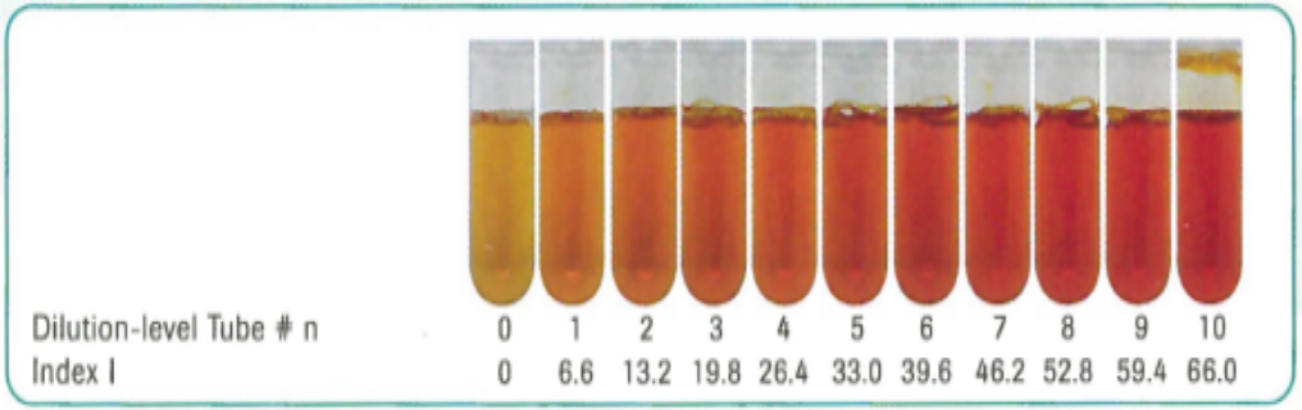
- Clear written procedure
- Explain clearly regarding patient preparation eg: fasting or non fasting, 24 hour urine collection
- Acceptance and rejection criteria

Using appropriate technology

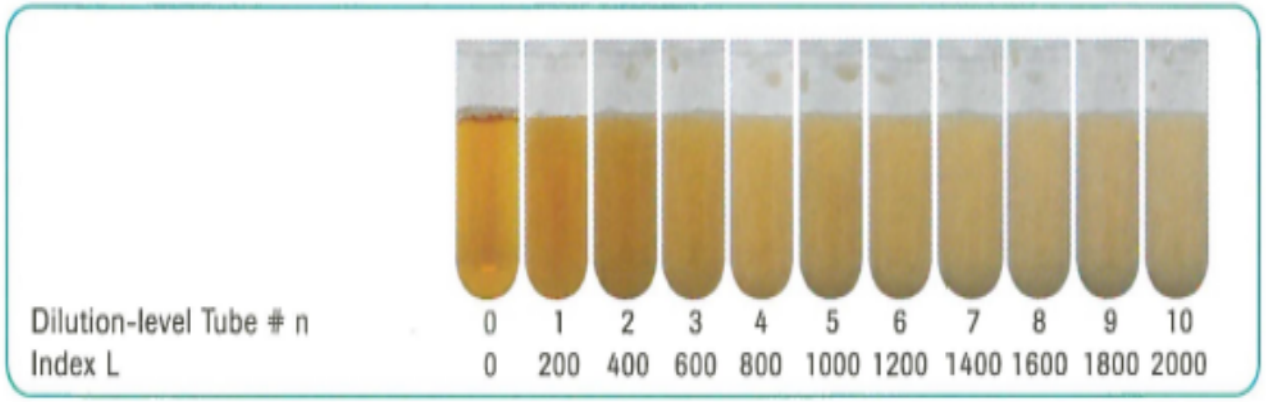
- Eg: HIL index
- HIL replace manual inspection
- Operator dependent
- Assess the quality of the sample
- Prevent sample retrievable in post analytical process



Plasma samples with increasing degrees of hemolysis



Plasma samples with increasing degrees of icterus



Plasma samples with increasing degrees of turbidity

Features of HI on different platform

Table 1
Characteristics of hemolysis index [HI] test parameters on different commercial platforms.

Company/platform	Interferent material used	Maximum concentration of hemoglobin tested [g/l]	Sample volume for HI testing [μl]	Diluent type [volume] [μl]	Read wavelengths [nm]	HI report
Abbott Architect	Fresh erythrocyte hemolysate	20	5.3	Saline [200]	572/604; 628/660	5 levels
Beckman Coulter AU	Fresh erythrocyte hemolysate	5	2.0–1.6	Saline [150]	410/480; 600/800	6 levels
Beckman Coulter Synchron	Fresh erythrocyte hemolysate	5	14	Tris buffer pH 7.6 [200]	340, 410, 470, 600, 670	11 levels
Ortho Vitros	Fresh erythrocyte hemolysate	5–10	35[a]	Undiluted	522/750	Concentration units
Roche Cobas & Integra	Fresh erythrocyte hemolysate	10	6	Saline [150]	570/600	Absolute numbers [range: 1–1000]
Siemens Advia	Fresh erythrocyte hemolysate	5.25	5	Saline [100]	571/596	5 levels
Siemens Dimension	Fresh erythrocyte hemolysate	10	10	Water [150]	405/700	8 levels
Recommended[b]	Fresh erythrocyte hemolysate	10	The lowest yielding an accurate measurement	Not giving rise to paraprotein precipitation	Detection methods should account for the absorbance spectrum overlap of hemoglobin, bilirubin and lipemia/turbidity	Concentration unit or absolute number

[a] HI analysis does not consume the sample.
[b] According to the Clinical and Laboratory Standards Institute document C56-A [5].

Monitoring of sample transportation

- Need to monitor

- Time between specimen collection and specimen analysis

- Temperature and time of sample storage from collection and specimen analysis. Eg: Ammonia, lactate, blood gas

- Temperature monitoring system eg: temp lodger.

Monitoring quality indicator

- LTAT for urgent & routine
- Rejection rate
- Compared with national standard
- For continuous improvement

Thank You