Editorial

Primary blood tubes mixing: time for updated recommendations

Giuseppe Lippi and Mario Plebani

Keywords: additive; laboratory errors; preanalytical variability; serum; tube mixing.

Due to spasmodic efforts made by international organizations (1, 2), national and international working groups on quality in laboratory medicine (3, 4) as well as from the activities and publications of several independent research teams (5–7), the quality throughout the total testing process has dramatically increased over the past decades, especially in the manually intensive activities of the preanalytical phase that still represent the most vulnerable steps in laboratory diagnostics (2, 5–7). Reliable data attest that the errors in the pre-preparation phase (5–7) are still prevalent and most of these involve unsuitable or mishandled procedures for collection of the specimens. Although major focus is increasingly placed on accurate patient (and tube) identification and use of specimens, although major focus is increasingly placed on accurate patient (and tube) identification, the use of inappropriate devices, underfilling of blood tubes, exposure to extreme temperatures and centrifugation at a too high speed of partially coagulated specimens. Among these causes, excessive shaking or mixing of blood after collection (i.e., for at least three main reasons. First, in vitro hemolysis is the most prevalent preanalytical error across countries, healthcare facilities and categories of clinical laboratory (15–20). Several causes have been traditionally associated with an increased rate of spurious hemolysis, including difficult venipuncture, use of inappropriate devices, underfilling of blood tubes, exposure to extreme temperatures and centrifugation at a too high speed of partially coagulated specimens. Among these causes, excessive shaking or mixing of blood after collection (i.e., for times longer than recommended or with great forces) has also been acknowledged as a leading source of RBC injury, but no previous evidence has been provided that instant and gentle mixing may yet increase hemolysis in venous blood samples. The second take-home message from the article of Parenmark and Landberg is more practical. The prevalence of hemolytic specimens is increasingly considered a reliable index for assessing preanalytical quality (21–23). The evidence that the
standard procedures for sample handling may still generate hemolysis, calls for an urgent revision of this policy, in that a certain number of unsuitable specimens may still be produced, while strictly following what is currently considered the “best practice”. Finally, the data provided by Parenmark and Landberg, as well as that provided in previous studies (9-12), demonstrate that large, well-designed studies, based on the most possible types of tubes or anticoagulants and performing the largest possible number of tests, are required for updating the current recommendations for primary blood tubes handling immediately after collection.

Conflict of interest statement

Authors’ conflict of interest disclosure: The authors stated that there are no conflicts of interest regarding the publication of this article.

Research funding: None declared.

Employment or leadership: None declared.

Honorarium: None declared.

References


Giuseppe Lippi1
Mario Plebani2,*
1Clinical Chemistry and Hematology Laboratory, Department of Pathology and Laboratory Medicine, Academic Hospital of Parma, Parma, Italy
2Department of Laboratory Medicine, University-Hospital of Padova, Padova, Italy

*Corresponding author: Prof. Mario Plebani, CCLM Editor-in-Chief, Department of Laboratory Medicine, University-Hospital of Padova, Via Giustiniani 2, 35128 Padova, Italy
Phone: +39 0498212792, Fax: +39 049663240, E-mail: mario.plebani@unipd.it