Giuseppe Lippi, Gianfranco Cervellin and Mario Plebani*

Less is more, but do not throw out the baby with the bathwater either!

DOI 10.1515/dx-2014-0041

The appropriate and discretionary use of laboratory resources is a paradigm for emergency physicians and other healthcare professionals working in short stay units. This epitome has become more and more true in the past decade, for a number of reasons. First, an unprecedented economical crisis is dramatically inflating public healthcare funding around the globe, and this trend clearly collides with the increasing demand for healthcare services. Simultaneously, major advances in human biology and technology have identified a large number of innovative biomarkers, and these have considerably amplified the diagnostic armamentarium for diagnosing and monitoring human disorders [1]. Last but not least, the uncertainty that still surrounds the use of a number of biomarkers in the emergency room (e.g., cardiospecific troponins among others) has accentuated some ancient diagnostic dilemmas that found their natural expression in the concept of “personalized medicine”.

In an article published in this issue of the Journal, van de Wijngaart et al. [2] investigated which laboratory tests are essential for optimal decision making in the Emergency Department (ED) of a large, general care and teaching hospital in the Netherlands. The study was based on a survey, which was disseminated by email to a relevant number of fellows and physicians who were active at the ED. The results of this study are interesting, because the responders identified that a rather limited number of tests (i.e., C-reactive protein, leukocytes, urea, creatinine, sodium, potassium, hemoglobin) were essential for optimal decision making. Glucose and troponin were excluded from the list since the former parameter was assessed using portable point-of-care (POC) devices, and cardiac patients were directly referred to the cardiac care unit. Although the authors should be commended for this interesting study, there are several aspects that deserve critical comment.

The first issue is whether this list is too restrictive. We would all agree that the parameters identified in this study are a valuable support to clinical decision making

in the emergency room, but several others are unaccountably lacking. Some examples:

- Thrombocytopenia (platelet counts below $50 \times 10^9/L$), regardless of the specific cause, is associated with severe bleeding, a not infrequent problem in the ED [3].
- Pancreatitis is another frequent diagnosis in the ED, but in the Dutch survey no mention is made about the usefulness of pancreatic lipase, currently the biochemical gold standard for the diagnosis of this condition [4].
- First line coagulation tests (i.e., prothrombin time, activated partial thromboplastin time and fibrinogen) are also absent from the list, and this is another surprising finding since it is virtually impossible to accurately and speedily investigate a bleeding patient without knowing their hemostatic balance [5].
- D-dimer is another essential parameter, and the mainstay for the diagnosis of venous thromboembolism (VTE) and disseminated intravascular coagulation (DIC) [6].
- The essential role of other biomarkers such as the natriuretic peptides [7] or procalcitonin [8] is now virtually unquestionable for the early management of patients with heart failure and severe infections, respectively.

Another issue that deserves discussion is the use of portable POC devices for glucose measurement. The historical guidelines of the American Diabetes Association, recently updated in the 2014 [9], advise against the use of POC devices for diagnosing diabetes, since blood glucose monitoring by POC is primarily indicated for guiding insulin dosing. Considering that urea, creatinine, sodium and potassium were routinely assessed in the core laboratory, it seems rather inappropriate and inexplicably expensive to separately measure this parameter by a POC device, that is not intended for this use in emergency settings.

A final concern is the pathway for evaluation of patients with suspect acute coronary syndrome.

According to the local protocol, patients with suspected heart problems (whether or not an ECG had been performed), were directly referred to the Cardiac Care Unit. This is a practice that carries several potential problems. The first issue is the potential for overcrowding of this highly specific and fragile healthcare environment, a condition that may be dramatically magnified with the use of highly-sensitive troponin immunoassays [10]. Moreover, and probably most clinically important, the definition of an acute “cardiac” patient is now most appropriately done via troponin testing, with the exception of ST-segment elevation myocardial infarction (STEMI). In this unique clinical presentation, troponin testing is confirmatory but probably unnecessarily redundant, and in the Western world STEMIs currently represent only 15%–30% of all the acute coronary syndromes [11]. The care pathway of direct referral of cardiac patients to the cardiac care unit may expedite care for those few patients experiencing an acute coronary syndrome, but might have the unintended consequence of delaying appropriate care for patients with other diagnoses.

Regardless of these concerns, a very reasonable conclusion was reached by van de Wijngaart et al. after extensive discussions with the representatives of the ED, in that it was decided not to revise the current practice by introducing smaller test panels. This seems appropriate, from both the laboratory and the ED perspective. In fact, although the notion that “less is more” has indeed a rational basis [12], we must not throw out the baby with the bathwater as a reflexive effort to increase appropriateness and decrease avoidable healthcare costs. It is appropriate to recognize that that although ‘stat’ testing is expensive, [13] laboratory diagnostics accounts for <2% of overall healthcare expenditure [14], and that several biomarkers now provide an invaluable support to the decision making process in the ED when these testing requests are appropriate and indicated [15]. In the ED, as well as in the entire health care context, the potential information conveyed by patient history, physical examination, and diagnostic testing is only overlapping, but often mutually dependent. We should all accept the challenge of developing and refining circumscribed clinical pathways that improve outcomes, and not focus solely or narrowly on measures to restrict test ordering.

In conclusion, the study by Van de Wijngaart et al. [2] examines the tension between the costs of and the quality of healthcare, using the real-world example of diagnostic testing in a specific ED, and the inherent difficulty of optimizing both. We believe that a patient-centered approach should be the deciding factor, in the belief that appropriate care is ultimately also the most economical.

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

1. Lippi G, Plebani M. Biomarker research and leading causes of death worldwide: a rather feeble relationship. *Clin Chem Lab Med* 2013;51:1691–3.
2. van de Wijngaart DJ, Scherrenburg J, van den Broek L, van Dijk N, Janssens PM. Survey of doctors reveals that few lab tests are of primary importance at the Emergency Department. *Diagnosis* 2014;1:239–44.
3. Carubbi C, Masselli E, Nouvenne A, Russo D, Galli D, Mirandola P, et al. Laboratory diagnostics of inherited platelet disorders. *Clin Chem Lab Med* 2014;52:1091–106.
4. Lippi G, Valentino M, Cervellin G. Laboratory diagnosis of acute pancreatitis: in search of the Holy Grail. *Crit Rev Clin Lab Sci* 2012;49:18–31.
5. Lippi G, Favaloro EJ. Laboratory hemostasis: milestones in Clinical Chemistry and Laboratory Medicine. *Clin Chem Lab Med* 2013;51:91–7.
6. Lippi G, Cervellin G, Casagrandi I, Morelli B, Testa S, Tripodi A. D-dimer testing for suspected venous thromboembolism in the emergency department. Consensus document of AcEMC, CISMEL, SIBioC, and SIMeL. *Clin Chem Lab Med* 2014;52: 621–8.
7. Di Somma S, Navarin S, Giordano S, Spadini F, Lippi G, Cervellin G, et al. The emerging role of biomarkers and bio-impedance in evaluating hydration status in patients with acute heart failure. *Clin Chem Lab Med* 2012;50: 2093–105.
8. Di Somma S, Magrini L, Travaglino F, Lalle I, Fiotti N, Cervellin G, et al. Opinion paper on innovative approach of biomarkers for infectious diseases and sepsis management in the emergency department. *Clin Chem Lab Med* 2013;51:1167–75.
9. American Diabetes Association. Standards of medical care in diabetes – 2014. *Diabetes Care* 2014;37(Suppl 1):S14–80.
10. Casagrandi I, Cavazza M, Clerico A, Galvani M, Ottani F, Zaninotto M, et al. Proposal for the use in emergency departments of cardiac troponins measured with the latest generation methods in patients with suspected acute coronary syndrome without persistent ST-segment elevation. *Clin Chem Lab Med* 2013;51:1727–37.
11. Cervellin G, Lippi G. Of MIs and Men – a historical perspective on the diagnostics of acute myocardial infarction. *Sem Thromb Hemost* 2014; DOI <http://dx.doi.org/10.1055/s-0034-1383544> Accessed on 14 July 2014, [epub ahead of print].
12. Schuur JD, Carney DP, Lyn ET, Raja AS, Michael JA, Ross NG, et al. A top-five list for emergency medicine: a pilot project

to improve the value of emergency care. *JAMA Intern Med* 2014;174:509–15.

13. Lippi G, Mattiuzzi C, Plebani M. Stat testing utilization in clinical laboratories. National survey of Italian Society of Clinical Biochemistry and Molecular Biology (SIBioC). *Clin Chem Lab Med* 2014;52:e79–84.
14. Lippi G, Mattiuzzi C. Testing volume is not synonymous of cost, value and efficacy in laboratory diagnostics. *Clin Chem Lab Med* 2013;51:243–5.
15. Lippi G, Cervellin G, Plebani M. The ten commandments of laboratory testing for emergency physicians. *Clin Chem Lab Med* 2014;52:183–7.

Mario Plebani

Co-Editor of *Diagnosis*, Department of Laboratory Medicine, University-Hospital of Padova, Via Giustiniani 2, 35128 Padova, Italy, Phone: +390498212792, Fax: +39049663240, E-mail: mario.plebani@unipd.it

Giuseppe Lippi

Laboratory of Clinical Chemistry and Hematology, Academic Hospital of Parma, Parma, Italy

Gianfranco Cervellin

Department of Emergency Medicine, Academic Hospital of Parma, Parma, Italy