Keywords: laboratory organization; phlebotomy; preanalytical variability; stat testing; urgent testing.

Stat or urgent testing is a conventional circumlocution, which is used to designate timely or “rush” performance of laboratory tests. The term “stat” is literally derived from the Latin word “statim”, which actually means “immediately”. In the daily practice, this concept is used to define a series of activities or processes required to obtain rapid test results for the immediate management of life-threatening conditions, and thereby involves typically rapid access information on blood gases, glucose, electrolytes, coagulation tests, enzymes of acute cytolysis (e.g., alanine aminotransferase or lipase) and cardiac troponins, among others. It thereby designates the highest degree of medical priority, so that the laboratory staff should ideally interrupt what they are doing to run the test immediately. In a broader perspective, this definition can be enlarged to embrace all those conditions – even when not really life-threatening – that would require rapid diagnostic or therapeutic decision, either clinically or organizationally driven. Typical cases may be those of patients urging therapeutic adjustment or rapid diagnostic testing before undergoing surgery, or requiring fast test results for being discharged from the emergency department (ED) or intensive care unit (ICU). The ideal – although not really exclusive – stakeholders of stat testing are thereby the emerging physicians (and/or nurses) working in EDs or ICUs, whereby time is always critical for both clinical (i.e., serious pathologies) and organizational (i.e., overcrowding) issues (1). While in the past laboratory professionals have often overlooked timeliness as an important attribute, clinicians often judge the adequacy of laboratory services by the speed with which results are reported (2). In the last decades, however, both for the developments of point-of-care (POC) technologies and reorganization of acute care in hospitals, laboratory professionals have considered this important issue more in-depth (3).

The laboratory management of stat testing encompasses three main solutions, which include: 1) processing all samples, both stat and routine, in the central laboratory on the same instrumentation (i.e., the “core lab”), with priority given to the formers; 2) processing urgent testing on dedicated instrumentation (i.e., a “satellite lab”), separate from the pathway and analyzers that are used for routine diagnostics; and 3) bedside testing through implementation of POC devices in the ED, ICU or any other ward that more often would require urgent test results for patient management (Figure 1). There is no reliable evidence supporting the conjecture that one solution may be better than another, so that the final choice typically suits mission and vision of the healthcare facility, as well as economical, organizational and environmental aspects, all being locally defined (4). Each solution carries its own peculiar advantages [e.g., the turnaround time (TAT) may be shorter for bedside testing than in a satellite laboratory, wherein the same TAT of the latter may be shorter than centralized testing] (5, 6), as well as its own drawbacks (e.g., the implementation of a satellite laboratory may require a greater number of analyzers and operators, whereas POCs require appropriate formation and continuous education of nursing staff).

Besides this general premise on the topic, the universal perception that most laboratory professionals have about stat testing is scarcely enthusiastic. What we commonly observe in our laboratories, is that stat exams are often requested for the utmostly different reasons, including re-testing of samples (when the previous had been reported as unsuitable, or because some tests were forgotten), the need – or wish – to have quick routine results in overcrowded wards, the unawareness of the real difference between a routine or stat test, or simply because busy physicians are not getting results in the expected and timely manner and thereby order more urgent tests to compensate for the perceived inefficiency of the laboratory. In these uneventful perspectives, it is not surprising that some laboratories can reach a point where a bizarre 50% proportion of tests are ordered stat (7). Another interesting and peculiar scenario, published in this issue of Clinical Chemistry and Laboratory Medicine, is that depicted in a Danish hospital by Scherrenburg et al., whereby the laboratory is normally responsible for phlebotomy (except for ED, ICU and cardiology department) (8). When the clinicians request the laboratory for blood sampling at any time outside the three regular blood-sampling rounds, all these requests would be automatically labeled as stat. It is rather clear that such an attitude puts an exaggerated pressure on the laboratory, and may rather questionably delay the results of patients in queue waiting for important diagnostic or therapeutic decisions.

Before specifically addressing the matter of what can be done to relieve the laboratory from a large number of not really stat – but still urgently ordered – tests, it is important...
to focus on another relevant issue raised in the article of Scherrenburg et al., that is how phlebotomy is carried out in different countries. In the era of globalization, drawing blood is probably the least standardized “diagnostic” procedure worldwide (9, 10). In some countries the blood collection responsibility is mostly attributed to physicians, in others is mostly performed by the nursing staff or is under the responsibility of certified or accredited phlebotomists, whereas in some countries the laboratory and administrative staff can also draw blood, provided that a specific educational program had been followed (11). When we explore the type and level of education required to become qualified for drawing blood, the situation is even more heterogeneous across different countries, and often within the same nation (12, 13). It is also important to mention here that independently from specific indications provided by the manufacturers of blood tubes and blood collection devices, there are only a few official recommendations or guidelines on phlebotomy, such as those issued by the Clinical Laboratory Standards Institute (CLIS) in 2007 (14), the World Health Organization in 2010 (15), the International Committee for Standardization in Haematology back in 1982 (ICSH) (16), or those locally produced by the Italian Society of Clinical Biochemistry and Molecular Biology (SIBioC)/Italian Society of Laboratory Medicine (SIMeL) in 2008 (17), and by the Scandinavian Committee on Reference Values and a working group set up by the National Paediatric Societies in the Nordic countries in 1990 (18), among others. It is hence noteworthy that the Working Group on the Preanalytical Phase of the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) – as first step of its activity – has disseminated a 17-item questionnaire across all European societies of clinical biochemistry and laboratory medicine affiliated to the EFLM for investigating by whom phlebotomy is done and what level of education is required for this specific task. The results of this preliminary survey, which will be presented at the 2nd EFLM-BD European Conference on Preanalytical Phase that will be held in Zagreb, 1–2 April 2013 (http://www.preanalytical-phase.org/), will also serve as a background for developing European guidelines about phlebotomy and several other preanalytical issues that still plague laboratory diagnostics (9, 10, 19), including accurate labeling (20) and mixing (21) of the samples, as well as appropriate conditions for transportation of biological materials to the laboratory (22).

Going back to the article of Scherrenburg et al., some conclusions appear questionable. Although we would all agree that stat tests ordered for medical needs may be most often appropriate, it is however doubtful that logistical issues can be considered “good reasons” for ordering urgent phlebotomy and thereby stat testing. What must be clearly understood by clinicians and the laboratory is that organizational inefficiency or inadequacy within or outside the hospital pose unreasonable pressure to the laboratory, incidentally delaying those analyses that are instead really urgent. According to philosophical and – most importantly – practical reasons, the use of stat requests cannot be considered the logical solution for correct functioning of modern hospital care (both routine and acute), and it is even more impressive that these logistical problems accounted for nearly half of all urgent tests daily performed in the laboratory of Clinical Chemistry and Haematology of Arnhem. It is even more concerning that both physicians and
nurses had implicitly acknowledged, while ordering an urgent test, that in up to two-third of cases this would not lead to an urgent change in treatment, and that in most cases this had been required for coupling with fixed time points as required by protocols, as confirmation before an intended intervention, a check before discharging the patients from the hospital, or for a short stay of the patient in the ward. It is undeniable that all these cannot be considered “genuine” conditions for justifying urgent testing, and a more flexible organization, coupled by technology and automation, would dramatically reduce the ordering of virtually inappropriate stat tests (23). The inappropriateness of stat test request has also been previously demonstrated by Kilpatrick and Holding in a UK hospital (24), wherein the results from 1443/3228 (45%) of urgent requests from accident and emergency and 529/1836 (29%) from the admissions ward were never accessed via the ward terminal.

In whatever healthcare system there is little reason to justify that blood drawing must be performed by phlebotomists or laboratory personnel not being doctors or nurses close to the patient, provided that the healthcare staff with blood collection responsibility are adequately trained. The other important issue that may motivate a stat test is the long TAT, which may be caused by the need to call the phlebotomist and then manually transport the samples in the central laboratory. The latter problem can be solved with technological aids that would replace human activities, e.g., the use of pneumatic transport systems or robots, or with placement of POC devices in EDS and ICUs under direct supervision and jurisdiction of the laboratory manager (25). The implementation of a pneumatic tube system, with stations located at each nursing and outpatient area, would particularly permit to eliminate the batch processes at the front-end order, collection, and delivery-to-core-lab stages (26). This would also favorably impact on the clinical-laboratory interface, which is already challenged by several other relational (27), pre-analytical and analytical problems (9, 10, 19). It is however undeniable that Scherrenburg et al. should be prized for their valuable initiative to investigate the pathway of stat testing in their local facility, since this has allowed to identify some conventional behaviors or logistical inefficiency that might be targeted with tailored interventions, but also because physicians and nurses were forced to retrospectively analyze the reasons for the stat phlebotomy requests, and thus assess their appropriateness.

Squeezed between rising expenditures and falling healthcare revenues, the relationship between phlebotomy, stat testing and hospital organization is anything but ancillary. Stat testing is unquestionably inherent to medicine, but the placement of a barely sustainable pressure on the laboratory through urgent testing is not the panacea to logistical inefficiencies. We all know that reducing inappropriate stat requests implies to embark on a challenging journey and a nearly systemwide redesign, but it is undeniable that the constrained budget coupled with the shortage of personnel that are likely to characterize the scenario of clinical laboratories in the second decade of the third millennium will require our full commitment to this goal.

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
Ana-Maria Simundic²
Mario Plebani¹,*
¹Clinical Chemistry and Hematology Laboratory, Academic Hospital of Parma, Parma, Italy
²Clinical Institute of Chemistry, Sestre Milosrdnice University Hospital Center, Zagreb, Zagreb, Croatia
³Department of Laboratory Medicine, University 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