

## POINT-OF-CARE TESTING: CAN IT BE ADAPTED FOR THE FIELD ENVIRONMENT?

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### SUMMARY

Technologic advances have made laboratory testing feasible at the bedside. Point-of-care testing (POCT) allows medical providers to assess a wide range of clinical conditions in a rapid fashion at the site of patient interaction. While POCT has begun to impact on the delivery of care in the hospital setting, its potential for use in remote, field environments or during aeromedical evacuation is just being realized. In the civilian setting, discussion of POCT focuses on regulatory guidance, cost effectiveness, and reimbursement. Little attention has been paid in the literature to expanding the use of these capabilities beyond the traditional hospital boundaries. In this paper, we will briefly review the development of POCT and the associated technology. In addition, we will discuss the potential role of POCT in the field using current technology. Finally, we will review the available literature on use of POCT in the field.

### INTRODUCTION

When providing direct patient care in nontraditional settings, there occasionally arises the need to ascertain physiologic measurements which are difficult to obtain outside of the hospital environment. Rapid analysis of laboratory tests can be essential in the management of our patients, particularly the critically ill and injured. The availability of selected analytes such as glucose, electrolytes, hematocrit, blood gases, and pH can significantly affect the direction of treatment, prognosis, and triage decisions. The lack of this information can lead to the assumption of a "worst case" which will then drive triage and treatment decisions that may adversely impact the delivery of care to other patients and the need for evacuation.

The development of devices incorporating microchemistry, miniaturization, and microcomputerization has led us to a point where many of these desired tests can be performed real-time at the point of patient interaction. This capability is referred to as point-of-care testing (POCT). It would seem a simple answer to a complex clinical problem, but even in the traditional clinical setting, POCT is surrounded by controversy. Issues of regulation, quality management, and cost effectiveness often interfere with the establishment of a POCT system. In the field setting, there are even more questions regarding durability, reliability, and ease of use.

In this paper, we will review the development of POCT along with its associated technology. Using this information we will examine some of the currently available systems and their applicability for use in the field or during aeromedical evacuation. Finally, we will review the limited literature on POCT in the field to assess the overall utility of this technology for application in the, more often than not, hostile field environment.

### POCT DEVELOPMENT

There has always been a desire on the part of clinicians to have immediate access to all of the variables which impact on our patient's diagnosis, treatment, and prognosis. Technologic advances continue to provide us with greater opportunities to have that information at our fingertips. Point-of-care testing has been available for many years. The monitoring of blood glucose concentrations through the use of reagent strips and subsequent techniques has been available since the 1970's (Ref 1). The Vietnam conflict with the resulting movement of large numbers of casualties led to early attempts to provide portable, miniaturized electrolyte analyzers (Fig 2). Concerns about the need to provide rapid evaluation of hematocrit and electrolytes in burn patients being moved through the aeromedical system was the prime motivating factor in these development efforts (Ref 2).



FIGURE 1. Complete analytic system with case open and with miniature centrifuge mounted on its charger base (Aerospace Med 1970;41:880).