TITLE: Pre-Hospital Phlebotomy for Patients with Urgent Conditions: A Review of the Clinical Effectiveness and Guidelines

DATE: 01 June 2010

CONTEXT AND POLICY ISSUES:

One of the important factors in diagnosing and treating an urgent medical condition is prompt medical attention. Rapid diagnosis and treatment of a potentially life-threatening condition such as myocardial infarction (MI), stroke, or sepsis can improve clinical outcomes and not only save lives, but also prevent permanent disability for survivors. Pre-hospital phlebotomy may facilitate expedited care for patients with urgent medical conditions at the receiving facility such as hospital emergency departments (ED). In this review, pre-hospital phlebotomy refers to the blood draw performed by Emergency Medical Services (EMS) personnel before patients with urgent medical conditions are transported to a hospital ED.

Data has shown that about 29% to 65% of patients with signs or symptoms of acute stroke accessed their initial medical care via local EMS, but another report stated that hospital emergency department (ED) acceptance of blood sample drawn by EMS staff is not a consistent standard of practice across hospitals. A suggestion was made to re-evaluate the practice of EDs that do not accept pre-hospital phlebotomy specimens drawn by EMS staff.

In order to help the Canadian jurisdictions develop guidelines on the acceptance of the pre-hospital blood sample, there is a need to identify the research evidence about the effectiveness of pre-hospital blood draw on clinical outcomes such as mortality, complications, and length of stay in hospital, and review the existing international guidelines on the practice of the pre-hospital phlebotomy. Evidence on EMS drawing evidentiary blood and at-home therapeutic phlebotomy for patients with iron-overload are not within the scope of this review.

RESEARCH QUESTIONS:

1. What is the clinical effectiveness of performing phlebotomy in the pre-hospital setting for patients with urgent conditions?
2. What are the guidelines for performing phlebotomy in the pre-hospital setting for patients with urgent conditions?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, OVID Embase, EBSCO CINAHL, the Cochrane Library (Issue 5, 2010), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold), EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between January 1, 2005 and May 6, 2010. No filters were applied to limit the retrieval by study type. Internet links were provided, where available.

SUMMARY OF FINDINGS:

One controlled clinical trial and two guidelines on pre-hospital phlebotomy were identified.

Controlled clinical trials

In a non-randomized controlled clinical trial published in 2010, Harrison et al compared sample redraw rates, ED throughput time, and staff undue blood exposure incidences due to blood drawing in patients whose blood sample was drawn by EMS with those patients whose blood samples were collected in the ED. Four hundred patients who were brought to ED by EMS (200 in EMS group; 200 in ED group) were included in this study. The results showed that the redraw rate was higher for the ED group (11.5%) than the EMS group (9.5%), although there was no statistically significant difference (P=0.88). No incidences of undue blood exposure were reported for EMS or ED staff caused by obtaining blood samples. There was a statistically significant difference in median ED throughput time between EMS group and ED group (163 minutes versus 180 minutes, respectively; P ≤0.05). Based on the results, the author concluded that pre-hospital phlebotomy by EMS in the field and subsequent ED acceptance of samples could be implemented as a standard of practice. The limitation of this study was that the participants were not randomly assigned to the two study groups. The author also pointed out several limitations, including the fact that the level of difficulty of intravenous line access and patient triage acuity were not measured. In addition, EMS staff did not have access to Microtainer tubes, which caused the greater sample redraw rate due to insufficient sample volume in the EMS group. Finally, no patient-related clinical outcomes such as mortality and complications were evaluated. Therefore, the results of this study should be interpreted with caution.

Guidelines and recommendations

Two potentially relevant American guideline documents were identified. One is the general operating guideline for intermediate level emergency medical technicians (EMT-I), which was developed by Stamford Hospital EMS Sponsor Hospital Program. The limitation of this guideline was that no methodology and development process were reported in this document. No evidence was provided to support the guideline statements. The other is the American Heart Association/ American Stroke Association guidelines for the early management of adults with ischemic stroke. The guideline recommendations were developed based on a systematic review.
by a guideline development panel. However, no clear recommendation was made on whether the pre-hospital phlebotomy should be implemented in EMS. Information from the two American guidelines is summarized in Table 1.

Table 1: Guideline information relevant to pre-hospital phlebotomy

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<th>Guidelines (source, year)</th>
<th>Guidelines/Statements</th>
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| EMT-Intermediate Clinical Care Guidelines, Policies and Procedures Stamford Hospital EMS Sponsor Hospital Program, Stamford, CT, USA, 2009⁵ | General operating guidelines for emergency medical technicians at the intermediate level (EMT-I):  
- Venous phlebotomy is not allowed in the pre-hospital setting.  
- Capillary blood sampling to obtain a fingerstick glucose level is permitted |
| Guidelines for the Early Management of Adults With Ischemic Stroke American Heart Association/ American Stroke Association et al: 2007⁵ | It was indicated that EMS checking blood glucose in most patients with stroke has been a routine practice, even for patients with no history of diabetes mellitus or use of insulin |

Limitations

Limited information was identified on pre-hospital phlebotomy by EMS. No randomized studies were identified. One non-randomized control trial was identified, but did not investigate the patient related clinical outcomes such as mortality or complications. The two guidelines identified did not make a clear recommendation on whether pre-hospital phlebotomy should be adopted as a standard practice in EMS.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

Although rapid assessment and diagnosis is key for early treatment of potentially life-threatening conditions such as MI and stroke, hospital ED acceptance of blood samples drawn by EMS staff is not a consistent standard of practice across hospitals. In this review, no evidence was identified to show whether pre-hospital phlebotomy or blood draw by EMS staff for expedited diagnosis and care improved the clinical outcomes for patients with urgent conditions such as MI or stroke. No recommendations were identified on whether pre-hospital phlebotomy should be used by EMS staff from identified international guidelines. Further well designed trials are needed to evaluate the clinical effectiveness of performing phlebotomy in the pre-hospital setting for patients with urgent conditions and to identify processes that will improve the quality of blood sample by EMS staff, such as providing appropriate education and supplies to the EMS.

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