TITLE: Routine Blood Tests for Patients in the Intensive Care Unit: Clinical Effectiveness, Cost-Effectiveness, and Guidelines

DATE: August 16, 2013

RESEARCH QUESTIONS

1. What is the clinical effectiveness of routine and daily blood tests for patients in the intensive care unit?

2. What is the cost-effectiveness of routine and daily blood tests for patients in the intensive care unit?

3. What are the evidence-based guidelines for routine and daily blood tests for patients in the intensive care unit?

KEY MESSAGE

Five non-randomized studies and one economic evaluation were identified regarding the clinical and cost-effectiveness of routine and daily blood tests for patients in the intensive care unit. No evidence-based guidelines were found.

METHODS

A limited literature search was conducted on key resources including PubMed, Medline, The Cochrane Library (2013, Issue 6), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2003 and August 2, 2013. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines.

Five non-randomized studies and one economic evaluation were identified regarding the clinical and cost-effectiveness of routine and daily blood tests for patients in the intensive care unit (ICU). No health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, or evidence-based guidelines were identified. Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

Five non-randomized studies (NRS)[1-5] examined routine and daily blood testing in the ICU. Three studies[1,2,5] implemented strategies to prevent long-term standing orders for routine biochemistry and hematology blood tests. All three studies found that the number of routine lab tests decreased significantly, resulting in less iatrogenic anemia and substantial cost savings, without compromising patient outcomes. One NRS[3] tracked routine blood tests performed consecutively and daily in the ICU, and documented the normality of the results. Almost 50% of the results were normal and 32% were consecutively normal. The authors questioned the practice of ordering consecutive routine blood tests that might not affect decision-making, could result in more transfusions, and add to the total health care costs. The fifth NRS[4] examined the practice of routine serial arterial blood gas (ABG) measurements in extubated patients in the ICU. The authors concluded that serial ABG measurements at one and three hours post-extubation were not useful.

One UK economic evaluation[6] on daily blood tests for patients in the ICU, implemented an order chart requiring medical personnel to specify required blood tests each day, for the following day. The implementation of this strategy resulted in a 33% net reduction in tests ordered, with a savings of approximately £18,000 per year. The evaluation did not study patient outcomes.

Overall, the included studies suggest that the ordering of routine and daily blood tests in the ICU could be limited without compromising patient safety, while providing substantial cost savings. No evidence-based guidelines regarding routine and daily blood testing in ICU patients were identified.

REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified

Systematic Reviews and Meta-analyses
No literature identified

Randomized Controlled Trials
No literature identified

Non-Randomized Studies

1. Iosfina I, Merkeley H, Cessford T, Geller G, Amiri N, Baradaran N, et al. Implementation of an on-demand strategy for routine blood testing in ICU patients [conference abstract]. American Journal of Respiratory and Critical Care Medicine [Internet]; 2013 [cited 2013 Aug 8];187:A5322. (Presented at American Thoracic Society 2013 International Conference; 17-22 May; Philadelphia, PA). Available from: http://www.atsjournals.org/doi/abs/10.1164/ajrccm-conference.2013.187.1_MeetingAbstracts.A5322

2. Pageler NM, Franzon D, Longhurst CA, Wood M, Shin AY, Adams ES, et al. Embedding time-limited laboratory orders within computerized provider order entry reduces laboratory utilization. Pediatr Crit Care Med. 2013 May;14(4):413-9.
    PubMed: PM23439456

3. Peixoto A, et al. Laboratory routine in the ICU: a practice to be abolished? Critical Care [Internet]. 2013 [cited 2013 Aug 8];17(Suppl 3):P12. http://ccforum.com/content/17/S3/P12

4. See KC, Phua J, Mukhopadhyay A. Monitoring of extubated patients: are routine arterial blood gas measurements useful and how long should patients be monitored in the intensive care unit? Anaesth Intensive Care. 2010 Jan;38(1):96-101.
    PubMed: PM20191784

5. Kumwilaisak K, Noto A, Schmidt UH, Beck CI, Crimi C, Lewandrowski K, et al. Effect of laboratory testing guidelines on the utilization of tests and order entries in a surgical intensive care unit. Crit Care Med. 2008 Nov;36(11):2993-9.
    PubMed: PM18824907

Economic Evaluations

6. Goddard K, Austin SJ. Appropriate regulation of routine laboratory testing can reduce the costs of associated with patient stay in the intensive care unit. Critical Care [Internet]. 2011 [cited 2013 Aug 8];15(Suppl 1):P133. Available from: http://ccforum.com/content/15/S1/P133

Guidelines and Recommendations
No literature identified

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APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies – changing ordering behaviours

7. Gonano C, Sitzwohl C, Pusch F, Kettner SC, Weinstabl C, Zimpfer M. Educational or organizational approach: which is more effective in changing blood-sampling habits? Anesth Analg. 2003 Nov;97(5):1479-82.
PubMed: PM14570669

Additional References

8. Melanson SE, Szymanski T, Rogers SO, Jarolim P, Frendl G, Rawn JD, et al. Utilization of arterial blood gas measurements in a large tertiary care hospital. Am J Clin Pathol. 2007 Apr;127(4):604-9.
PubMed: PM17369137