Paucity of studies to support that abnormal coagulation test results predict bleeding in the setting of invasive procedures: an evidence-based review

Segal J B, Dzik W H

CRD summary
The review assessed the ability of abnormal coagulation tests to predict bleeding during invasive procedures. The review process was reported clearly but it suffered from a number of limitations (as the authors acknowledged). The available evidence was weak and the authors' conclusion, that there was insufficient evidence to conclude that abnormal test results predict bleeding, was appropriate.

Authors' objectives
To determine whether abnormal coagulation tests can predict bleeding during invasive procedures.

Searching
MEDLINE was searched from inception to August 2004; the search terms were reported. In addition, the Cochrane Controlled Trials Register was searched, the reference lists of retrieved articles were screened, experts in the field were contacted, and the authors' own files were searched. No language restrictions were applied.

Study selection
Study designs of evaluations included in the review
No inclusion criteria relating to the study design were specified. All but one of the included studies was observational (prospective or retrospective series).

Specific interventions included in the review
Studies that measured the prothrombin time (PT) or international normalised ratio (INR) before an invasive procedure were eligible for inclusion. An abnormal test result was defined as an elevated INR or prolonged PT; where reported, the included studies defined an elevated INR as >1.2 or >1.5 and definitions of prolonged PT ranged from >11.5 seconds to >16 seconds.

Reference standard test against which the new test was compared
The review did not include any diagnostic accuracy studies that compared the performance of the index tests with a reference standard of diagnosis. The included studies measured the ability of the index tests to predict a clinical outcome.

Participants included in the review
Studies of participants undergoing one of 11 specified, invasive procedures were eligible for inclusion. Such procedures were: liver or kidney biopsy, nephrostomy tube placement, transhepatic biliary tube placement, epidural injection or lumbar puncture, central vein cannulation or implantation of venous access device, angiography or venography or cardiac catheterisation, thoracocentesis or paracentesis, or endoscopy. The included studies had to include at least 5 participants with abnormal test results. Participants were excluded if attempts were made to correct the coagulation abnormality prior to the procedure.

Outcomes assessed in the review
The included studies were required to report bleeding as an outcome, and report the outcomes separately for participants with abnormal coagulation tests. Definitions of bleeding and degree of severity varied between studies and were reported in full.

How were decisions on the relevance of primary studies made?
One reviewer made initial decisions on the relevance of primary studies using an abstract review form. More detailed inclusion criteria were then applied to retrieve articles.
Assessment of study quality
The authors stated that they assessed study quality using a validated quality assessment form, but provided no further details of the validity assessment.

Data extraction
One reviewer, who was not blinded to authors or journal names, extracted the data using a piloted data extraction form. Data from the forms were used to populate evidence tables, which a second reviewer checked for accuracy. Event rates were reported with 95% confidence intervals (CIs). For studies reporting a comparison group, the risk difference for bleeding outcomes in patients with abnormal coagulations tests relative to those with normal tests was calculated, along with its 95% CI.

Methods of synthesis
How were the studies combined?
No quantitative pooling was undertaken. The studies were grouped by procedure in a narrative synthesis. The results of individual included studies were plotted, by procedure, on a forest plot.

How were differences between studies investigated?
The studies were grouped by procedure and examined for qualitative heterogeneity. Since significant qualitative heterogeneity was apparent within groups, no quantitative analyses were undertaken.

Results of the review
Twenty-five studies (24 observational and one trial) were included in the review. The total number of participants was unclear.

The study designs were generally weak; only one trial was identified. Of the observational studies, only half included a comparison group with normal coagulation tests. Seven studies did not report a mean INR or PT (or range) for the participants. Descriptions of the inclusion criteria were poor, and sample size calculations were rare. Most studies reported an attempt to account for confounding factors.

Fourteen studies reported a comparison group, with normal coagulation tests, thereby allowing the calculation of risk differences. No study showed a significant risk difference.

Authors' conclusions
There is insufficient evidence to conclude that abnormal test results predict bleeding. Randomised controlled trials (RCTs) are needed to inform clinical decision-making on pre-procedure transfusions.

CRD commentary
The review addressed a clearly stated and clinically relevant question. Appropriate inclusion criteria were defined; study design was not specified. Searches of electronic bibliographic databases were limited to two sources and as such, although no language restrictions were applied, relevant data might have been missed. The review process was clearly described, but measures to minimise error and bias were limited. The authors acknowledged that the review had methodological limitations. Details of the included studies were reported clearly, along with a brief summary of the results of the quality assessment, and the authors discussed the limitations of the dataset. The approach taken to synthesise the evidence was appropriate given the quality of the data. The authors' conclusions about the lack of evidence to support the ability of abnormal coagulation tests to predict procedural bleeding follow from the data presented.

Implications of the review for practice and research
Practice: Clinicians should not assume that mild to moderate elevation of INR or prolongation of PT is predictive of procedural bleeding, or that these are indicators for pre-procedural therapy intended to correct the INR.

Research: RCTs, comparing pre-procedural therapy (intended to correct the INR) with no therapy, should be performed in patients with abnormal coagulation tests who are undergoing invasive procedures.

**Funding**
NHLBI, grant number 5 U01 HL072268-02.

**Bibliographic details**
Segal J B, Dzik W H. Paucity of studies to support that abnormal coagulation test results predict bleeding in the setting of invasive procedures: an evidence-based review. Transfusion 2005; 45(9): 1413-1425

**PubMedID**
16131373

**DOI**
10.1111/j.1537-2995.2005.00546.x

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Blood Coagulation Tests; Bronchoscopy /adverse effects; Catheterization, Central Venous /adverse effects; Decision Making; Hemorrhage /diagnosis /etiology; Humans; Predictive Value of Tests

**AccessionNumber**
12005004447

**Date bibliographic record published**
31/05/2007

**Date abstract record published**
16/05/2008

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.