Critical Review Form

Diagnostic Test

Contribution of Blood Cultures to the Clinical Management of Adult Patients Admitted to the Hospital with Community-Acquired Pneumonia: Prospective Observational Study, *Chest*, 2003; 123: 1142-1150

Objective: **"To assess the clinical usefulness of blood cultures in the management of patients hospitalized with community-acquired pneumonia." (p 1142)**

Methods: **Prospective observational study of 19 Canadian hospitals serving as part of a separate multi-center, controlled clinical trial with cluster randomization designed to determine the efficacy of CAP treatment with or without a clinical pathway to guide physician diagnostic and treatment decision making. In the current study, they assessed the impact of true-positive BCx on antimicrobial management changes. Eligible patients were adults presenting to participating ED's during 7 months of 1998 with a radiographic infiltrate and ≥ 2 of the following: temperature > 38°C, productive cough, dyspnea, chest pain, or rales. Subjects were excluded if they had immune deficiency, shock or ICU admission, alcohol addiction, chronic renal failure, or were pregnant or nursing. (p 1143) Of 1743 eligible patients, 760 had BCx drawn with 43 patients (5.66%) resulting in true-positive.**

Guide		Comments
I.	**Are the results valid?**	Answer questions IA, IB, & IC below
A.	**Did clinicians face diagnostic uncertainty?** *"Clinicians" can represent the original treating physicians and/or the research investigators.*	Yes, 1743 patients presenting with signs/symptoms of CAP and no clear method other than BCx to establish which were bacteremic.
B.	**Was there a blind comparison with an independent gold standard applied similarly to the treatment group and to the control group?**	No other gold standard was applied to either arm. A purist could argue for a confirmatory lung biopsy, but no IRB would approve such a study today. The positive BCx were not being compared to another diagnostic test, but rather the clinical impact of the information provided by culture results was being assessed.
C.	**Did the results of the test being evaluated influence the decision to perform the gold standard?**	No, since BCx were either obtained or not obtained at the treating physician's discretion and independent of the ultimate BCx result.
II.	**What are the results?**	Answer questions IIA below.

A.	**What likelihood ratios were associated with the range of possible test results?**	Insufficient data was provided to construct a 2x2 table or calculate LR's. However, one can report the following: • 43/760 (5.66%) demonstrated "significant organisms" on BCx with 68% S. pneumonia, and S. aureus and E. coli 11.4% each. • 25/43 (58%) of antimicrobial changes were contraindicated by culture results. • 3/43 (6.9%) of antimicrobial changes were appropriate based upon *in vitro* sensitivities. • 20/46 (46.5%) of positive BCx led to no change (Table 4, p 1145). Each change in treatment attributed to BCx results cost the system $1922 based on a crude analysis with two-sets of BCx costing $41.70 and adjusting for observed narrowing of antibiotics to cheaper alternatives.
III.	**How can I apply the results to patient care?**	Answer questions III A-D below.
A.	**Will the reproducibility of the test result and its interpretation be satisfactory in my clinical setting?**	Yes, no reason to suspect findings not reproducible (other than the cost) at BJH. Unfortunately, the lack of efficacy findings will probably have no impact until JCAHO amends their stance that BCx in admitted CAP are a valid quality indicator.
B.	**Are the results applicable to the patients in my practice?**	No demographic information was provided, but based on the Pneumonia Severity Index range there is no reason to suspect this broad mix of Canadian pneumonia patients differ in any important prognostic index from our patient population.

C.	**Will the results change my management strategy?**	No, I did not believe BCx were universally indicated before this study and I still do not.

D.	**Will patients be better off as a result of the test?**	Yes, if society could divert funds spent on expensive, unused BCx and direct them towards proven, cost-effective measures like pneumonia vaccination, smoking cessation, and more readily available routine health care.

Limitations:

1) **Poorly defined exclusion criteria: What is immunodeficiency? HIV? Steroid therapy? Chemotherapy? Also, how are "contaminants" defined?**
2) **Observational study neither designed to reliably assess the utility of BCx or as a formal economic evaluation, but still offering unique prospective assessment of an issue previously explored only retrospectively.**

Bottom Line:

Prospective analysis of the utility of routine BCx in admitted CAP patients demonstrating that in only 0.4% of BCx drawn was a resulting change made to a more reliable antimicrobial coverage at a cost of $1922 per clinically useful positive culture. Even in the interventional arm of this study, only 58% of physicians obtained BCx compared with 33% of the control arm. Routine BCx testing in this patient population is not a cost-effective means to guide therapy or follow epidemiological trends, is poorly accepted by treating physicians, and lacks any evidence other than anecdotes that patient-important outcomes are improved.