Impact of a Molecular Based Rapid Diagnostic for Bloodstream Infections without Antimicrobial Stewardship Intervention at a Cancer Center

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Abstract - revised

Results

Outcomes Assessment Pre-BCID (n=42) Post-BCID (n=43) p-value

Primary Outcomes

Time to Antibiotic from Gram stain (median, range)* 29.8 (0-254) hours 16.9 (10-20) hours 0.256

Time to Organism Identification from Gram stain (median, range) 43.6 (13-140) hours 2.8 (0.1-23) hours <0.001

Secondary Outcomes

Appropriate Antibiotic* 47 (90.4%) 43 (99.2%) 0.062

30 day readmission 12 (28.6%) 9 (20.9%) 0.316

30 day readmission with bacteremia 2 (4.7%) 1 (2.3%) 0.673

Death in hospital 2 (4.7%) 3 (7.0%) 0.656

30 day all cause mortality 7 (16.7%) 6 (14.6%) 0.538

Variables that significantly decreased the time to appropriate antibiotic prescribing

• Admission to oncology service (34 hours)

Variables that significantly increased the time to appropriate antibiotic prescribing

• ANC > 500 (55 hours)

Background

Recent analyses identified a benefit in implementing molecular-based rapid diagnostic testing to increase narrow spectrum antibiotic use and decrease treatment of suspected microbiologic contaminants. To date, there has not been an analysis of implementing molecular based diagnostic testing in a cancer center, where treatment decisions may not be as dependent upon pathogen identification versus guideline based therapy. We evaluated the clinical utility of implementing Biofire FilmArray® BCID panel at a National Cancer Institute-Comprehensive Cancer Center (NCI-CCC).

Methods

We performed a retrospective quasi-experimental pre-post study 100 days prior and 100 days post implementation of Biofire FilmArray® Blood Culture Identification multiplex PCR panel without antimicrobial stewardship intervention.

Inclusion

• All patients with first positive aerobic blood culture at the Huntsman Cancer Institute Exclusion

• Patients (1)≥18 years; (2)one positive blood draw for microbiologic culture; (3)transferred from an outside hospital with bloodstream infection; (4)discharged prior to clearance of bloodstream infection

Statistics

• Descriptive statistics including mean (SD), frequency (%), Wilcoxon-Mann-Whitney test, Fisher's exact test to compare cohort demographic and clinical characteristics.

Objectives and Outcomes

Evaluate Biofire FilmArray® Blood Culture Identification Multiplex PCR panel implementation without Antimicrobial Stewardship notification at NCI-CCC.

Primary Outcome – Time from Gram stain result to ordering of appropriate antibiotic defined as the narrowest spectrum antibiotic dependent upon bloodstream organism identification, evidence based treatment guidelines, patient allergies and need for polymicrobial coverage

Secondary Outcomes – Time from Gram stain to organism identification, patients ordered appropriate antibiotics, in-hospital mortality, 30 day all cause mortality and readmission

Microbiologic Distribution

The use of Biofire FilmArray® Multiplex PCR Blood Culture Identification panel at a NCI-CCC, shortened time to appropriate antibiotic therapy for patients with bloodstream infections in a single center. Limited population study. Further evaluation is warranted to identify benefit from Antimicrobial Stewardship involvement with mBio at a NCI-CCC.

Demographics

Patient Demographics Pre-BCID (n=42) Post-BCID (n=43) p-value

Age (mean ± SD) 62 ± 12.7 57 ± 11.1 0.347

Sex

Male 18 (42.9) 14 (32.6) 0.586

Female 24 (57.1) 29 (67.4) 0.263

Race

White 18 (42.9) 21 (48.8) 0.331

Black 4 (9.5) 1 (2.3) 0.305

Other 7 (16.7) 12 (27.9) 0.089

Histology diagnostic 8 (19.0) 12 (27.9) 0.107

Histology unknown 2 (4.7) 2 (4.7) 0.406

Metastatic tumor 11 (26.2) 11 (26.2) 0.151

Surgical Operation 4 (9.5) 5 (11.6) 0.443

Admission to ICU 10 (23.8) 21 (48.8) 0.588

Chasten Turnover Index (mean ± SD) 5.6 ± 2.3 5.3 ± 2.8 0.651

DiDiCo 22 (52.4) 18 (41.9) 0.165

Immunosuppression* 24 (57.1) 5 (11.6) 0.038

Type of Cancer* 19 (45.2) 8 (18.6) 0.039

Gastro 7 (16.7) 9 (20.9) 0.619

Lymphoma 7 (16.7) 5 (11.6) 0.769

Cancer 4 (9.5) 6 (13.9) 0.724

Head 8 (19.0) 1 (2.3) 0.017

Pancreatic 1 (2.3) 3 (7.0) 0.365

Any Cancer 16 (38.1) 29 (67.4) 0.099

Infection Source (not mutually exclusive)

Post n (%) unless otherwise noted

• Blood 31 (73.8) 47 (90.4) 0.094

• Abdomen 18 (42.9) 13 (29.3) 0.425

• Respiratory tract 8 (19.0) 1 (2.3) 0.180

• Urinatied 5 (11.6) 6 (13.9) 0.777

• Outlined as: n (%) unless otherwise noted

* Immune suppression = WBC suppression ≤2500/mm³, cut-off WBC, solid organ transplant, active hermoptosis, or solid organ malignancy, inquired in active chemotherapy treatment plan

† Documented if 3 or more in one cohort

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