Development of a Clinical Research Project Comparing Infection Risk Assessment Scores in Oncology

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**Problem**
- Sepsis is the leading cause of nonmalignant death in oncology patients1. Approximately 14% of oncology patients develop sepsis.
- Sepsis-related mortality rate in this patient population is estimated to be 30-40%2,3.
- Early sepsis detection results in better patient outcomes. Multiple sepsis screening tools exist, but none are validated specifically for oncology patients. Hospital-wide sepsis screening methods over diagnose sepsis, and research suggests that the universal screening criteria should be updated4.
- The MASCC score is recommended to predict sepsis in oncology patients. It is only validated in febrile neutropenic patients and not all oncological populations1,2.

**Long Term Objectives**
- **Primary Aim:** Evaluate MASCC’s sensitivity and specificity to predict severe sepsis or septic shock in ambulatory oncology patients who screen positive for sepsis.
- **Secondary Aim:** Analyze subpopulations for which the MASCC Risk score has not been validated to evaluate potential application.

**Short Term Objectives**
- Conduct review of current evidence to determine which variables and screening tools should be studied. Findings were utilized to draft an IRB proposal to compare and correlate variables and tools supporting prediction of sepsis outcomes in patients with cancer.

**Literature Review**
A review of current literature was done to update a previous review from 20134. PubMed, EMBASE, Cochrane, CINAHL, and Guidelines.gov were used to search for qSOFA, SOFA, MASCC, and Sepsis screening related articles published since March 2014 to determine appropriate variables. Based on the review and current JHH practices it was concluded that three scoring systems should be compared along with MASCC results:
- **JHH Oncology Current Sepsis Score Not validated in powered study4**
- **qSOFA Low sensitivity, high specificity4**
- **Surviving Sepsis Poor sensitivity & specificity4**

**Methods:** Prospective chart review of all patients seen in the ambulatory Hematology-Oncology Clinic or the Weinberg Urgent Care Clinic. 
- **Numerator data:** 3660 patient encounters during which patients display signs of sepsis
- **Denominator data:** all clinic visits.

**ROC Curve**
The ROC statistic allows for comparison of different tools’ sensitivity and specificity. The area under ROC curves indicates the accuracy of MASCC5. These AUC statistics will be compared between tools to determine relative accuracy as is seen in other literature6.

**Timeline**
- Literature review; consult with experts in oncology, infectious disease and statistics
- Observed current practices in the ambulatory clinics and discussed with unit leadership
- Submitted application to the Oncology Nursing Research Committee. After revisions, received final approval
- Submitted and received Shirley Sohmer Research Grant
- Drafted outcomes assessment and data collection tools
- Submitted project to Hospital Nursing Research Committee
- Completed IRB required modules, drafted IRB application and submitted project

**Lessons Learned**
- Additional research was needed to determine the best way to record lab culture data that was drawn at the initial screen and what to use as time zero.
- Approval was required by the Oncology Nursing Research Committee, Hospital Nursing Research Committee, and the IRB prior to beginning the research
  - Provided multiple sources of input
  - Delayed data collection.

**References**

**Table 1:** Sepsis screening score criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Surviving Sepsis</th>
<th>MASCC</th>
<th>qSOFA/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>&lt; 36.0°C or 98.6°F</td>
<td>&gt; 38.5°C (with or without symptoms)</td>
<td>38.0°C</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>HR &gt; 90 bpm</td>
<td>HR &gt; 100 bpm</td>
<td>HR &gt; 100 bpm</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>RR &gt; 20/min</td>
<td>RR &gt; 20/min</td>
<td>RR &gt; 20/min</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>SBP &lt; 90 mmHg or drop from baseline, or MAP &lt; 65 mmHg</td>
<td>SBP &lt; 90 mmHg or drop from baseline, or MAP &lt; 65 mmHg</td>
<td>SBP &lt; 90 mmHg or MAP &lt; 65 mmHg</td>
</tr>
<tr>
<td>White Blood Cells</td>
<td>&lt; 4000/mm³ or &gt; 12,000/mm³ or &gt;10% bands</td>
<td>&lt; 4000/mm³ or &gt; 12,000/mm³ or &gt;10% bands</td>
<td>&lt; 4000/mm³ or &gt; 12,000/mm³ or &gt;10% bands</td>
</tr>
<tr>
<td>Other</td>
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<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Positive Screen</td>
<td>None</td>
<td>None</td>
<td>None</td>
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