Improving Patient Safety in the Inpatient Setting Through Risk Assessment and Mitigation

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This article describes a working tool for clinicians in an inpatient oncology unit, aimed at preventing adverse events and increasing the clinical safety of patients with cancer. With the development of a catalog of adverse events and a risk map, healthcare providers are able to implement safe, best practices in daily activities.

At a Glance
- Identifying the magnitude and significance of risks to patients and clinicians is a key focus for assessment and improvement.
- The author’s institution used the Oncology Patient Care Process, a catalog of adverse events, and developed a risk map of the cancer center to identify areas for improvement.
- Making a graphic representation of the patient care process can help patients newly admitted to the inpatient unit.

The care process for patients with cancer is particularly complex and affected by multiple factors that can impact patient safety. A detailed analysis of the entire care process allowed the author’s institution to identify critical points that affect patient safety and to implement safer practices. The treatment of patients with cancer is unique in that it requires numerous, successive, and interrelated interventions by different healthcare professionals (pharmacists, doctors, nurses, nursing assistants). These clinicians are responsible for the administration of antineoplastic chemotherapy, which requires special handling (Jiménez Torres, Albert Mari, Almenar Cubells, & Vandenbroucke, 2009). These drugs (a) have a narrow therapeutic range, (b) are administered in varying doses, (c) are administered in protocols that combine multiple agents, (d) have doses and numbers of cycles that are variable, and (e) are often high in cost. The risk of high-severity medical errors is great with these agents, and adverse effects from errors are disproportionate to those from other drugs.

Risk Map
The safe handling and administration of antineoplastic drugs is a priority for achieving maximum safety and quality of care. Antineoplastic agents can result in adverse events (AEs) with serious consequences (e.g., 23% result in permanent disabilities), and it has been shown that 50% of the AEs are preventable (Jiménez Torres et al., 2009). The use of a risk map can facilitate the prevention of AEs (Aranaz-Andrés et al., 2008, 2009). A risk map is a tool that healthcare institutions can use in care planning processes to identify high-risk patients, procedures, and staff behaviors, and to establish prevention priorities. The risk map identifies critical points described in the care process for patients with cancer and supports the design of a plan to improve safety.

Becoming aware of the risks inherent in care processes is vital to avoiding errors. In an oncology unit, the risks of serious consequences associated with making a mistake are greater because the procedures used are considered high risk. Drug handling is subject to errors and any mistakes in writing, reading, calculation, or preparation can have potentially serious or fatal consequences. Therefore, minimizing the number of medication errors reaching the patient and creating a culture of safety by eliminating punitive approaches and facilitating error prevention and in-depth analysis techniques are vital.

Quality Care Plan
The author’s institution developed and implemented a quality care plan from 2009–2010 (Andalusian Consejería de Salud, 2005, 2010; HUVN Management Quality Unit, 2009), which articulated the Project for Patient Safety, developed in the Strategy for Patient Safety from the Andalusian Public Health System (Barrera Becerra, Del Río Urenda, Dotor Gracia, Santana López, & Suárez Alemán, 2011).

The aim of this project was to design a working tool for clinicians in the oncology unit that would decrease the
incidence of AEs and increase clinical safety. Specific goals were to (a) define the patient care process, (b) create a catalog of potential and actual AEs, (c) develop and articulate the risk map of the clinical management unit and integrate it with the care process for patients with cancer, (d) make a graphic representation of the care process for patients with cancer once a patient is admitted to the inpatient unit, and (e) develop and implement actions and recommendations for improvement.

This study focused on the Clinical Management Unit of Medical Oncology, which is composed of several sections: radiation oncology, the day hospital, and outpatient and inpatient units. The inpatient unit was the focus of the current study. The unit has a capacity for 14 patients and three rooms for brachytherapy (metabolic radiation therapy). Patients who cannot receive chemotherapy treatment on an outpatient basis and those coming from the emergency department because of disease or treatment complications are admitted to the inpatient unit. The unit is staffed by a nursing supervisor, nine nurses, and nine nursing assistants.

**Multidisciplinary Efforts**

A multidisciplinary working group of clinicians from the oncology unit was assembled to work on the project. The group was comprised of the medical and nursing leaders, the ambulatory care nursing coordinator, a staff nurse, and a nursing assistant. The analysis occurred during five working sessions (see Figure 1). During the sixth session, the plan to improve patient safety was presented to the entire clinical staff.

Initially, the working group described the care process for patients with cancer, bringing together all possible scenarios from the moment a patient presents for care to the point where the patient is discharged from the unit. A graphic representation of the care process (see

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**FIGURE 1. Work Meetings and Actions**

<table>
<thead>
<tr>
<th>First session</th>
<th>Second session</th>
<th>Third session</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Analysis and discussion on the integrated oncology care processes</td>
<td>• Justification of the project</td>
<td>• Nominal group consensus exercise to weigh factors by seriousness, frequency, ability</td>
</tr>
<tr>
<td>• Creation of a consensus group for the design of the process for patient care</td>
<td>• Training in basic methodology: failure mode and effect analysis</td>
<td></td>
</tr>
<tr>
<td>• Training in basic concepts on safety</td>
<td>• Brainstorming for the elaboration of the catalog of adverse events (adverse events, errors, and causes)</td>
<td></td>
</tr>
</tbody>
</table>

**Fourth session**

- Group identification of preventive measures for adverse events.
- Construction of the risk map according to the graphic representation of the process for patient care

**Fifth session**

- Group development of the graphic representation of the patient care process during hospitalization

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**FIGURE 2. Care Process for Patients With Cancer**

Note. Based on information from Andalusian Consejería de Salud, 2009.
Figure 2) was derived from this discussion and analysis. The journey patients make from the consultation appointment through admission and until discharge from the hospital is very similar across disease types. Consequently, the working group was able to develop a single-care pathway to use with every patient. Secondly, a failure mode and effect analysis (FMEA) (DeRosier, Stalhandske, Bagian, & Nudell, 2002) was carried out by developing a catalog of 23 potential AEs, detecting faults and causes, and listing the interventions needed to implement preventive measures for each AE. Three variables were analyzed: severity, frequency of occurrence, and detectability of the AE. With respect to the severity of the 23 potential AEs, the study revealed that 26% of AEs were moderate, 70% were severe, and 4% resulted in death. Five percent of AEs had a very low frequency of occurrence (highly unlikely), 39% had a low frequency of occurrence (unlikely), 48% appeared occasionally (moderate frequency), and 4% appeared with high frequency because of repetitive failures. The ability to detect the failure before it occurred was high in 83% of cases and moderate in the remaining 17% of cases. The working group also analyzed the Priority Risk Index (PRI) and the criticality of each patient’s condition (DeRosier et al., 2002) (see Table 1). The PRI is the product of frequency, severity, and detectability, and it allowed the working group to prioritize the urgency of interventions and the order of corrective actions. In addition, preventive and improvement actions were prioritized for AEs with a PRI score greater than 100 and based on the criticality of each patient’s condition. Actions to prevent the failures that generated the AE were scheduled.

The working group also analyzed the patient journey from the first consultation appointment to admission to the inpatient unit and through discharge from the hospital. The graphic representation of the analysis is the care process roadmap for patients hospitalized in the oncology unit (see Figure 3).

Subsequently, the unit risk map was developed, enabling the working group to identify hidden risks to patient safety while measuring the probability of occurrence, severity, and the preventive strategies and measures needed to manage risks. The risk map was then incorporated into the graphic representation of the care process so that every AE that could appear in the patient journey was reflected. In total, the working group confirmed the presence of 10 AEs with a PRI score greater than 100 and 12 critical AEs out of a total of 23, reinforcing the need to address them with preventive measures and corrective actions.

### TABLE 1. Adverse Events Ordered by PRI

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>Order</th>
<th>Critical Level</th>
<th>PRI</th>
<th>Preventive Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error in analytic request</td>
<td>23</td>
<td>–</td>
<td>121</td>
<td>CP, T, PR</td>
</tr>
<tr>
<td>Visual, muscular, and/or mental fatigue</td>
<td>22</td>
<td>–</td>
<td>132</td>
<td>T, O</td>
</tr>
<tr>
<td>Patient falls</td>
<td>21</td>
<td>–</td>
<td>105</td>
<td>HP, T, O</td>
</tr>
<tr>
<td>Incorrect medication management</td>
<td>20</td>
<td>Medium</td>
<td>62</td>
<td>HP, T, C</td>
</tr>
<tr>
<td>Fire</td>
<td>19</td>
<td>Medium</td>
<td>32</td>
<td>O</td>
</tr>
<tr>
<td>Pulmonary embolism or deep venous thrombosis</td>
<td>18</td>
<td>Medium</td>
<td>62</td>
<td>HP, CP</td>
</tr>
<tr>
<td>Attempted suicide</td>
<td>17</td>
<td>High</td>
<td>64</td>
<td>T</td>
</tr>
<tr>
<td>Phlebitis</td>
<td>16</td>
<td>–</td>
<td>112</td>
<td>F, PR</td>
</tr>
<tr>
<td>Improper patient analgesia (excess or deficient)</td>
<td>15</td>
<td>–</td>
<td>45</td>
<td>CP, T</td>
</tr>
<tr>
<td>Patient mental stress faced with lack of information</td>
<td>14</td>
<td>Low</td>
<td>193</td>
<td>HP, I</td>
</tr>
<tr>
<td>Professional stress</td>
<td>13</td>
<td>–</td>
<td>129</td>
<td>T</td>
</tr>
<tr>
<td>Electric shock</td>
<td>12</td>
<td>Medium</td>
<td>62</td>
<td>T, PR</td>
</tr>
<tr>
<td>Slip in the corridor</td>
<td>11</td>
<td>–</td>
<td>56</td>
<td>T, O</td>
</tr>
<tr>
<td>Overexertion of professionals during patient movement</td>
<td>10</td>
<td>–</td>
<td>125</td>
<td>T, PR</td>
</tr>
<tr>
<td>Pressure ulcer incidence</td>
<td>9</td>
<td>Medium</td>
<td>79</td>
<td>CP, T, PR, O</td>
</tr>
<tr>
<td>Falling objects by collapse</td>
<td>8</td>
<td>–</td>
<td>88</td>
<td>T, O</td>
</tr>
<tr>
<td>Blood transfusion reaction</td>
<td>7</td>
<td>Medium</td>
<td>71</td>
<td>T, PR, C</td>
</tr>
<tr>
<td>Drug reaction or anaphylactic shock</td>
<td>6</td>
<td>High</td>
<td>128</td>
<td>HP, T, C</td>
</tr>
<tr>
<td>High temperature in the unit</td>
<td>5</td>
<td>–</td>
<td>115</td>
<td>O</td>
</tr>
<tr>
<td>Exposure to ionizing radiation</td>
<td>4</td>
<td>–</td>
<td>27</td>
<td>T, I, PR</td>
</tr>
<tr>
<td>Exposure to biologic contaminants</td>
<td>3</td>
<td>Low</td>
<td>108</td>
<td>F, PR</td>
</tr>
<tr>
<td>Exposure to chemicals</td>
<td>2</td>
<td>High</td>
<td>56</td>
<td>HP, T, PR</td>
</tr>
<tr>
<td>Exposure to carcinogenic agents</td>
<td>1</td>
<td>High</td>
<td>62</td>
<td>HP, T, PR</td>
</tr>
</tbody>
</table>

C—checklist; CP—clinical practice; I—information; HP—healthcare process; O—other; PR—protocols or procedures; PRI—priority risk index; T—training

Note. The mean score for PRI was 88.43.

Note. The score range for PRI is from 1–1,000. Scores for frequency, severity, and detectability range from 1–10. Scores indicate the priority of intervention. Higher scores represent a higher priority.

**Conclusion**

This article describes the analysis and exposure of the catalog of AEs that can occur throughout the care process for patients with cancer. This analysis allowed the working group to verify that daily practice does not always involve reporting of such events; therefore, they were not being documented as risk behaviors of the healthcare staff. Thanks to the development of the catalog of AEs and the risk map, the working group was able to...
Public healthcare system  
Patient request due to symptoms  
Appointment with the family physician  

Family physician  
Referral to the emergency department  
Referral to outpatient services  

Emergency department  
Patient medical history: Exploration and diagnostic  

Outpatient services  
Preliminary assessment  
Identification of signs and symptoms  
Interdisciplinary management  

Attendant  
Hospitalization  

Nurse and nurse assistant  
Patient’s reception  
Referring nurse and nurse assistant assignment  
Individualized care plan  
Assessment: diagnostic (collaborative problems, autonomy problems, nursing diagnostic); care planning (NOC/NIC); execution and evaluation  

Oncologist  
Clinical assessment  
Information  
Decision  
Therapeutic pain  
Informed consent  

Tumor committee  
Case reviewed  
Prioritization of therapeutic options  

Nurse  
Application of collaborative problems  
Nursing interventions  
Management of medication prescription; management of chemotherapeutic treatment; care planning derived from the treatment  

Oncologist and nurse  
Daily visit schedule  
Request of specific tests, complementary explorations, and clinical analysis  

Nurse and nurse assistant  
Physical preparation of the patient blood collection  

Oncologist  
Assessment of the study results  
Information action  

Nurse  
Prevention and detection of treatment complications  

Oncologist and nurse  
Discharge planning  

Nurse  
NOC measuring prior to discharge  
Issue of a report for the continuity of care: Salud Responde  

Oncologist  
Discharge report  
Shared monitoring between hospitalization and primary health care  
Advanced clinical state without specific treatment  
Palliative care tracking  

NIC—Nursing Interventions Classification; NOC—Nursing Outcomes Classification

FIGURE 3. Care Process Roadmap for Patients Hospitalized in the Oncology Unit
Note. Salud Responde is a software application of the Andalusian government that supports monitoring the continuity of care after discharge.
Note. Based on information from Andalusian Consejería de Salud, 2009.

implement safe, best practices into clinicians’ daily activities. When incorporating the design of preventive actions, the need to train clinicians, particularly new recruits, must be highlighted, as well as a periodic review of nursing procedures and protocols. The process provided the working group with evidence of their unit’s areas of risk so that changes could be implemented to increase safety and reduce the risk of medical errors. In addition, the study has allowed the staff to conduct an internal analysis of the critical issues of nurses’ daily clinical practice, being aware of the magnitude and significance of the risk to which both patients and professionals are subjected. By incorporating recommendations and
preventive measures, nurses can reduce variability in practice and promote a shift toward greater professional excellence.

References


