Microsoft’s Kinect Sensor System® as a component of a multicomponent falls prevention program

Abbreviated title: Microsoft’s Kinect Sensor System® in fall prevention

Marc B. Westle, D.O., FACP

Introduction: Hospital patient fall rates range from 1.3 to 8.9 per 1000 Patient Days of Care (PDOC), with up to 25% resulting in injury. The average cost for a patient fall with injury is $14,000; an amount no longer reimbursed by Medicare and most private insurance companies. The major contributing factors to acute inpatient falls include:

- Inadequate staff orientation, supervision, staffing levels, or skill mix
- Lack of protocol adherence
- Physical environment deficits
- Communication failures
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Risk factors for patient falls include but are not limited to:

- Age
- History of recent fall
- Mobility impairment
- Urinary Incontinence or frequency
- Certain medications
- Postural hypotension
- Cognitive impairment

Problem: Mission Health System (MHS) is focused on patient safety and our Big(ger) Aim – to get every patient to their desired outcome, without harm, without waste and with a great patient/family experience. Despite years of multicomponent fall prevention interventions, our inpatient fall rate in 2015 was 2.81/1000 PDOC, with an injury rate of 1.08/1000 PDOC. The neuroscience unit held the highest fall rate of 6.19/1000 PDOC, with an injury rate of 1.08/1000 PDOC.
**Traditional Fall Prevention Design:** Systematic review supports multicomponent fall prevention programs as the most effective in reducing falls. No strong evidence exists, however, about which components are most important. Multicomponent fall prevention programs may include:

- Strong administrative leadership
- Clinical champions
- Risk assessment
- Patient and staff education
- Bedside risk sign/wristband
- Scheduled/supervised toileting
- Medication review

**Design Innovation:** In 2015, MHS collaborated with Cerner to develop and pilot the Cerner Patient Observer® (CPO). CPO uses Microsoft’s Kinect sensor system to detect risky patient movements in a hospital bed or chair. The technology provides 3-D motion sensors and 2-way communication between the patient and a monitor technician. A 6-camera CPO system was deployed on the neuroscience unit. A fall risk algorithm was developed to identify “highest risk” patients and assure that TJC 1:1 sitter compliance requirements were met.

**Results:** A 3 month neuroscience pilot was conducted in 2015. 98 patients were monitored, representing 348 PDOC. Outcomes were compared to patients receiving the standard fall prevention program. Results are noted below.

<table>
<thead>
<tr>
<th></th>
<th>CPO</th>
<th>Standard Treatment</th>
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<tbody>
<tr>
<td>Falls Rate</td>
<td>0</td>
<td>4.06</td>
</tr>
<tr>
<td>Injury Rate</td>
<td>0</td>
<td>2.45</td>
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<tr>
<td>PDOC</td>
<td>348</td>
<td>2,472</td>
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</tbody>
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**Discussion:** While pilot results are of clinical significance, statistical analysis is currently underway. This technology represents an innovative addition to a multicomponent fall prevention program. The technology can also be deployed to automate and strengthen patient monitoring, to include epilepsy monitoring, virtual visitor, and nurse documentation as examples. Future endeavors include an “enterprise solution” that can monitor multiple patients, from multiple units, on multiple floors in multiple hospitals from a central location.
References for Mission CPO Abstract


