NPSD Data Spotlight:

Patterns of Fall Interventions

Agency for Healthcare Research and Quality

Patient Safety Listed PSO Organization

Patterns of Fall Interventions

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INTRODUCTION

The Patient Safety Organization Privacy Protection Center (PSOPPC) was created by the Agency for Healthcare Research and Quality (AHRQ) to support the implementation of the Network of Patient Safety Databases (NPSD) as authorized by the Patient Safety and Quality Improvement Act of 2005 (PSQIA). Healthcare providers submit patient safety event data to Patient Safety Organizations (PSOs), which in turn submit standardized versions of these reports to the PSO Privacy Protection Center (PSOPPC) using the Common Formats.[i] After aggregation and de-identification of data in the PSOPPC, analyses of the non-identifiable data are published in the NPSD to provide a national-level perspective of patient safety events and their contributing factors. These reports contain both structured data elements and unstructured free text that provide further detail on events – such as falls, and medication or other substance events[ii] – along with applicable interventions intended to prevent these incidents from reaching patients and/or reducing harm to patients. Analyzing these data enables the identification of opportunities for improving patient safety and healthcare quality.

As of December 31, 2022, the PSOPPC has maintained over 2.6 million patient safety event reports[iii] from across the country (AHRQ NPSD Dashboard). This Spotlight analysis focuses on falls within the NPSD since they are one of the most frequently reported patient safety events in the NPSD, second only to Medication or Other Substance events, making up approximately 10% of all events.[iv] The relative percentage of falls among all the event categories in the NPSD database has also been rising in recent

Highlights

- Consistent with prior studies, falls reported in the NPSD result in more harm (residual psychological or physical harm from incident after any rescue interventions) and injuries (physical injury as a result of fall) for seniors (ages 65 and older) compared to adults (ages 18-64) and for patients with sensory impairment, use of medication known to increase risk of falls, or a history of falls.
  - Seniors experienced harm almost twice as often as adults (16.7% vs. 9.5%).
  - Patients with sensory impairment had a 15.9% higher rate of injury compared to patients without sensory impairment (24.8% vs. 21.4%).
  - Patients on medication known to increase their risk of falls had a 10.0% higher rate of injury (22.2% vs. 20.1%) compared with patients not on any medication known to increase risk of falls.
  - Patients with a history of falls had a 10.7% higher rate of injury compared to patients with no history of falls (24.1% vs. 21.8%).
- Even though rates of harm and injury varied across patients with different risk factors, Frequent Pattern Analysis revealed very *similar* commonly used interventions in place across these groups, which may reveal opportunities for more tailored care.

[i] AHRQ coordinates the development of Common Formats for reporting and analysis of patient safety data: https://www.psoppc.org/psoppc_web/publicpages/commonFormatsOverview

[ii] Event categories (or modules, types) of the CFER-H include: Blood or Blood Product, Device or Medical/Surgical Supply, Fall, Healthcare-Associated Infection, Medication or Other Substance, Perinatal, Pressure Ulcer, Surgery or Anesthesia, and Venous Thromboembolism

[iii] As of September 2023, the total number of reports held by the PSOPPC that were submitted between July 26, 2012 and December 31, 2022 is 269,916 for CFER-H V1.1 and 2,347,775 for CFER-H V1.2 for a combined total of 2,617,691 reports. (2023 NPSD chartbook).

[iv] As described in the 2023 NPSD chartbook (2023 NPSD chartbook).

years.[v] Previous studies on hospital fall rates have shown varying trends, depending on factors such as patient populations, hospital environments, implemented intervention strategies, and other public health considerations.[1–4] Falls result in significant physical and economic burden, ranging from injuries and longer hospital stays for patients, to substantial costs to both patients and healthcare providers.[5] Hospitals and patient safety researchers have devoted substantial efforts to developing effective fall prevention interventions, including recent studies sponsored by AHRQ.[5–7] Across these studies, a common finding was that effective fall prevention requires tailored care that addresses patients' individual risk profiles.

Frequent Pattern Mining, a data mining approach, was incorporated into the Falls Dashboard to detect the most common interventions in place among patients who experienced a fall. The analysis identified common interventions in place for patients with different outcomes; however, it did not reveal distinctive patterns among falls for patients with different demographics or risks. Building on that work, the objective of this Spotlight is two-fold: (1) further describe the data mining method, its operationalization, and how it offers additional insights compared to the traditional summary statistical methods applied to the NPSD data; (2) highlight the major frequent pattern findings beyond those presented in the 2022 NPSD Fall Supplementary analyses.

Using the standardized non-identifiable falls data available from the NPSD, we examined two aspects of fall interventions:

1. The interventions that were in place to prevent or lessen impact of falls;
2. The interventions in place for patients with different demographic or risk characteristics.

LIMITATIONS

As stated in the NPSD Data Spotlight, Falls: Associated Factors and Clinical Outcomes, there are caveats to consider in the interpretation of any analysis using the NPSD data. To begin, data are submitted voluntarily and as such they are not a representative sample of patient safety events nationally, and cannot be used to calculate the actual prevalence of patient safety events. Another point to consider is that the information contained in the NPSD is subject to variations in clinical judgement due to reporters' different experiences and backgrounds; e.g., physicians tend to report incidents that result in more severe harm to patients, such as death, while nurses are more likely to report incidents that resulted in less severe harm or no harm to patients.[8] Also, while analyses in NPSD focus on hospital events, NPSD data may contain a small number of reports using the Common Formats for Event Reporting-Hospitals (CFER-H) that describe incidents occurring in settings other than hospitals. In addition, causal inferences cannot be based on these event data alone. Despite these limitations, the abundance of standardized patient event data across healthcare providers nationwide provides a rich resource for generating data-driven trends in patient safety events and practices in place. These discoveries also offer a unique opportunity to shed light on potential patient safety risks and inform approaches to help mitigate such risks and associated harms.

[v] As described in the prior NPSD Fall Spotlight focusing on patient subgroups, "Falls: Associated Factors and Clinical Outcomes."

METHODOLOGY

Data used for the analyses presented below are based on data submitted in CFER-H V1.2 that were submitted to the PSOPPC from Dec 31, 2009 through December 26, 2021. Among all 237,305 falls reported to PSOPPC through 2021, events that did not have a valid intervention[vi] reported were excluded from the analysis. After these exclusions, 77,274 (32.56%) records remained. Additional exclusions were applied in downstream subgroup analyses. Details of grouping and additional exclusions (where applicable) for specific analyses are provided in their respective sections below.

Interventions in place for each fall are specified by data element (DE) DE216, "Which of the following were in place and being used to prevent falls for this patient?" This data element captures information on any interventions used to prevent falls and/or lessen their impact. As more than one intervention can be used for a given patient, reporters can report multiple interventions for each fall. Traditional statistical analysis often analyzes single or pairs of interventions to understand their distributions or correlations. While this method provides the distribution of single intervention strategies, it does not readily provide information about the concurrent interventions used for each fall. This is especially true when two or more interventions are used for a patient. Understanding these intervention patterns provides greater insight into current fall prevention practices. However, reviewing all possible combinations of interventions and determining their frequencies is computationally demanding and impractical. Data mining approaches, like Frequent Pattern Mining, are well suited for this situation.

Frequent Pattern Mining was introduced in the 2022 NPSD Fall Supplementary Dashboard and Chartbook section. Frequent Pattern Mining has been widely used in various applications after it was first introduced in 1998, by Bayardo et al., for market basket analysis. In such analyses, Frequent Pattern Mining found items that were frequently bought together. For instance, customers who bought milk, might also buy bread, or butter. Such associations between items can help retailers increase their profit by arranging their shelves or selecting products to align with the most common "shopping baskets." Frequent Pattern Mining has been used in a variety of applications and across different data formats, including: outlier detection from Web log sequences; pattern discovery in spatial, biological and chemical data; and, software bug detection.[9] Throughout the document, we use the terms "pattern" and "combination" interchangeably.

Using the Frequent Pattern Mining method,[10,11] commonly used[vii] single interventions among all events are first identified. Then, among these common single interventions, the algorithm searches for common combinations of two interventions that co-occur. The algorithm then continues to find common combinations of three, four, or more interventions co-occurring within individual events among all events until it cannot find more common patterns that satisfy the specified frequency threshold of 0.001. In the following sections, for each specific analysis, the top 20 most frequent patterns are presented in decreasing order of frequency.

To better characterize interventions in place for patients with different demographic or different risk

[vi] Valid intervention: at least one intervention selected for Data element DE216, "Which of the following were in place and being used to prevent falls for this patient?" (see: 2022 NPSD Chartbook).

[vii] "Commonly used" refers to interventions that have a frequency higher than the specified threshold of 0.001, i.e., intervention(s) are common if they are present in more than 0.1% of all falls.

of falls, the analyses were performed by:

- Age group - Adults (aged 18-64) vs. Seniors (aged 65 and older);
- Documented risk factors – previous history of falls, sensory impairment;
- Use of medication known to increase risk of falls.

For this analysis, harm was defined using EXTENT OF HARM indicated in DE55 in response to the question "After any intervention to reduce harm, what was the degree of residual harm to the patient from the incident (and subsequent intervention)?" Harm can contain both bodily or psychological injury. For this analysis, reported EXTENT of HARM were further dichotomized as either No harm or Harm (i.e., Mild harm, Moderate harm, Severe harm or Death). Injury information was captured from INJURY AS RESULT OF FALL in DE201 in the Fall module in response to the question: "Did the patient sustain a physical injury as a result of the fall?" Interventions applied to the fall were captured in DE216 in response to the question "Which of the following were in place and being used to prevent falls for this patient?" The original answer values for DE216 are listed in Appendix B. To simplify reading and interpretation of plots, short labels were used to represent lengthy answer values for DE216, consistent with those used in the 2022 NPSD Chartbook and the 2023 NPSD Falls Chartbook. Mapping between the labels and the original answer values for DE216 are also listed in Appendix B.

KEY FINDINGS

For brevity, key findings are highlighted in the body of this Spotlight. All other findings are detailed in Appendix A.

1. Commonly reported interventions are similar across senior and adult patients even though seniors have much higher rates of harm and injury from falls.

Among the 77, 274 falls[viii] that have at least one valid intervention in place reported, 36,089 (46.7%) were by adults (aged 18 through 64); 35,659 (46.2%) were by seniors (aged 65 and older); 2,779 (3.6%) were by minors (aged younger than 18); and 2,747 (3.6%) had no age reported. The 5,526 (7.2%) falls that were among patients under 18 or had no age indicated were excluded from the analysis. Results in Table 1 below and Figure A1 in Appendix A are based on the 36,089 and 35,659 events among adults and seniors, respectively.

Table 1. Frequency and percentage of falls resulting in harm or injury for each age group

Age group (years)	Number of falls in the group	Number of falls resulted in harm (percentage within group)	Number of falls resulted in injury (percentage within group)
Adult (18-64)	36,089	3,428 (9.5%)	6,171 (17.1%)
Senior (65+)	35,659	5,951 (16.7%)	8,820 (24.7%)

[viii] 32.6% of all 237,305 falls reported in the NPSD as of December 31, 2021.

Table 1 shows that adults and seniors have different rates of harm and injury resulting from falls. Specifically, seniors have a 75.7% higher rate of falls resulting in harm (16.7% vs. 9.5%) and a 44.6% higher rate of falls resulting in injury compared to the adult group (24.7% vs. 17.1%).

Common interventions between the adults and the senior subgroups are similar (Appendix A Figure A1), with the most frequent intervention in place being Assistive device. Both subgroups also share frequent intervention patterns, which include a combination or subset of the following: Lowered bed, Items in reach, Non-slip wear, Education, Alarm and Visible risk ID.

2. Commonly reported interventions are similar between patients with and without sensory impairment even though rates of harm and injury from falls are higher among patients with sensory impairment.

Sensory impairment is the second most commonly cited patient risk factor for falls in the NPSD. Among the 77,274 (32.6% of all 237,305 falls) falls that have at least one valid intervention in place reported, 9,041 (11.7%) indicated that at the time of the fall, the patient was known to have sensory impairment, while 11,969 (15.5%) indicated that the patient did not have such risk factor. For 56,264 (72.8%) falls, risk factors were either reported to be unknown or information regarding patient risk factors were missing altogether. These 56,264 records were excluded from the analysis. Results in Table 2 below and Figure A2 in Appendix A are based on the 9,041 and 11,969 events with and without sensory impairment, respectively.

Table 2 below shows that patients with sensory impairment have a 10.3% higher rate of falls that result in harm compared to patients who do not have this risk factor (29.9% vs. 27.1%), and a 15.9% higher rate of falls resulting in injury compared to the other group (24.8% vs. 21.4%).

Table 2. Frequency and percentage of falls resulting in harm or injury for patients with or without sensory impairment

Patient has sensory impairment	Number of falls in the group	Number of falls resulted in harm (percentage within group)	Number of falls resulted in injury (percentage within group)
Yes	9,041	2,699 (29.9%)	2,246 (24.8%)
No	11,969	3,245 (27.1%)	2,566 (21.4%)

There is little variation in common interventions between the subgroup of patients with sensory impairment and those without (Appendix A Figure A2).The most frequently implemented intervention between the two groups is a Low bed. Other common interventions include various combinations of Low bed, Items in reach, Non-slip wear, Education, and Visible risk ID.

3. Commonly reported interventions are similar between patients on medications known to increase the risk of falls and patients not on these medications, even though rates of harm and injury from falls are higher among patients on medications known to increase the risk of falls.

Among the 77, 274 (32.6% of all 237,305 falls) falls that have at least one valid intervention in place reported, 23,314 (30.2%) indicated that patients were on medication known to increase their risk of falls, while 23,209 (30.0%) indicated that patients were not on any medication known to increase their risk of falls. For 30,751 (39.8%) falls, event reporters either indicated that use of medication known to increase risk of falls was unknown or this information was missing altogether. These 30,751 records were excluded from the analysis. Results in Table 3 and Figure A3 in Appendix A below are based on the 23,314 and 23,209 falls where valid information was available on whether the patient was on medication known to increase risk of falls.

Table 3 below shows that patients on medication known to increase their risk of falls have a 43.5% higher rate of harm resulting from falls (5.4% vs. 3.8%) and 10.0% higher rate of injury resulting from falls (22.2% vs. 20.1%), compared with patients not on any medication known to increase risk of falls.

Table 3. Frequency and percentage of falls resulting in harm or injury for patients on medication known to increase risk of falls vs. not taking medication known to increase risk of falls

Patient on medication known to increase risk of falls	Number of falls in the group	Number of falls resulted in harm (percentage within group)	Number of falls resulted in injury (percentage within group)
Yes	23,314	4,180 (5.4%)	5,163 (22.2%)
No	23,209	2,917 (3.8%)	4,672 (20.1%)

Commonly reported interventions show little variation between the subgroup of patients who were on medications known to increase the risk of falls and those who were not (Appendix A Figure A3). The most frequently implemented intervention for both subgroups is Assistive device. Additionally, the two subgroups share other frequent interventions, which include some combinations of Low bed, Items in reach, Non-slip wear, Education, Alarm, and Visible risk ID.

4. Commonly reported interventions are similar across patients with and without a history of falls even though rates of harm and injury from falls are higher among patients with a history of falls.

History of previous falls is the most frequent risk factor cited for patients at the time of falls. Among the 77,274 (32.6% of all 237,305 falls) falls that have at least one valid intervention in place reported, 10,023 (13.0%) indicated that at the time of the fall, the patient had a history of previous falls, while 10,987 (14.2%) indicated that the patient did not have a history of falls. For 56,264 (72.8%) falls, it was either unknown or there was no information available regarding the patient's history of falls. These 56,264 records were excluded from the analysis. Results in Tables 4-6 below and Figure A4 in Appendix A are based on the 10,023 and 10,987 events respectively.

Table 4 below shows that patients who have a previous history of falls have a 6.9% higher rate of falls resulting in harm compared to patients who do not have this risk factor (29.3% vs. 27.4%), and a 10.7% higher rate of falls resulting in injury compared to the other group (24.1% vs. 21.8%).

Table 4. Frequency and percentage of falls resulting in harm or injury for each patient group: patients with or without history of falls

Patient has history of falls	Number of falls in the group	Number of falls resulted in harm (percentage within group)	Number of falls resulted in injury (percentage within group)
Yes	10,023	2,935 (29.3%)	2,418 (24.1%)
No	10,987	3,009 (27.4%)	2,394 (21.8%)

There was little variation in common interventions between the subgroup of patients with a risk factor of history of previous falls and those without (Appendix A, Figure A4). The most frequently implemented intervention for both groups is the use of a low bed. Other common interventions used in both groups include combinations of a Low bed, Items in reach, Non-slip wear, Education, and Visible risk ID.

Previous history of falls is the most common risk factor for falls reported in the NPSD.[ix] While previous research shows patients benefit from tailored interventions, no distinct patterns were observed in the commonly used intervention strategies for patients with a history of falls compared to those without (Appendix A, Figure A4). To further evaluate potential differences in the efficacy of commonly used interventions with respect to preventing harm to patients with a fall history, an analysis of the no-harm rates for these common intervention patterns was conducted. Specifically, we examined the no-harm rate, or the percentage of falls that resulted in no harm to the patient, associated with each commonly used intervention pattern examined. Here, a higher no-harm rate for an intervention pattern indicates that a greater percentage of falls with that pattern resulted in no harm, compared to intervention strategies with a lower no-harm rate. This analysis provides valuable information about the effectiveness of these interventions in preventing harm in falls.

[ix] Source: NPSD Falls Chartbook, 2023.

The top 20 most frequently used intervention patterns in each risk group (Appendix A, Figure A4) were analyzed and examined to determine their respective no-harm rates. No-harm rates were calculated using events with valid, non-missing data on whether or not there was harm to the patient. Among 10,023 events for patients with history of falls, 9,414 (93.9%) had valid data on patient harm. Similarly, 93.3% of event reports among patients with no history of falls had valid data on patient harm (10,261 / 10,987). Tables 5 and 6 present the top 10 interventions with the highest no-harm rates, ranked in descending order, for patients with and without a fall history, respectively.

Among patients with a fall history, the intervention pattern of Low bed, Items in reach and Visible risk ID exhibited the highest no-harm rate. On the other hand, for patients without a history of falls, the intervention pattern of Low bed and Item in reach had the highest no-harm rate. Noticeably, Visible risk ID was present in 6 of the top 20 common intervention patterns for patients with a fall history and in 5 of the top 20 patterns for patients without a fall history (Appendix A4). Among the top 10 interventions with relatively higher no-harm rates for patients with a fall history (Table 5), all 6 patterns that included Visible risk ID are in the list. In contrast, none of the 5 common interventions that contain Visible risk ID was present in any of the top 10 interventions with high no-harm rates for patients without a history of falls (Table 6). Note that intervention(s) can be included multiple times as part of another pattern within a particular fall event. Therefore, the total count of frequent intervention patterns can exceed the number of falls in each subgroup.

Table 5. No-harm rate of common interventions among patients with history of falls (N= 10,023)

Common Intervention Pattern	Number of Events within Intervention Pattern with Harm Data	Number of Events Resulting in No Harm to Patient	No-harm Rate (%)
Low bed, Items in reach, Visible risk ID	3,835	2,746	71.6
Items in reach, Visible risk ID	4,128	2,949	71.4
Low bed, Items in reach, Non-slip wear	4,393	3,135	71.4
Low bed, Visible risk ID	4,290	3,055	71.2
Non-slip wear, Visible risk ID	3,935	2,799	71.1
Education, Visible risk ID	3,907	2,779	71.1
Items in reach, Non-slip wear	4,827	3,431	71.1
Items in reach, Non-slip wear, Education	3,699	2,628	71.1
Visible risk ID	5,022	3,565	71.0
Low bed, Items in reach, Education	4,469	3,163	70.8

Table 6. No-harm rate of common interventions among patients with no history of falls (N= 10,987)

Common Intervention Pattern	Number of Events within Intervention Pattern with Harm Data	Number of Events Resulting in No Harm to Patient	No-harm Rate (%)
Low bed, Items in reach	5,908	4,279	72.4
Low bed, Items in reach, Non-slip wear	3,886	2,812	72.4
Low bed	7,162	5,173	72.2
Low bed, Non-slip wear	4,568	3,297	72.2
Items in reach	6,709	4,837	72.1
Items in reach, Non-slip wear	4,388	3,162	72.1
Non-slip wear	5,935	4,271	72.0
Low bed, Education	4,754	3,418	71.9
Low bed, Items in reach, Education	4,186	3,004	71.8
Items in reach, Education	4,646	3,330	71.7

CONCLUSIONS

Falls are one of the most common patient safety events reported in the NPSD. This Spotlight illustrates the use of Frequent Pattern Mining, a data mining approach, to help identify common interventions and combinations of interventions in place before falls using the national level data. Compared with traditional statistical analyses, the data mining approach offers an efficient algorithm to identify common combinations of any number of interventions that are concurrent in individual events, and provides a comprehensive view of interventions implemented in healthcare practices reported in the patient safety event data. While the patient safety event data do not contain any other information on circumstances present before the falls, and therefore no causal relations can be drawn from the data, analyses of commonly applied interventions for falls with different reported characteristics help provide a better understanding of current practices in the healthcare settings, which can lead to opportunities for patient safety improvements.

As shown in the key findings, there was little variation in common interventions among patients with different risk of falls. Based on current fall prevention research, patients with differing risks of falling would benefit from tailored interventions targeted at their risks. For instance, senior patients vs. adult patients, patients with or without a history of previous falls, patients with or without sensory impairments, or patients on medications known to increase or not increase their risk of falls, all have different needs for fall prevention interventions. This absence of variation in currently observed prevention strategies may suggest a lack of customization in the current interventions for different patient groups. However, this could also be due to limitations in event reporting quality, including: missing information on current interventions reported to PSOPPC (and therefore not included in the NPSD data) and incomplete patient demographic information, health status, or

hospital setting details that can impact fall risks. Furthermore, the current method only focuses on the top 20 most frequently used interventions in each patient group and does not account for rare interventions. Expanding the list to include less frequently used interventions in each group could provide insight into intervention patterns that may not be consistently applied across the national data but have already been established in local practices.

Because there was little variation in common interventions across patients with different risk factors, potential differences in the efficacy of these commonly used interventions with respect to preventing harm to patients were further examined using the most prevalent risk factor - history of falls - for analysis. Examination of the no-harm rate for frequent interventions in groups with and without a history of falls revealed that different common intervention patterns have slightly different no-harm rates in their respective risk and no-risk groups. The results suggest frequent interventions may have varying levels of impact among patients with different risk factors and highlight the need for further research in the area, including efficacy of less frequently reported intervention patterns. However, any interpretation of no-harm rates is also subject to the same limitations discussed above.

The analyses in this Spotlight also revealed some unexpected findings. One such finding was that there were some instances where there were higher rates of injury reported compared to harm overall. While counterintuitive, these findings may be a by-product of the definition of harm itself within the Common Formats and differences in event reporters' interpretation. In the Common Formats, harm is defined as harm to the patient after discovery of the incident and any attempts to minimize adverse consequences. For example, a patient can sustain an injury as a result of a fall, then have their injury treated. An event reporter can either report no harm to the patient after their initial injury had been addressed or harm to the patient as they suffered the physical consequence of injury.

Another somewhat surprising finding was that the rate of harm among patients with a history of falls was only slightly higher than the rate of harm for patients without history of falls even though history of falls is the most commonly reported risk factor in the NPSD. This can be resulted from the fact that these analyses did not adjust for age, health conditions, and other clinical characteristics. [x] Another possible explanation for this finding may be that there may not be much customization or tailoring in the commonly used interventions for falls. It should also be noted that the data in the NPSD ultimately originate from reporting systems that are designed to provide timely information on safety problems as they are discovered, but vary in accuracy of the categorization of the event and the thoroughness and exactness of the information contained within the event report itself. Staff entering the information at the time of the event may not be aware of all the surrounding factors at time of report entry and this information may not always be entered in the report once they are known. Further, many event reporting systems, both at the provider and PSO level, predate the development of the Common Formats. These systems were adapted to include some Common Formats data elements and created data mappings to recode other data collected through established data elements into Common Formats data elements, which result in missing data and data that may not be comparable to what would have been collected with a full

[x] Patient health status, existing health conditions, and related clinical characteristics are not available in the NPSD. Additionally, patient age is reported as aggregated age groups in the NPSD.

implementation of the Common Formats.

This Spotlight demonstrates the effectiveness of using the data mining algorithm of frequent pattern mining in identifying common co-occurrent interventions for falls. The focus of this analysis is fall interventions. However, the method can be applied to other data elements or event categories in the NPSD to uncover associations between various concurrent reported event characteristics. With the availability of standardized, nation-wide patient safety event reports through the NPSD and an increasing number of patient safety events being reported, there is a growing ability to gain deeper insights into patient safety issues and identify new opportunities for improving healthcare.

Related Resources

For more detailed information on implementing effective strategies to prevent falls, please see AHRQ's:

- *Preventing Falls in Hospitals Toolkit*
- *Fall TIPS: A Patient-Centered Fall Prevention Toolkit.*

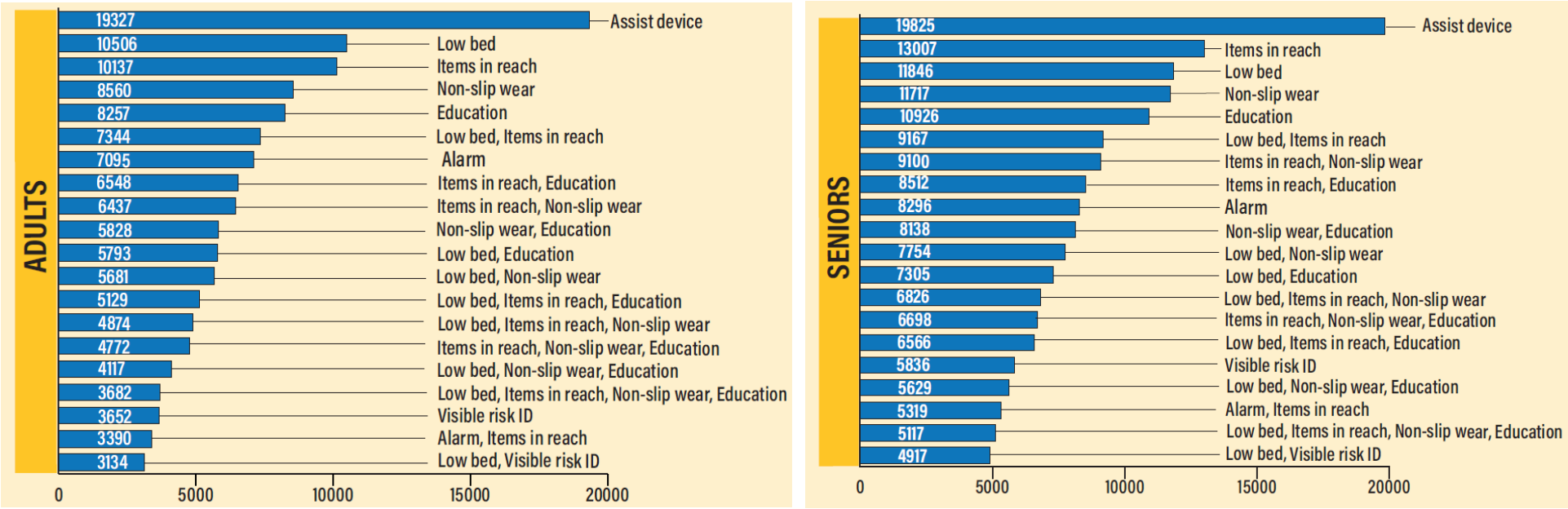
Appendix A. common intervention(s) in place for patients with different demographics or risks of falls or injuries

The appendix presents the twenty most common interventions in place for patients with different demographics (Adults (aged 18-64) vs. Seniors (aged 65 and older)) or risks of falls (previous history of falls, sensory impairment; or Use of medication known to increase risk of falls). Majority of these common intervention patterns are consistent across all these patient groups.

A1. Common interventions in place among falls from adult patients vs. senior patients

Figure A1 shows common interventions or combinations of interventions in place before the falls in decreasing order of frequency for adults compared to seniors. Common interventions between the adults and the senior subgroups are similar. Since an intervention can be included multiple times if it is part of another pattern within a particular fall event, the total count of frequent intervention patterns can exceed the number of falls in each subgroup.

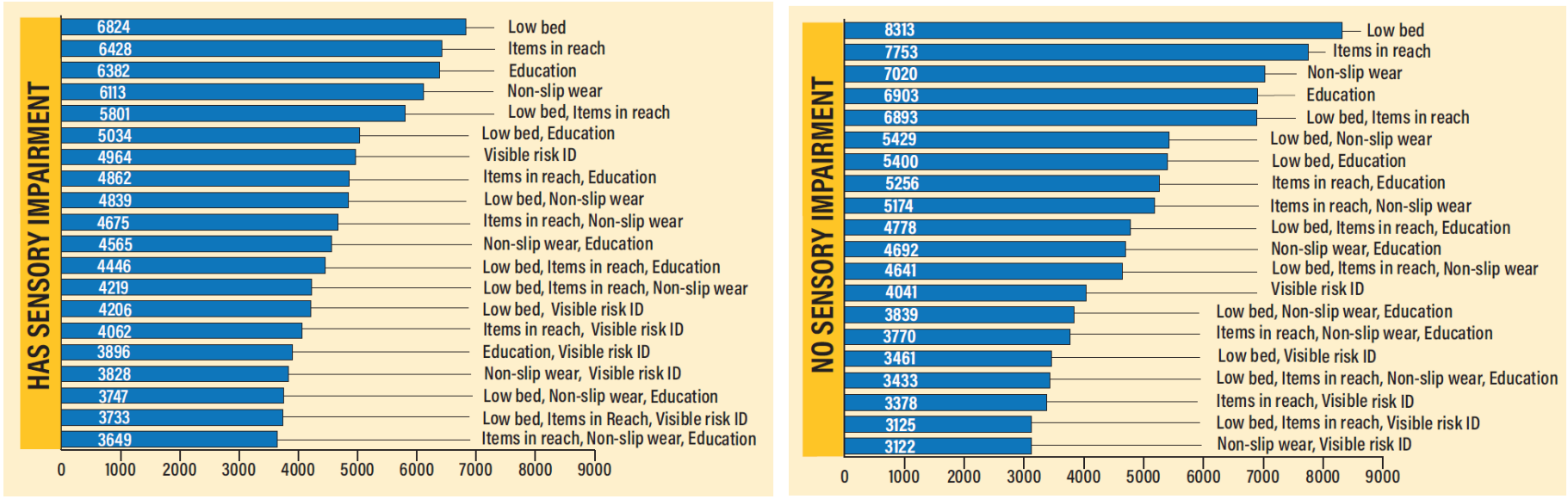
Figure A1 Twenty most common interventions in place among falls for adults vs. senior patients



A2. Common interventions in place among falls from patients with sensory impairment risk factor vs. patients without sensory impairment risk factor

Figure A2 shows common interventions used in falls of patients with sensory impairment compared to those without such impairment. There is little variation in common interventions between the subgroup of patients with a risk factor of sensory impairment and those without.

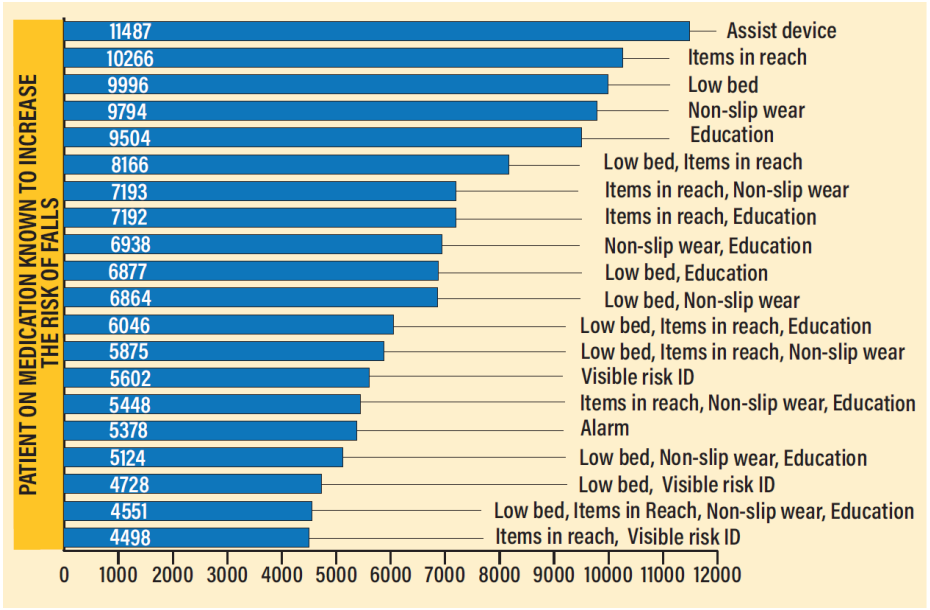
Figure A2 Twenty most common interventions in place among falls from patients with sensory impairment vs. patients without sensory impairment

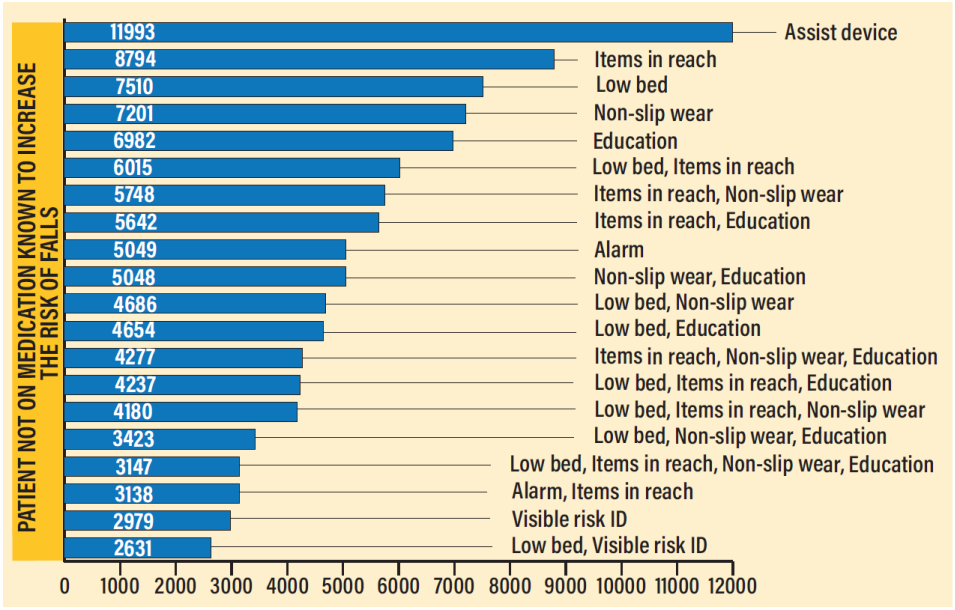


A3. Common interventions in place for falls of patients with medications known to increase the risk of falls vs. without medications known to increase the risk of falls

Figure A3 shows common interventions used in falls of patients who were on medication known to increase falls compared to those not on these medications. Common interventions show little variation between the subgroup of patients who were on medications known to increase the risk of falls and those who were not.

Figure A3. Twenty most common interventions in place for falls of patients on medications known to increase the risk of falls vs. patients not on medications known to increase the risk of falls

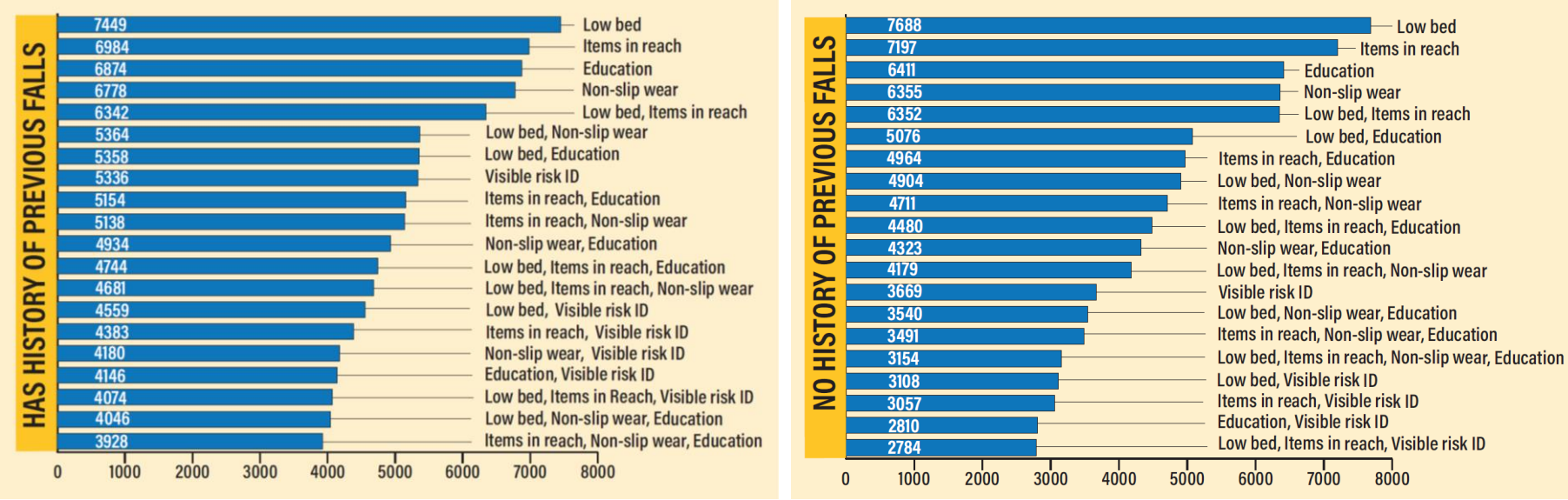




A4. Common interventions in place for falls of patients with a previous history of falls vs. those with no history of falls

Figure A4 shows common interventions used in falls of patients with a previous history of falls compared to those without such history. There is little variation in common interventions between the subgroup of patients with a risk factor of history of previous falls and those without.

Figure A4. Twenty most common interventions in place among falls from patients that have a previous history of falls vs. those with no history of falls



Appendix B. Abbreviated response categories for data element DE216

DE216 (Which of the following were in place and being used to prevent falls for this patient?)

Table B1. Mapping between the answer values and labels

Original answer values from CFER H1.2	Labels in figures and text of this report
Assistive device (e.g., wheelchair, commode, cane, crutches, scooter, walker)	Asst. device
Bed or chair alarm	Alarm
Bed in low position	Low bed
Call light/personal items within reach	Items in reach
Change in medication (e.g., timing or dosing of current medication)	Change in meds
Non-slip floor mats	Non-slip mats
Hip and/or joint protectors	Joint protectors
Non-slip footwear	Non-slip wear
Patient and family education	Education
Patient sitting close to the nurses' station	Near staff
Physical/occupational therapy, includes exercise or mobility program	Phys. Therapy
Sitter	Sitter
Supplemental environmental or area lighting (when usual facility lighting is considered insufficient)	Lighting
Toileting regimen	Toilet regimen
Visible identification of patient as being at risk for fall (e.g., Falling Star)	Visible risk ID

APPENDIX C. REFERENCES

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