NPSD Data Spotlight:

Behavioral Health AI Free-Text Analysis

Agency for Healthcare Research and Quality

Patient Safety Listed PSO Organization

Behavioral Health AI Free-Text Analysis

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INTRODUCTION

Behavioral health is a top concern in all healthcare settings. Behavioral health-related issues (BH issues) among patients provide a unique challenge to providing safe, high-quality care. Furthermore, healthcare staff exposed to aggressive behavior from patients are at an increased risk for injury.

This *Data Spotlight* illustrates the use of artificial intelligence (AI)-based free-text analysis to identify BH issues associated with in-hospital safety events submitted by Patient Safety Organizations (PSOs). The goal of the analysis was to gain a better understanding of the relationship between BH issues and patient safety events in hospital settings.

This *Data Spotlight* provides insights into the free-text analysis methods used by the Patient Safety Organization Privacy Protection Center (PSOPPC) to analyze qualitative data. It details the technical methods involved, the analytic approach, and the results of the analysis.

Highlights

- A behavioral health-related issue (BH issue) was found in free text for 16.5 percent of the hospital-based patient safety events sample.
- The most common BH issue was Against Medical Advice (AMA) / Leave.
- BH issues were less frequently identified for patients age 65 and older compared to patients younger than 65.
- Slightly over one-third of the events located in the emergency department had a BH issue.
- BH issues were more prevalent among events without patient residual harm compared to those with patient residual harm.
- Among patient safety events with at least one BH issue, the two most reported contributing factor categories were "policies & procedures" and "human factors."

BACKGROUND

Behavioral health is a critical factor in hospital patient safety events. Patients experiencing a BH issue and those not following medical advice about discharge can have an increased risk of medical problems, including falls and other adverse events.[1] In addition, studies have shown that the prevalence of substance use disorders is higher among medical inpatients than in the general population.[2,3]

Common BH-related issues or adverse events include suicide attempts, patient-on-patient assaults, staff abuse or neglect, elopement (unauthorized leave or departure), restraint-related

[1] Mills, PD., Watts, BV., Shiner B., Hemphill RR. Adverse events occurring on mental health units. *General Hospital Psychiatry*. 2018. Vol 50, Pages 63-68, ISSN 0163-8343, https://doi.org/10.1016/j.genhosppsych.2017.09.001

[2] Kouimtsidis, C., Reynolds, M., Hunt, M., Lind, J., Beckett, J., Drummond, C., Ghodse, H. Substance use in the general hospital. *Addictive Behaviors.* 2003. 28(3): 483-499.

[3] van Niekerk, M., Walker, J., Hobbs, H., Magill, N., Toynbee, M., Steward, B., Harriss, E., Sharpe, M. The prevalence of psychiatric disorders in general hospital inpatients: A systematic umbrella review. *Journal of the Academy of Consultation-Liaison Psychiatry.* 2022*;* 63 (6): 567-578. https://doi.org/10.1016/j.jaclp.2022.04.004.

injuries, medication errors, and self-harm.[4] When patients experience episodes of agitation during hospitalization, there may be an increase in both physical and verbal aggressive encounters with hospital staff. Studies have found that BH issues are linked to an increase in staff injuries, a decrease in an organization's workplace safety, and an increase in hospital length of stay.[5,6] To address these concerns, hospitals and psychiatric facilities implement rigorous safety protocols to reduce risks, including suicide risk screening, crisis de-escalation training, robust incident reporting and analysis, medication safety protocols, patient rights and protections, and environmental hazard (e.g., inadequate sanitation and hygiene) mitigation.[7]

Regulatory bodies like the Centers for Medicare and Medicaid Services (CMS) and accreditation organizations set standards to help prevent events with BH issues. For example, the Joint Commission encourages screening patients with emotional or behavioral disorders for suicide risk.[8] The Joint Commission's Sentinel Event Policy encourages hospitals to investigate and learn from these incidents to improve patient safety.

The 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 provider organizations submit patient safety event data to PSOs, which in turn submit standardized versions of these event reports to the PSOPPC via the Common Formats.[9] AHRQ's Common Formats are a set of standardized definitions and formats that make it possible to collect, aggregate, and analyze uniformly structured information about patient safety. The Common Formats also include fields for reporters to enter unstructured free text to provide further detail on events. 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.

Events in the hospital setting are reported to the PSOPPC through the AHRQ Common Formats for Event Reporting (CFER) – Hospital, which collects information for 10 event categories: (1) Anesthesia; (2) Surgery, including other invasive procedures; (3) Blood or Blood Product; (4)

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[4] Barrins & Associates. Sentinel events in behavioral health and psychiatric hospitals settings — and how accreditation and regulatory standards help prevent them. May 8, 2025. Accessed on 6/20/25 at https://barrins-assoc.com/tjc-cms-blog/behavioral-health/sentinel-events-in-behavioral-health/.

[5] Laprime A., Kanaley R., Keller A., Stephen, SJ., Schriefer, J., Fallon, A., Sosa, T. Improving employee safety through a comprehensive patient behavioral program. *Hosp Pediatr.* May 2024; 14 (5): 356–363. https://doi.org/10.1542/hpeds.2023-007714.

[6] Rhodes, SM., Patanwala AE., Cremer, JK., et al. Predictors of prolonged length of stay and adverse events among older adults with behavioral health-related emergency department visits: A systematic medical record review. *Journal of Emergency Medicine.* 2016. Volume 50, Issue 1, 143 – 152.

[7] Zegers, Hesselink, Geense, et al. Evidence-based interventions to reduce adverse events in hospitals: A systematic review of systematic reviews. *BMJ Open.* 2016;6:e012555. doi: 10.1136/bmjopen-2016-012555

[8] Joint Commission. National Patient Safety Goal (NPSG) 15.01.01 Reduce the Risk for Suicide. Accessed on 7/21/25 at https://www.jointcommission.org/our-priorities/suicide-risk-reduction/suicide-risk-reduction-resource-center/#t=_TabStrategies.

[9] AHRQ. The Agency for Healthcare Research and Quality coordinates the development of Common Formats for reporting and analysis of patient safety data. Accessed on 6/20/25 at https://www.psoppc.org/psoppc_web/publicpages/commonFormatsOverview.

Device or Medical/Surgical Supply; (5) Fall; (6) Healthcare-associated Infection; (7) Medication or Other Substance; (8) Perinatal; (9) Venous Thromboembolism (VTE); and (10) Other.

Although PSOs have concerns about BH issues associated with hospital patient safety events and workplace safety (e.g., violence against staff), behavioral health is not an event type in the CFER – Hospital. Therefore, the purpose of this analysis is to explore the free-text data to assess the prevalence of BH issues among the reported events. More specifically, the goals of this analysis are to:

- Define categories of BH issues
- Quantify BH issues found within the available free text
- Analyze the frequencies of the BH issues across event characteristics
- Evaluate the overlap and relationships among the BH issues
- Discover and analyze the relationships between BH issue(s) found in the free text and other factors associated with an event, such as contributing factors, harm level, hospital setting/location, and patient characteristics

METHODOLOGY

Free-text Analysis

Free-text analysis is the scanning of unstructured, qualitative text fields, which allows for the identification and categorization of critical information that is not collected as a structured data element or answer value (i.e., with pre-determined response options). Free-text analysis provides the opportunity to see a more comprehensive picture of an event by reviewing the written text entered in a narrative text field (e.g., an unstructured Common Formats field). Specific to events reported to the PSOPPC, free-text analysis aids in identifying common events, unsafe conditions, and contributing factors that may not be immediately obvious in the structured data.

Data Source

This analysis was based on a 10 percent random sample of patient safety events submitted to the PSOPPC in 2024, encompassing both CFER – Hospital V1.2 and CFER – Hospital V2.0 submissions and totaling 16,666 events.

The PSOPPC free-text analysis focuses on narrative text associated with the following CFER – Hospital data elements:

- Free-text field for the description of the event captured by data element (DE) 15, which guides the user to "Describe the specifics of the incident, near miss, or unsafe condition in your own words, as best you know them." There is a 4,000-character field limit for this DE to be submitted to the PSOPPC.
- Another free-text field for "additional event information" captured by DE87. This field is captured in CFER-Hospital V1.2 only.
- The "Other, please specify" write-in text field associated with DE21 when the reporter selects "OTHER" as the Event Type.
- The "Other, please specify" write-in text field associated with DE105 when the reporter selects "OTHER" as the Contributing Factor.

The above free-text fields were extracted from the PSOPPC database and kept together for each safety event record.

Data Preparation

To prepare and handle the free-text data, the following steps were performed:

1. Data deidentification: for data protection and privacy, the data is stripped of all identifiers and personal information. For example, all names, addresses, and dates are replaced with a default "NAME," "ADDRESS," and "DATE," respectively.
2. Text processing: the free-text fields are reviewed, cleaned, and prepared for analysis.

Free-text Analysis Method

The use of advanced AI techniques for free-text analysis offers significant potential for improving patient safety and identifying adverse events.

The first step in the BH free-text analysis was a method called latent dirichlet allocation (LDA) for topic modeling. Topic modeling is a general technique used in text analysis to uncover hidden themes or topics within a collection of free text. We provided the model with key words and terms associated with BH categories and tested it on a test dataset of random 2025 events. We researched categories of BH issues associated with hospital events and reviewed the BH terms from the United States Core Data Interoperability standard. For example, in Common Format free-text fields, LDA identified topics like "suicide," "violence," and "against medical advice" based on the words commonly associated with each theme. We started with six categories: (1) against medical advice (AMA); (2) leave / elopement; (3) mental health disorders; (4) substance abuse; (5) suicide ideation or attempt; and (6) violent action. AMA and leave were extremely overlapping and redundant as were mental health disorders and substance abuse. Thus, those categories were combined, and we ended with four distinct BH issue categories described in the table below.

Behaviors associated with AMA / leave (when not overlapping with other BH issues) may not always be BH-related. For example, AMA discharge may be caused by dissatisfaction, financial concerns, or feeling better prematurely.[10] However, a recent report by the DHHS Office of the Inspecter General found that among Medicare enrollees, those with a mental health diagnosis were more likely to leave AMA than enrollees without a mental health diagnosis.[11] Therefore, for this analysis of patient safety event free text, we included this action as a unique BH issue.

AI-based large language models (LLMs) understand text very well. For our analysis, we chose to use Claude 3.5 Sonnet LLM to classify free-text narratives into pre-defined categories. Claude 3.5 LLM is available on Amazon Web Services Bedrock, which is FedRAMP High Level-

[10] Edwards J, Markert R, Bricker D. Discharge against medical advice: how often do we intervene? *J Hosp Med.* 2013 Oct;8(10):574-7. doi: 10.1002/jhm.2087.

[11] Office of the Inspector General (OIG). Data Brief: Medicare enrollees left acute-care hospitals against medical advice at increasing rates. Aug 2025. U.S. Department of Health and Human Services (USDHHS). Report number: A-04-24-03003. Accessed on 8/27/25 at https://oig.hhs.gov/documents/audit/10896/A-04-24-03003.pdf.

Approved. A FedRAMP-authorized platform offers secure and cost-effective access to LLM models and includes data isolation and encryption.

Next, we provided the LLM with a problem statement in order to classify an event's free text into four BH issue categories or classifications. The classification of BH issues was achieved iteratively through "prompt engineering." More specifically, we started by providing keywords associated with each BH issue category to the Claude 3.5 LLM. The model then generated clean text outputs for each event and determined which BH issue categories were found. The results of a random subset of records were manually evaluated to identify errors and improvement areas. Based on this evaluation, the definition prompt was refined with additional rules and instructions. This cycle was repeated for at least four rounds, allowing continuous improvement in both classification accuracy and prompt quality.

We tested the LLM with a small 2025 dataset and then ran the LLM using the final, larger 2024 analysis dataset. The AI model effectively and efficiently developed each BH issue category definition and solved our problem of categorizing an event's BH issue(s).

The box below lists the four BH issue categories and the AI-developed final definition prompt.

Behavioral Health Issue Categories and AI-developed Definition

BH Issue Category	Definition*
Against Medical Advice (AMA) / Leave	Patients who discharge themselves against medical advice (AMA). This includes instances where individuals refuse recommended interventions or treatments and leave the care facility before completion of their prescribed care plan. This includes patients who voluntarily exit the facility, either as part of a planned departure or through an abrupt, unplanned exit. This category covers behaviors described as leaving, fleeing, going home without formal discharge, or eloping.
Mental Health Disorders and/or Substance Abuse	A broad range of psychiatric and behavioral health conditions including, but not limited to, schizophrenia, hallucinations, post-traumatic stress disorder (PTSD), obsessive-compulsive disorder (OCD), bipolar disease, bipolar disorder (BPD), attention deficit hyperactivity disorder (ADHD), mood disorders, eating disorders (anorexia, bulimia, binge eating), panic attack, anxiety disorders, phobias, autism spectrum disorders, substance use disorders (SUD), alcoholism, and drug abuse. This also includes related mental health treatment, substance use disorder treatment, unintentional overdose, and clinical institute withdrawal assessments for alcohol (CIWA). Patients can exhibit signs of psychological distress or psychiatric symptoms. This category encompasses a wide spectrum, from general emotional instability and mood disturbances to specific conditions (e.g., depression, anxiety, or behavioral dysregulation). *Note: This category excludes mental health screening and mental health assessment.*
Suicide Ideation or Attempt	Suicide ideation includes expressions, thoughts, or contemplation about suicide. Patients in this category exhibit ideation related to self-harm or suicide without necessarily having taken action. They may be given a suicide risk assessment or suicide risk screen. Involuntary commitment may play a part. Suicide attempts are instances where patients engage in self-injurious behaviors that indicate an active attempt to harm themselves. This includes deliberate actions such as cutting wrists, intentional overdose, shooting oneself, or other behaviors that pose a direct danger to their own life (e.g. attempted suicide or attempting suicide).
Violent Action	Incidents characterized by aggressive or violent behavior within the healthcare setting. This includes physical actions (e.g., assault, hitting, kicking, punching, biting) as well as severe verbal aggression (e.g., yelling, screaming, verbal abuse, threat of violence, threatening staff) including expressions of anger or agitation. *Note: This category excludes intimate partner violence occurring outside of the facility.*

* Note that the definition for a BH issue may interchangeably include words and terms with the same meaning to assist AI in the detection of the issues in the text.

We again reviewed a random subset of the results to validate the accuracy of the categorizations. After the AI LLM scans the free text, an event may have up to four of the BH issues. These categories are not mutually exclusive. Thus, to quantify the categorization among events that had at least one issue, we created mutually exclusive category combinations for each event.

Analysis of Differences in Characteristics

To obtain key patient and event characteristics, we merged in the Common Formats' structured fields for all 16,666 events. We then calculated and compared the distribution of patient characteristics and event characteristics among the full sample and among a subset of the sample (i.e., the 2,751 events that had at least one BH issue found in the free text).

RESULTS

BH Issue Categories

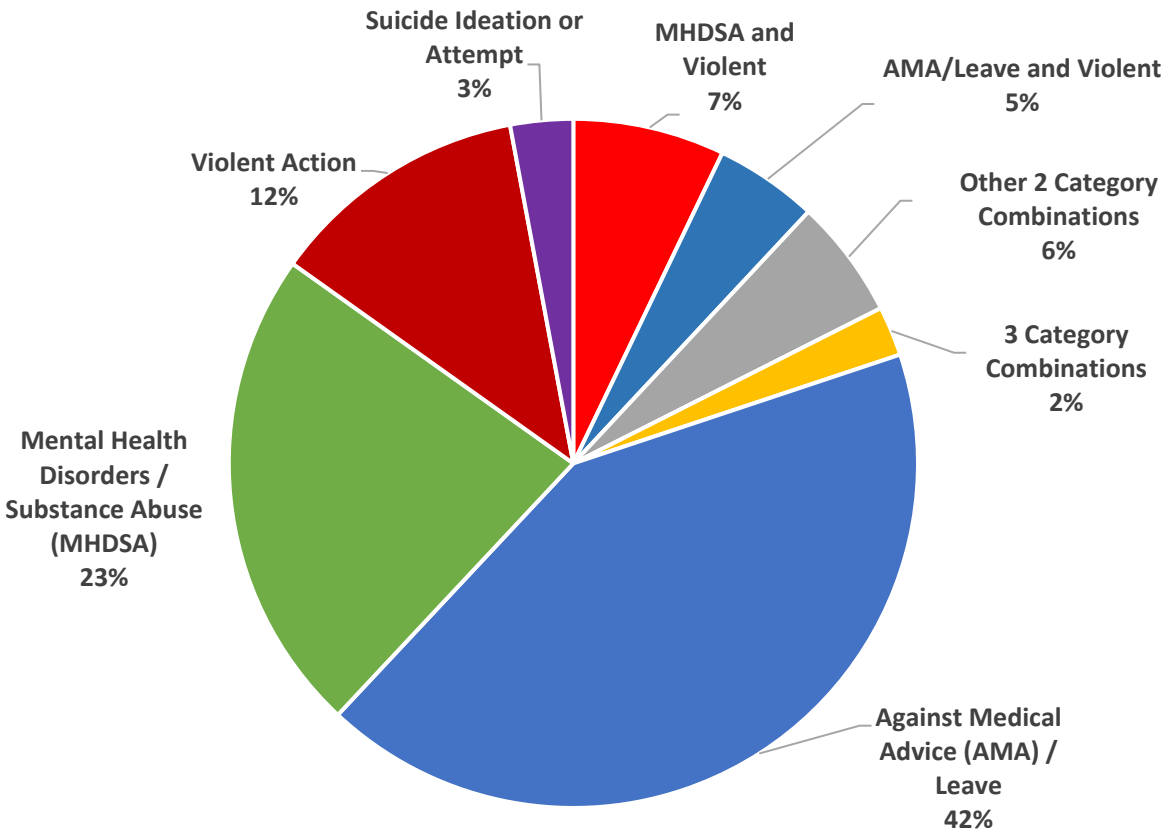
Table 1 reports the category combinations for all events. Among 16,666 events in the sample, 2,751 (16.5 percent) had at least one BH issue. Eighty percent (n=2,204) of the 2,751 events had only one BH issue category, while 20 percent of the events (N=547) had two or more BH issue categories. The most common BH issue was AMA / leave (N=1,440). Only 6 percent of the total BH issues included suicide ideation or attempt. The most common overlap of issues was mental health disorder and/or substance abuse (MHDSA) with violent action. The second most common overlap of issues was AMA / leave with violent action.

Table 1. Number of Behavioral Health Issues among 16,666 Events

Category Combinations	Against Medical Advice (AMA) / Leave	Mental Health Disorder and/or Substance Abuse (MHDSA)	Violent Action (VA)	Suicide Ideation or Attempt	Total BH Issues	N (Percent) of Events with a BH Issue
Events with 1 Category Only	1,158	629	336	81	2,204	2,204 (80.1)
Events with 2 Categories: MHDSA and VA		196	196		392	196 (7.1)
Events with 2 Categories: AMA/Leave and VA	133		133		266	133 (4.8)
Events with 2 Categories: AMA/Leave and MHDSA	91	91			182	91 (3.3)
Events with 2 Categories: MHDSA and Suicide		43		43	86	43 (1.6)
Events with 3 Categories: AMA/Leave, MHDSA, and VA	39	39		39	117	39 (1.4)
Events with 3 Categories: MHDSA, Suicide, and VA		15	15	15	45	15 (0.5)
Events with 2 Categories: Suicide and VA			11	11	22	11 (0.4)
Events with 3 Categories: AMA/Leave, MHDSA, and Suicide	10	10		10	30	10 (0.4)
Events with 2 Categories: AMA/Leave and Suicide	9			9	18	9 (0.3)
TOTALS	**1,440**	**1,023**	**691**	**208**	**3,362**	**2,751**
Percent of Total BH Issues	**43%**	**30%**	**21%**	**6%**		

Figure 1 shows the distribution of mutually exclusive BH issue category combinations among the 2,751 events with a BH Issue. For example, the 1,158 events with AMA / leave as the only category accounted for 42 percent of the 2,751 events. The 196 events with both MHDSA and violent action accounted for 7 percent of the 2,751 events.

Figure 1. Distribution of Behavioral Health Issues across 2,751 Events



Differences in Characteristics between Full Sample and Subsample with a BH Issue

Table 2 shows the distribution of characteristics across the full sample (N=16,666) compared to the distribution of characteristics across the sub-sample of events with at least one BH issue (N=2,751). Compared to the full sample, the findings show that among the events with a BH issue, there were more male patients (34.1 percent), patients aged 18-64 years (44.9 percent), event report types of unsafe condition (16.7 percent), event types reported as other (77 percent), events with a contributing factor of human factors (51.3 percent), and events located in the emergency department (21.4 percent).

Table 2. Sample Characteristics (Full Sample / Among Events with BH Issues)

Characteristic	Number (N)	Percent of Sample	N with BH Issue	Percent of the Full Sample
Patient Sex				
Missing	4,277	25.7%	856	31.1%
Unknown	1,388	8.3%	111	4.0%
Female	5,982	35.9%	846	30.8%
Male	5,019	30.1%	938	34.1%

Characteristic	Number (N)	Percent of Sample	N with BH Issue	Percent of the Full Sample
Patient AGE GROUP				
Under 18 years	901	5.4%	122	4.4%
Adult (18-64 years)	5,632	33.8%	1,234	44.9%
Mature adult (65-74 years)	2,288	13.7%	229	8.3%
Older adult (75-84 years)	1,867	11.2%	160	5.8%
Aged adult (85+ years)	1,038	6.2%	99	3.6%
Unknown	4,940	29.6%	907	33.0%
Patient EXTENT OF HARM				
Harm (Death, Severe, Moderate, or Mild)	2,876	17.3%	272	9.9%
No Harm	8,938	53.6%	1,510	54.9%
Unknown	528	3.2%	109	4.0%
Missing	4,324	25.9%	860	31.3%
Event REPORT TYPE				
Incident: a patient safety event that reached the patient, whether the patient was harmed or not.	12,552	75.3%	1,899	69.0%
Near Miss: a patient safety event that did not reach the patient.	2,187	13.1%	393	14.3%
Unsafe Condition: any circumstance that increases the probability of a patient safety event.	1,927	11.6%	459	16.7%
EVENT TYPE				
Other	9,151	54.9%	2,119	77.0%
Falls	2,271	13.6%	276	10.0%
Medication or Other Substance	2,880	17.3%	272	9.9%
Surgery or Anesthesia	832	5.0%	38	1.4%
Blood or Blood Product	288	1.7%	*	*
Perinatal	561	3.4%	21	0.8%
Device	329	2.0%	14	0.5%
Pressure Injury	318	1.9%	*	*
Healthcare-associated Infection	33	0.2%	*	*
Multiple	*	.02%	0	0%
Event CONTRIBUTING FACTOR CATEGORY				
Human Factors	7,255	43.5%	1,410	51.3%
Missing	6,074	36.4%	1,010	36.7%
Multiple	1,088	6.5%	115	4.2%
Communication	714	4.3%	87	3.2%
Other	926	5.6%	82	3.0%
Policies and Procedures	104	0.6%	22	0.8%
Staff Qualifications	197	1.2%	12	0.4%
Environment	179	1.1%	*	*
Supervisor/Support	55	0.3%	*	*
Data	74	0.4%	*	*

Characteristic	Number (N)	Percent of Sample	N with BH Issue	Percent of the Full Sample
Event LOCATION				
Impatient general care area (e.g., medical/surgical unit)	3,851	23.1%	818	29.7%
Emergency department	1,695	10.2%	590	21.4%
Missing or unknown	4,210	25.3%	559	20.3%
Other area / location (including outside area and blood bank)	2,203	13.2%	338	12.3%
Special care area (e.g., ICU, CCU, NICU)	1,504	9.0%	173	6.3%
Outpatient care area	478	2.9%	101	3.7%
Operating room or procedure area, including PACU or recovery area	1,345	8.1%	91	3.3%
Labor and delivery	746	4.5%	46	1.7%
Radiology/imaging department, including onsite mobile units	406	2.4%	23	0.8%
Pharmacy	228	1.4%	12	0.4%

** Numbers less than 10 are suppressed.*

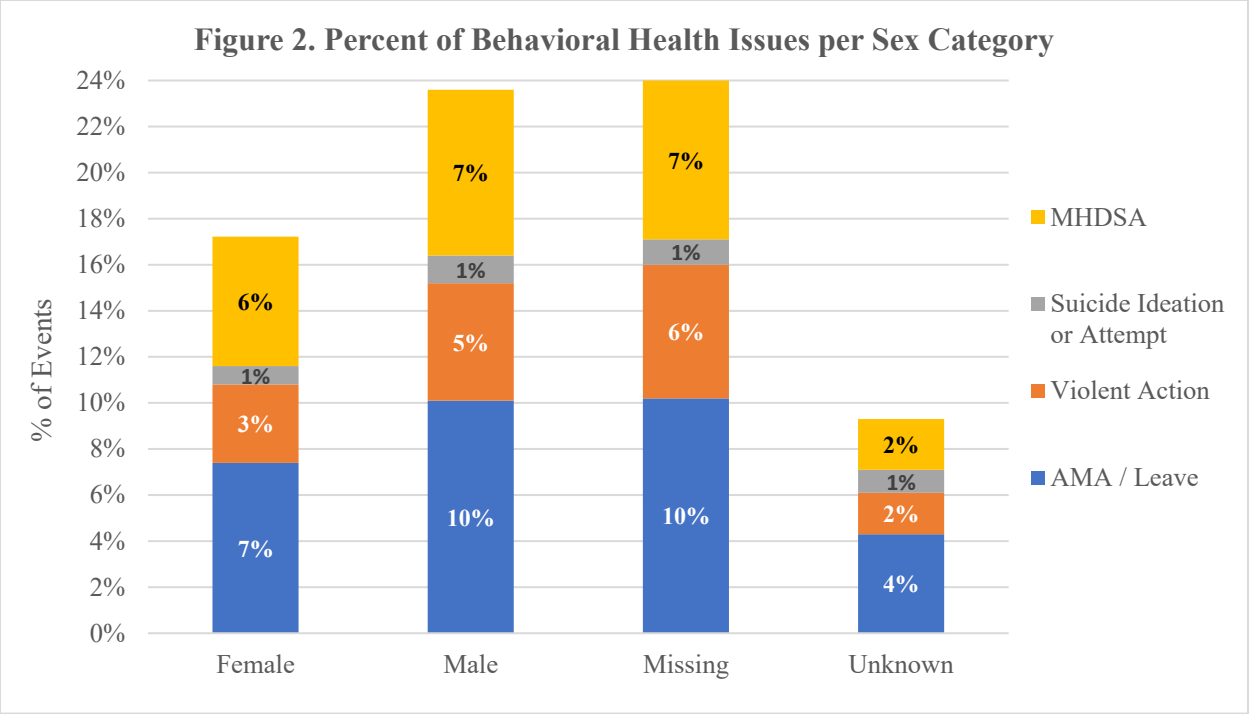
Distribution of BH Issues across Patient and Event Characteristics

The figures that follow are the results of frequencies of each individual BH issue within a subgroup of patients grouped by a characteristic. For example, events that included a violent action either alone or in combination with another issue was found among 3 percent of the female group and 5 percent of the male group.

The non-mutually exclusive percentages were stacked in each bar of the figure to represent the **total** percentage of issues. For each characteristic, we provide a graph showing the percent of total issues found within a group. After the graph, we report the findings of the percent of events with *at least one* BH issues found within a group. (As shown in the Appendix Tables.) Because an event can have more than one BH issue category, the total percentage of BH issues most often exceeds the percentage with *at least one* BH issue among a given group.

Patient Sex

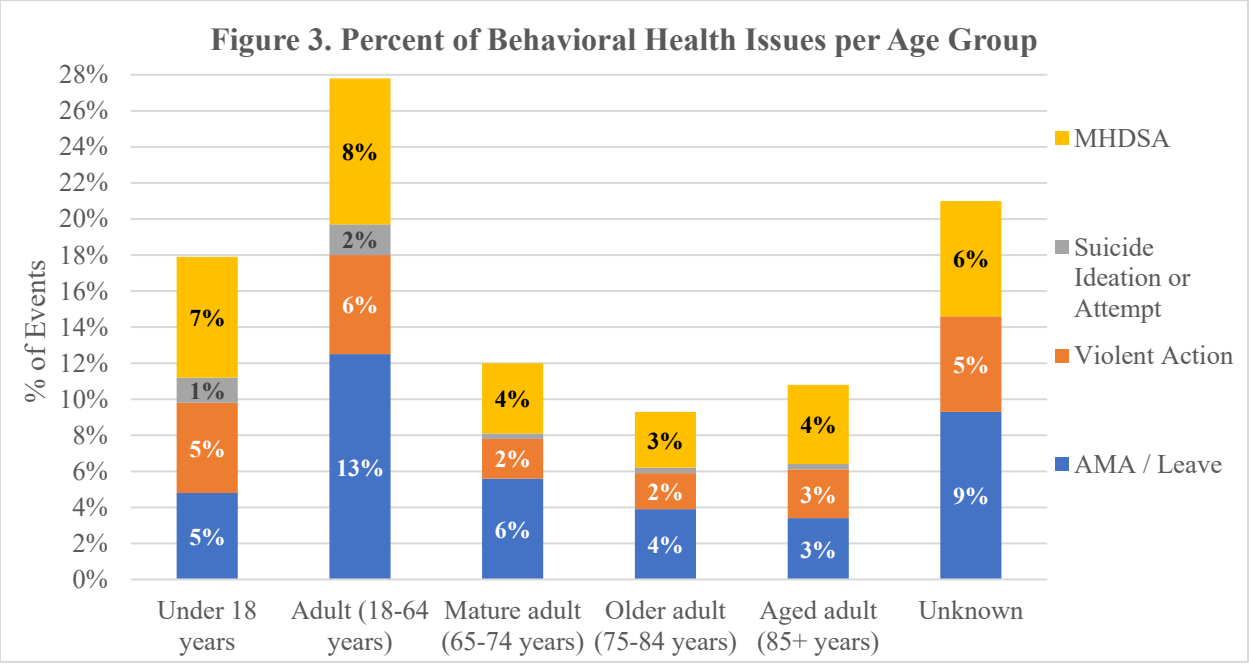
Figure 2 shows that more BH issues were found among male patients (total = 24 percent) than among female patients (total = 17 percent).



The percent of male patients with *at least one* BH issue was 18.7 percent and the percent of female patients with *at least one* BH issue was 14.1 percent. (See Appendix Table 1.)

Patient Age Group

Figure 3 shows that a higher percentage of BH issues were found among patients between the ages of 18 and 64 years (total =28 percent) than the other age groups.

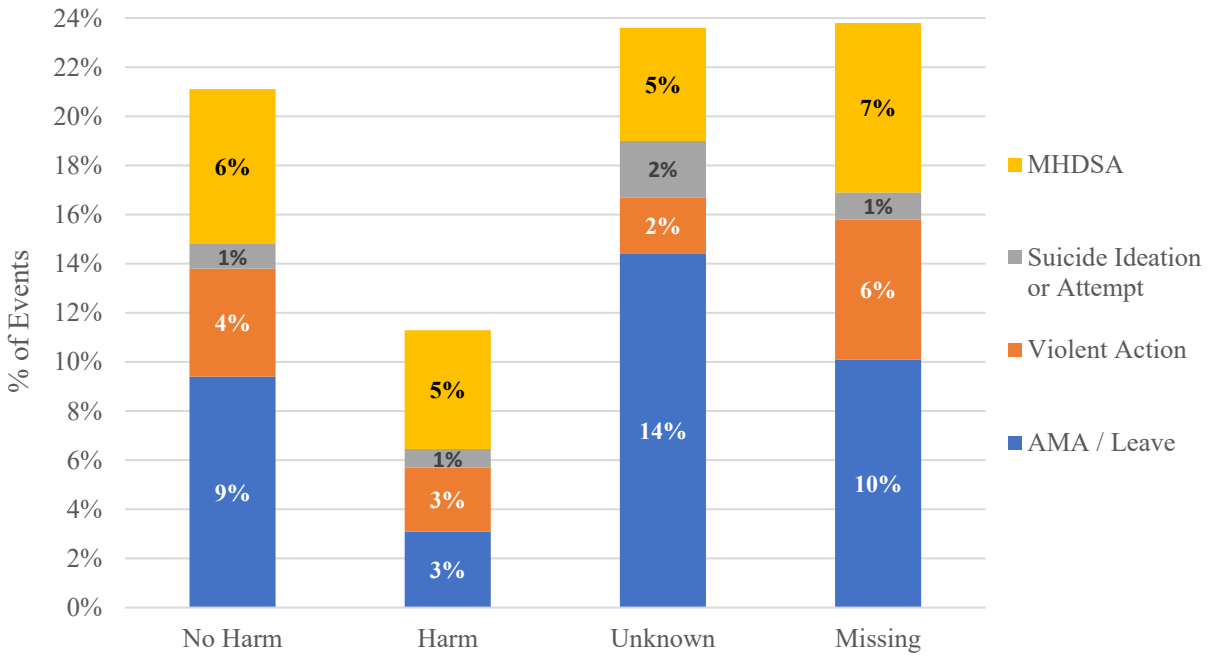


The percentage of patients aged 18-64 years with *at least one* BH issue was 21.9 percent. In contrast, the percentage of patients aged 75-84 years with *at least one* BH issue was 8.6 percent. Overall, a BH issue was less frequently identified in patients aged 65 and older compared to patients younger than 65 years. (See Appendix Table 2.)

Extent of Residual Harm to Patients

Figure 4 shows that more BH issues were found among events with no residual harm to patients (total = 21 percent) compared to events with residual harm to patients (total = 11 percent). BH issues were highest among events with harm not reported or unknown (total = 24 percent for each).

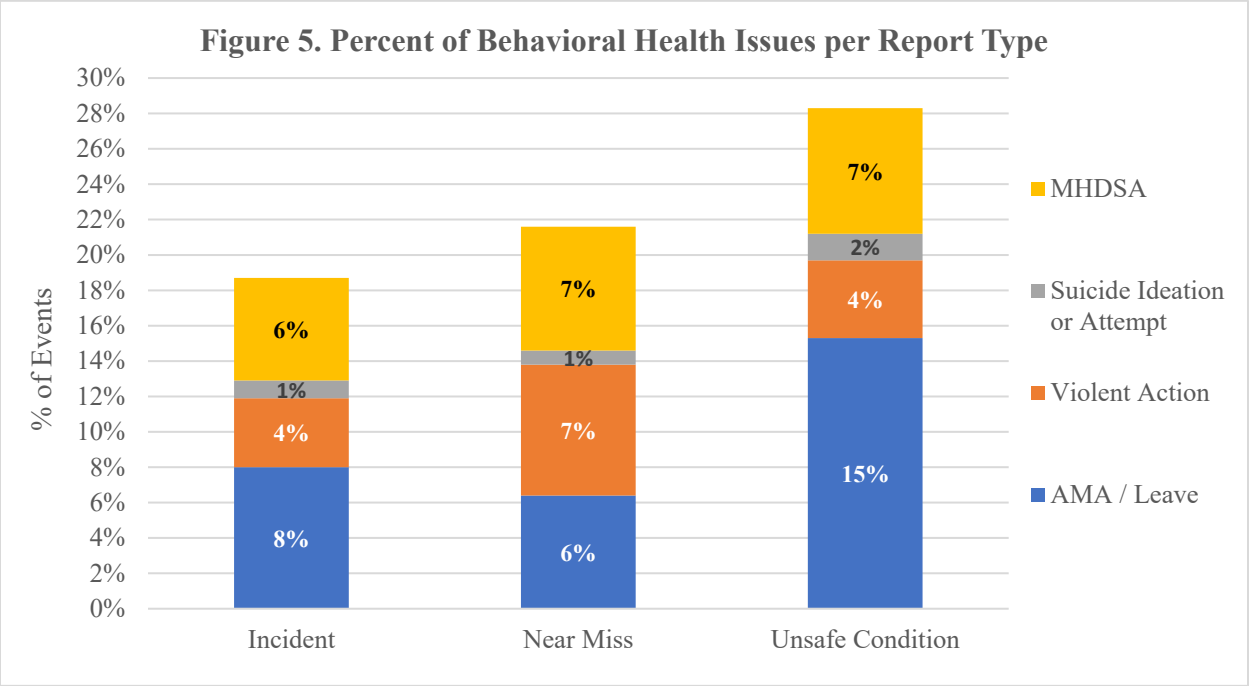
Figure 4. Percent of BH Issues per Extent of Residual Harm



As shown in Appendix Table 3, the percentage of NO harm events with *at least one* BH issue was 16.9 percent, and the percentage of harm events with *at least one* BH issue was 9.5 percent Thus, BH issues were less prevalent among events resulting in patient residual harm compared to no-harm events.

Report Type

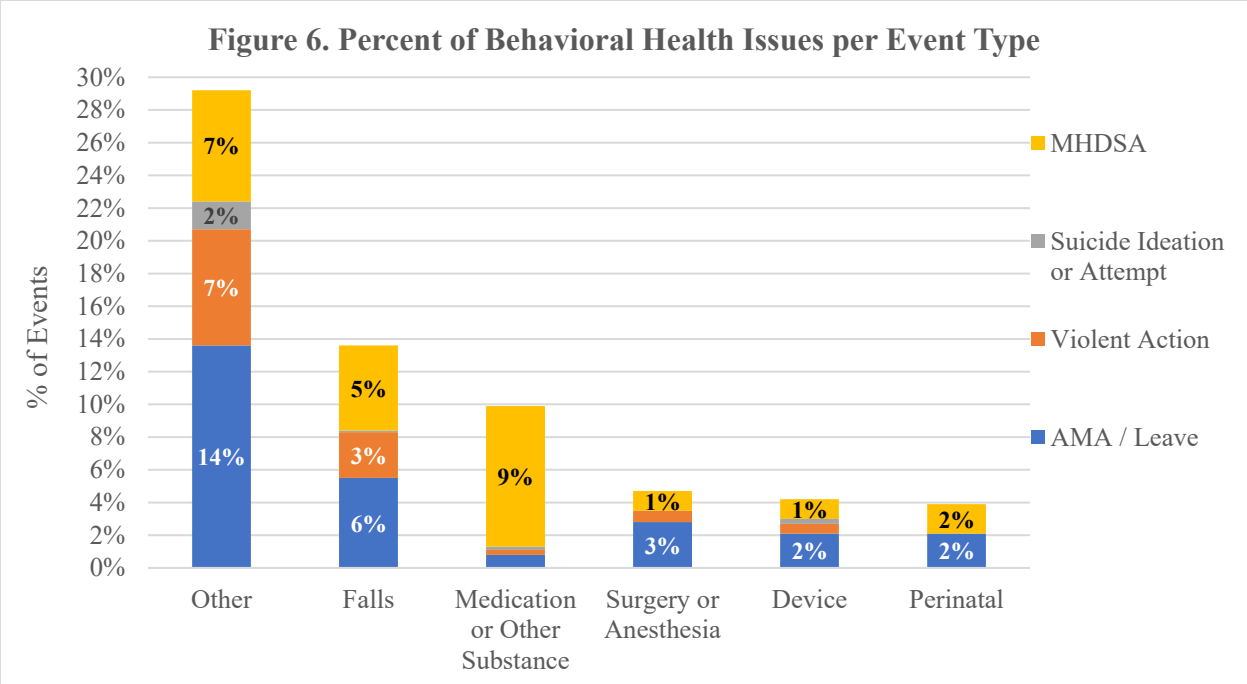
Figure 5 shows that more BH issues were found among events reported as unsafe conditions (total = 28 percent) compared to near miss (total = 22 percent) and incident report (total = 19 percent) types. AMA / leave constituted the majority of the BH issues found among unsafe conditions. The percentage of violent action BH issues (7 percent) was highest among near miss event types.



The percentage of unsafe condition events with *at least one* BH issue was 23.8 percent among unsafe condition events, 18.0 percent among near miss events, and 15.3 percent among incident events. (See Appendix Table 4.)

Event Type

Figure 6 shows the percent of BH issues was the highest among the group of events reported as other type (total = 29 percent), followed by falls events (total = 14 percent), and medication or other substance events (total = 10 percent). Slightly less than half of the total BH issues among other events were AMA / leave. This figure includes only the event types with 10 or more BH issues.

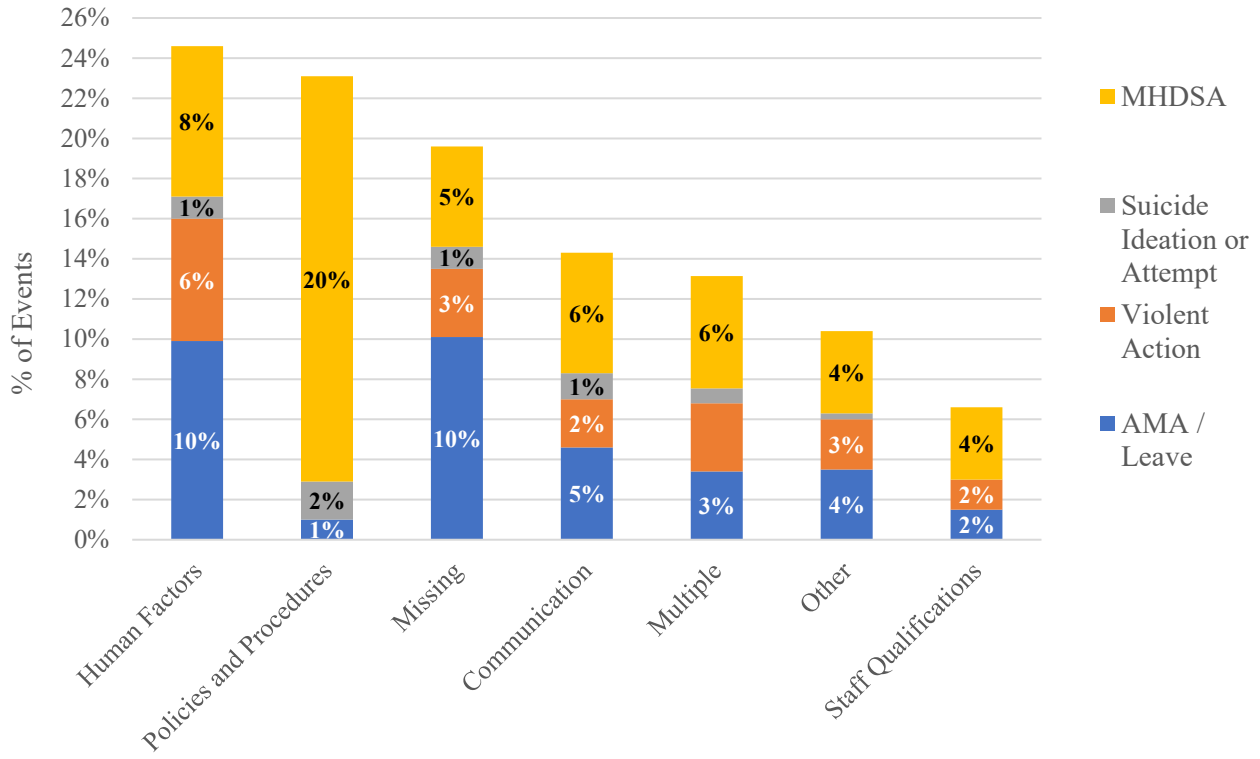


As shown in Appendix Table 5, the percentage of other events with *at least one* BH issue was 15.3 percent, followed by falls (12.2 percent), medication or other substance (9.4 percent), surgery or anesthesia (4.6 percent), device (4.3 percent), and perinatal (3.7 percent).

Contributing Factors

Figure 7 shows that the total percentage of BH issues among events with the contributing factor reported as human factors was 25 percent, followed closely by policies and procedures, including clinical protocols (total = 23 percent). Among the policies and procedures group of events, MHDSA was found to be the dominant BH issue (total = 20 percent). Among the other contributing factor groups, the BH issue categories were more evenly distributed.

Figure 7. Percent of BH Issues per Contributing Factor Category

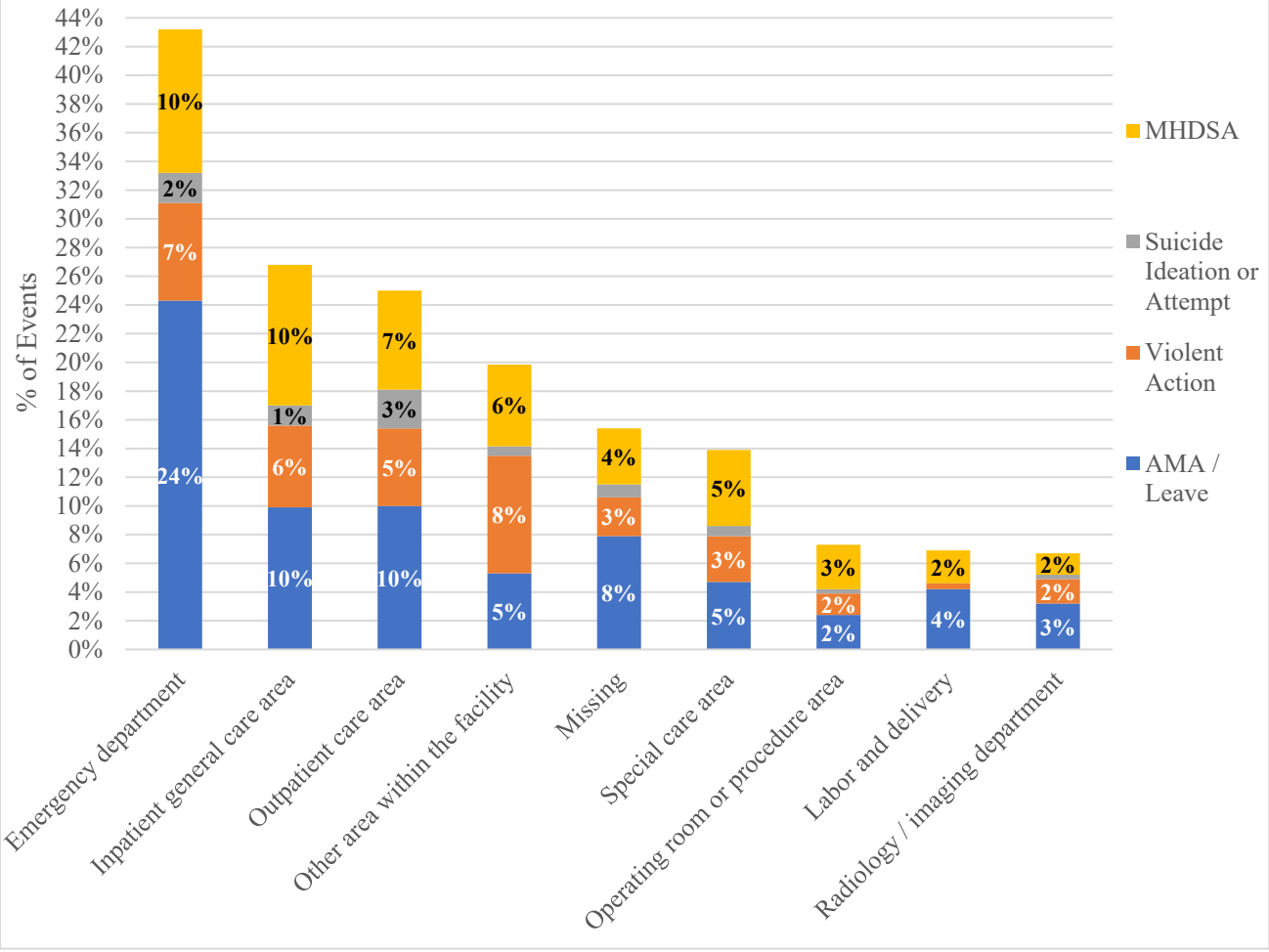


Events with the contributing factor category of policy and procedures had the highest percentage of at least one BH issue (21.2 percent). (This statistic is less than the total percent of BH issues, because events can have more than one BH issue.) For the other contributing factor categories, the percentage of events with *at least one* BH issue was 19.4 percent for human factors, 16.6 percent for missing contributing factor, 12.2 percent for communication, 10.6 percent for multiple contributing factors, 8.9 percent for other category, and 6.1 percent for staff qualifications as the contributing factor. (See Appendix Table 6.)

Location of Event

As shown in Figure 8, the percentage of BH issues was highest among the group of events that took place in the emergency department (total = 43 percent), with AMA / leave the most common issue. The other locations with 25 percent or higher total percentage of BH issues were inpatient general care area and outpatient care area.

Figure 8. Percent of BH Issues per Event Location at Hospital



CONCLUSION

The AI free-text analysis of a random 16,666 events submitted to the PSOPPC in 2024 resulted in 16.5 percent of the events with at least one BH issue. The most common issue was AMA / leave (n=1,440), followed by mental health disorder and/or substance abuse (n=1,023), violent action (n=691), and suicide ideation or attempt (n=208).

Slightly over one-third of the events located in the emergency department had at least one BH issue. This is not surprising because BH complaints are prevalent in the emergency department due to high rates of cognitive impairment (especially among older patients) and lack of patient acceptance to hospital care presenting as AMA / leave.[6,12]

[12] Kraft, CM., Morea, P., Teresi, B., Platts-Mills, T.F., et al. Characteristics, clinical care, and disposition barriers for mental health patients boarding in the emergency department. *The American Journal of Emergency Medicine*. 2021. Volume 46, Pages 550-555, https://doi.org/10.1016/j.ajem.2020.11.021.

A limitation to the analysis was the research team's use of a manual validation process of the LLM results rather than using precise metrics for validation such as positive predictive value or sensitivity / specificity testing. This was because we did not have any "ground truth" or "gold standard" with which to compare our results. Another limitation is that the analysis used a 10 percent random sample of 2024 events that might not have been reflective of the whole year. Lastly, the analysis was unable to measure the association between a BH issue and increased length of stay, patient outcomes, or staff harm because that information was not in the data.

The highest percentage of at least one BH issue was found among events in which the contributing factor was policies and procedures. Interestingly, mental health disorder and/or substance abuse (MHDSA) issues were highly prevalent among this group of events. This contributing factor category includes the absence, inadequacy, and/or lack of clarity of clinical protocols, policies, and procedures. Thus, hospitals could potentially better address MHDSA issues with the proper development, training, and implementation of programs aimed at preventing, addressing, and de-escalating these issues. The second highest percentage of at least one BH issue was found among events in which the contributing factor was human factors. Human factors can include fatigue, stress, inattention, cognitive factors, and/or health issues experienced by medical staff.

An unexpected finding was that BH issues were not higher among incident events (compared to near misses and unsafe conditions) and did not appear to be more frequently associated with patient harm. Not surprisingly, though, we found that three-quarters of the events with a BH issue were among events reported as other types. We suspect that this is because reporters did not feel as though the event fell into one of the nine event categories.

AHRQ plans to continue to use AI free-text analysis to investigate BH issues reported in the Common Formats free text. The output from this AI analysis could be applied in the future to simplify downstream automation and enable consistent, scalable categorization of BH issues. More specifically, these analyses can help determine whether there is a need for revising the Common Formats to include BH-related concepts, such as a *Behavioral Health* event type for Common Formats, a *Patient Behavioral Health Issue* contributing factor, or a *Workplace Aggression* event type with data elements that include staff harm.

Providers and PSOs can also perform free-text analysis of their event reporting data to measure and better understand the effect of BH issues on adverse events, patient and staff harm, patient safety culture, and workplace safety. Programs, tools, resources, culture surveys, workplace violence training, and response procedures are available to help guide providers in addressing patient BH issues and to reduce subsequent adverse events to patients, family, and staff.[5,13,14]

[13] AHRQ. Workplace safety supplemental items for the SOPS Hospital Survey. Accessed on 7/28/25 at https://www.ahrq.gov/sops/surveys/hospital/supplemental-items/workplace-safety.html

[14] AHRQ. Improving workplace safety in hospitals: A resource list for users of the AHRQ Workplace Safety Supplemental Item Set. Accessed on 6/23/25 at https://www.ahrq.gov/sites/default/files/wysiwyg/sops/surveys/nursing-home/workplace-safety-resources.pdf

This *Data Spotlight* demonstrates the effectiveness of using AI-based free-text analysis methods to identify and categorize event information that does not fit within the structured Common Formats data elements. The focus of this analysis was BH issues. The method can also be applied to other issues to uncover associations between various concurrently reported event characteristics and to detect new contributing factors. This analysis and other free-text analysis will provide actionable insights for reducing patient and staff harm, improving Hospital Common Formats Event Reporting, and enhancing the Network of Patient Safety Databases (NPSD).

APPENDIX

Notes for all Tables:

1. MHDSA = *Mental Health Disorder and/or Substance Abuse*
2. The last column of each table shows the percentage of at least one BH issue per group (row).

Table 1. Percent of Behavioral Health Issue by Sex

Sex	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	Total Percent	Percent with at least one BH Issue*
Female	7.4%	3.4%	0.8%	5.6%	17.2%	14.1%
Male	10.1%	5.1%	1.2%	7.2%	23.6%	18.7%
Missing	10.2%	5.8%	1.1%	6.9%	24.0%	20.0%
Unknown	4.3%	1.8%	1.0%	2.2%	9.3%	8.0%

** May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

Table 2. Percent of Behavioral Health Issue by Age Group

Age Group	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	Total Percent	Percent with at least one BH issue*
Adult (18-64 years)	12.5%	5.5%	1.7%	8.1%	27.8%	21.9%
Under 18 years	4.8%	5.0%	1.4%	6.7%	17.9%	13.5%
Mature adult (65-74 years)	5.6%	2.2%	0.3%	3.9%	12.0%	10.0%
Aged adult (85+ years)	3.4%	2.7%	0.3%	4.4%	10.8%	9.5%
Older adult (75-84 years)	3.9%	2.0%	0.3%	3.1%	9.3%	8.6%
Unknown	9.3%	5.3%	1.0 %	6.4%	21.0%	18.4%

** May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

Table 3. Percent of Behavioral Health Issue by Extent of Residual Patient Harm

Extent of Patient Harm	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	Total Percent	Percent with at least one BH issue*
No Harm	9.4%	4.4%	1.0%	6.3%	21.1%	16.9%
Harm	3.1%	2.6%	0.8%	4.8%	11.3%	9.5%
Unknown	14.4%	2.3%	2.3%	4.6%	23.6%	20.6%
Missing	10.1%	5.7%	1.1%	6.9%	23.8%	19.9%

** May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

Table 4. Percent of Behavioral Health Issue by Report Type

Report Type	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	Total Percent	Percent with at least one BH issue*
Incident	8.0%	3.9%	1.0%	5.8%	18.7%	15.3%
Near Miss	6.4%	7.4%	0.8%	7.0%	21.6%	18.0%
Unsafe Condition	15.3%	4.4%	1.5%	7.1%	28.3%	23.8%

** May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

Table 5. Percent of Behavioral Health Issue by Event Type

Event Type*	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	Total Percent	Percent with at least one BH issue**
Other	13.6%	7.1%	1.7%	6.8%	29.2%	15.3%
Falls	5.5%	2.8%	0.1%	5.2%	13.6%	12.2%
Medication or Other Substance	0.8%	0.3%	0.2%	8.6%	9.9%	9.4%
Surgery or Anesthesia	2.8%	0.7%	0.0%	1.2%	4.7%	4.6%
Device	2.1%	0.6%	0.3%	1.2%	4.2%	4.3%
Perinatal	2.1%	0.0%	0.0%	1.8%	3.9%	3.7%

* *This table includes only the event types with 10 or more BH-related Issues*

** *May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

Table 6. Percent of Behavioral Health Issue by Contributing Factor Category

Contributing Factor Category*	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	Total Percent	Percent with at least one BH issue**
Human Factors	9.9%	6.1%	1.1%	7.5%	24.6%	19.4%
Policies and Procedures	1.0%	0.0%	1.9%	20.2%	23.1%	21.2%
Missing	10.1%	3.4%	1.1%	5.0%	19.6%	16.6%
Communication	4.6%	2.4%	1.3%	6.0%	14.3%	12.2%
Multiple	3.4%	3.4%	0.7%	5.6%	13.1%	10.6%
Other	3.5%	2.5%	0.3%	4.1%	10.4%	8.9%
Staff Qualifications	1.5%	1.5%	0.0%	3.6%	6.6%	6.1%

* *This table includes only contributing factor categories with 10 or more BH-related Issues.*

** *May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

Table 7. Percent of Behavioral Health Issues by Location

Event Location*	AMA / Leave	Violent Action	Suicide Ideation or Attempt	MHDSA	TOTAL	Percent with at least one BH issue**
Emergency department	24.3%	6.8%	2.1%	10.0%	43.2%	34.8%
Inpatient general care area	9.9%	5.7%	1.4%	9.8%	26.8%	21.2%
Outpatient care area	10.0%	5.4%	2.7%	6.9%	25.0%	21.1%
Other area within the facility	5.3%	8.2%	0.7%	5.7%	19.9%	15.5%
Missing	7.9%	2.7%	0.9%	3.9%	15.4%	13.3%
Special care area	4.7%	3.2%	0.7%	5.3%	13.9%	11.5%
Operating room or procedure area	2.4%	1.5%	0.3%	3.1%	7.3%	6.8%
Labor and delivery	4.2%	0.4%	0.0%	2.3%	6.9%	6.2%
Radiology / imaging department	3.2%	1.7%	0.3%	1.5%	6.7%	5.7%

* *This table includes only locations with 10 or more BH-related issues*

** *May be less than the sum of the individual BH categories because the categories are not mutually exclusive.*

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