Distribution Statement

Distribution A: Public Release.

The views presented here are those of the author and are not to be construed as official or reflecting the views of the Uniformed Services University of the Health Sciences, the Department of Defense or the U.S. Government.

UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES
POSTGRADUATE DENTAL COLLEGE
SOUTHERN REGION OFFICE
2787 WINFIELD SCOTT ROAD, SUITE 220
JBSA FORT SAM HOUSTON, TEXAS 78234-7510
https://www.usuhs.edu/pdc

THESIS APPROVAL PAGE FOR MASTER OF SCIENCE IN ORAL BIOLOGY

Title of Thesis: "Assessing the Effectiveness of MEDCOM Form 741D"

Name of Candidate: Dr. Justin Peeples
Master of Science Degree
Research defense date: June 1, 2022

THESIS/MANUSCRIPT APPROVED: DATE:

MASTERSON.ROBERT.EDWARD.1300590302 Digitally signed by MASTERSON.ROBERT.EDWARD.1300590302 Date: 2022.03.21 10:03:38 -05'00'

21 March 2022

Dr. Robert Masterson
PROGRAM DIRECTOR, FORT HOOD AEGD-2
Committee Chairperson

KREIDER.JOHN.KEITH.1152698816 Digitally signed by KREIDER.JOHN.KEITH.1152698816 Date: 2022.03.21 12:55:48 -05'00'

21 March 2022

Dr. John Kreider
ASSISTANT PROGRAM DIRECTOR- FACULTY MENTOR,
FORT HOOD AEGD-2

COLTHIRST.PAUL.1062710990 Digitally signed by COLTHIRST.PAUL.1062710990 Date: 2022.04.04 09:41:15 -05'00'

21 March 2022

COL Paul Colthirst
COMMANDER, US ARMY DENTAL HEALTH ACTIVITY, FORT HOOD
Dean, Fort Hood AEGD-2

Measuring the effectiveness of MEDCOM Form 741D, the U.S. Army Dental Corps Universal Protocol Checklist

Justin Peeples, DDS
MAJ DC, USA
AEGD-2 year
Ft. Hood, TX
1 June 2022

Acknowledgments:
1. Special thanks to Dr. Robert Masterson, Program Director, Fort Hood AEGD 2 Year Residency, for mentoring and advising throughout this project.
2. Special thanks to Dr. Brittany Eidson, Research mentor and Chief Oral Maxillofacial Surgery, Fort Hood AEGD 2 Year Residency, for mentoring and advising throughout this project.
3. Successful navigation through the eIRB process for this project was done with the assistance of Dr. Rachael Jones.

PEEPLES.JUSTIN.1384327237 Digitally signed by PEEPLES.JUSTIN.1384327237 Date: 2022.06.08 15:42:32 -05'00'

Justin W. Peeples, D.D.S.
MAJ, DC US Army
Fort Hood AEGD-2 Residency

ABSTRACT

Background. There are thousands of preventable deaths annually due to medical errors in the United States. There has been a major emphasis in the medical field to reduce human errors and for medical facilities to become “High Reliability Organizations” (HRO). Even if not fatal, human error can lead to mistrust within any industry whether it be a car repair shop, a hospital or a dental clinic. Within the Military Health System (MHS), Patient Safety Reports (PSRs) are used to track a large variety of errors and serve as a gauge for the reliability of the Army’s dental health care system. Sentinel events (SEs) are a subset of PSRs; these are events that have caused harm to the patient and or the staff. The purpose of this study was to compare the number of SEs reported from 2015-2016, to the number of SEs reported from 2018-2019 in order to determine the effectiveness of MEDCOM (US Army Medical Command) Form 741D (commonly known as the dental timeout form). MEDCOM Form 741D has been mandated for use in all irreversible procedures in the Army Dental Corps since its introduction in 2017. The null hypothesis for this project was that there would be no statistically significant difference in the number of SEs from 2015-2016 as compared to 2018-2019.

Methods.

This study was a retrospective chart review of the dental Patient Safety Report data from the Defense Health Agency Patient Safety Analysis Center (PSAC) for the period 2015-2019. The PSR database was reviewed to determine the number of SEs reported within the Army Dental Health Activities before and after the implementation of the new timeout form.

Results.

Based on the results of the T-test, there was not significant statistical power to reject the null hypothesis ($\alpha = 0.24$). Despite insufficient statistical power, the comparison did show a trend toward less SE reporting after implementation of MEDCOM Form 741D —2015 and 2016 had a combined total of 91 SEs compared to 2018- 2019 with a combined 40 SEs which represented a 67% decrease after the implementation of MEDCOM Form 741D.

Conclusion.

The improvement could not be attributed to just one specific form or effort, but more likely was a collective effort of many factors and individuals. Every team member across the MHS has to be competent in their specific roles in order to prevent errors and achieve the title of a HRO. Enhanced communication protocols and training programs also likely contribute to preventing potential sentinel events. In the end, the many efforts surrounding the implementation of Form 741D, combined with the use of the form, seem to have successfully induced positive cultural changes toward safer patient care within the Army Dental Corps.

Introduction

The Medical field accounts for 250,000 preventable deaths annually due to medical errors.[1] There has been a major emphasis in the medical field to reduce human errors and for medical facilities to become “High Reliability Organizations” (HRO). The Huron group describes an HRO as, ”an organization with predictable and repeatable systems that support consistent operations while catching and correcting potentially catastrophic errors before they happen.”[2,3] The book ‘*Why Hospitals Should Fly’* compared the medical field to some of the world’s most dangerous industries, from nuclear reactor plants to the airline industry.[4] In each industry they found that when it comes to catastrophic incidents, the prevailing wisdom is that “it’s not bad people but bad systems. Fix the systems!”[4] The book went on to highlight how it took many factors to reduce critical errors in the airline industry, from changes in personnel hierarchies to revised system processes. Pilots transformed from being treated like rock stars surrounded by “yes-men” to well communicating players of a team. Procedural changes such as the introduction of checklists were added into each and every flight encounter. These changes were instrumental in reducing catastrophic events. Spurred on by this example, the Dental Corps, alongside hospitals within the Military Health System (MHS), embarked on the challenge to improve the culture of safety.

In the article “Dental Patient Safety in the Military Health System: Joining Medicine in the Journey to High Reliability”, an increase in Sentinel Events within the MHS was noticed from the time-period of 2013-2016.[5] To combat this concerning trend, the initial efforts that became ubiquitous across the MHS focused on empowering every member on the team. Initiatives like Team STEPPS (Strategies and Tools to Enhance Performance and Patient Safety) training became mandatory and the introduction of the use of checklists for every patient encounter became the standard.[6]

Prior to 2017, dental clinics in the MHS used a Universal Protocol sticker that did not dictate a pause in action before carrying out an irreversible step in a procedure, e.g. administering local anesthesia. It focused solely on confirming right patient/ right procedure. In hopes of addressing the concerning rise in patient harm events, the MHS implemented MEDCOM Form 741D (figure 1) In Feb 2017.[5] Form 741D included many additional steps. It added a mandated review of the medical history at each appointment and had a section ensuring the right patient is being treated via two patient identification methods. Site verification for the procedure was addressed via site marking and via verbal confirmation with the patient, assistant and dentist. It also forced verification of the sterility of instruments sets via mandated visualization of the indicator strips by both treatment team and patient. At the same time, the MHS made distinct efforts toward increased training requirements, implementing safety stand-down sessions that reviewed the MEDCOM 741D Time-out checklist and scenario-based trainings. Doctor-assistant teams were tested in mock scenarios and then spot-checked and monitored while utilizing MEDCOM form 741D during actual patient care. Trainings and spot -checks continued each year until as late as 2021.

A major emphasis of the safety overhaul sweeping the MHS was reducing sentinel events (SEs), as SEs can be traumatizing to both patients and health care providers involved in the event. A sentinel event is a patient safety event that results in death, permanent harm, or severe temporary harm.[6,7] Dental was especially caught in the cross-hairs of this push as a group of researchers had found that dentistry

was responsible for the highest number of sentinel events (SEs) compared to other clinical specialties within the MHS, accounting for 32% of all SEs during that 2013-2016 window.[5] This article focused on Wrong Site Surgeries (WSS), which included wrong site anesthesia, wrong tooth treated and wrong procedure. Root Cause Analyses revealed that communication failures and inconsistent adoption of Universal Protocols were the leading contributing factors to these SEs.

Sentinel events are tracked via the Patient Safety Reporting (PSR) system. This is a database of any self-reported patient safety incidents that may or may not have brought harm to the patient and or staff.[8] PSRs may be entered by any member of the dental treatment team—administrative staff, lab technicians, assistants or dentists. There are thousands of PSRs submitted across the MHS annually from errors as simple as the misspelling of a patients' name, or as detrimental as the extraction of the wrong tooth. Since SEs represent the most egregious errors reported in the PSR system and are the most likely events to be reported, they serve as an appropriate marker of the overall usefulness of the patient safety tools being utilized. To determine the effectiveness MEDCOM FORM 741D, total SEs from 2015-2016 were compared to total SEs from 2018-2019. The year 2017 was not included to allow for two similar, distinct time groups before and after enterprise-wide implementation of the form. The null hypothesis was that there would be no statistically significance difference in the number of SEs from 2015-2016 compared to 2018-2019.

Methods

This study was a retrospective chart review of dental Patient Safety Report data from the Defense Health Agency Patient Safety Analysis Center (PSAC) for the period 2015-2019.[9] The PSR database was reviewed to determine the number of SEs reported within the Army Dental Health Authority before and after the implementation of the timeout form.

Statistical analysis

A two tailed T-Test was performed with a P value set to .05.

Results

With $\alpha = 0.24$, there was not enough statistical power to reject the null hypothesis, but there was an obvious trend toward a decrease in the number of SEs following the implementation of Form 741D (Fig 2).[10] Less than half the number of SEs were reported in 2018-2019 compared to what was reported in 2015-2016. The total number of SEs climbed from 2015 (38 SEs) to 2016 (53 total SEs) for a combined total of 91SEs, but then subsequently declined in both 2018 (24 total SEs) and 2019 (16 total SEs) for a combined two-year total of 40 total SEs. This represented a 67% decrease in the number of total SEs from 2015-16 compared to 2018-19. Sentinel Events represented 1.4% of total PSRs in 2015 and 1.5% in 2016 compared to 0.5% of total PSRs for 2018 and 0.3% for 2019 a reduction of roughly 1%.

Discussion

Analysis

The total number of PSRs submitted each year is a key factor in interpreting data for SEs. Patient safety report totals help decipher whether a reduction in SEs correlates with proper or improper procedural compliance by DENTAC (US Army Dental Activity) personnel. In other words, a decrease of total SEs could be interpreted in two different ways. An increase in PSR submissions with a decrease in SEs would display that the DENTAC is on the right track to becoming an HRO as heavy reporting likely indicates a universal safety focus. On the other hand, a decrease in both PSR submissions and SEs would perhaps signify a lack of compliance with the intended use of the PSR system.

SEs represented 1.4% of total PSRs in 2015 and 1.5% in 2016 compared to 0.5% of total PSRs for 2018 and 0.3% for 2019, a reduction of roughly 1%. This data points to total SEs creeping closer to zero as the program has matured.

According to data from the PSAC, PSR totals consistently climbed from 2015 with 2,701 to 2019 with 4,423 (total PSRs can be found in figure 3). Going from 2017 to 2018, which is the year of the MEDCOM 741D roll out, there was an increase of 632 PSR submissions which reveals a positive correlation between PSR training and PSR submissions. When comparing 2015-16 PSR totals (6,089) to 2018-19 (8,575), there was a 30% increase indicating that the decreased SEs seen during the latter time period likely correlate with improved processes, not reporter apathy.

Limitations:

In 2017, SE classification became more nuanced. Instead of being lumped together, SEs were distributed in three distinct categories. These categories were wrong site surgeries, unintentionally retained foreign objects and other (contamination of equipment (sterilization issues), burns etc.). Attempts were made to compare the different categories of SEs but due to inconsistencies in reporting requirements across time, only the single variable of total SEs were comparable in the end. Attempting to separate the SEs from the first year group retrospectively to draw conclusions could give a false impression that the numbers were much lower for a certain dataset than they actually were for that timeframe. A future study comparing the year groups of 2018-2019 versus the year group of 2020-2021 would yield more comparable results.

Improvements:

A more accurate correlation of MEDCOM 741D with a reduction in SEs post-introduction is not possible without limiting a variety of confounding variables (frequency of staff training, Command emphasis on the use of the checklist, staff awareness of how to report via the PSR system). A more thorough breakdown of the issues associated with studying this topic, and the potential for improvement via future studies, is laid out in the following paragraphs.

To dive deeper, a comparison showing a correlation between low SE reporting and increased reporting of “near misses” and “good catches” would truly indicate a universal safety culture. Examples of these events would be catching improperly sterilized equipment before it goes to the clinic floor, or an assistant speaking up to stop the dentist working on the wrong side. Both of these examples, like all “near misses” and “good catches”, are non-sentinel event PSRs that signify a high quality of safety, as well as a frequent and proper use of the PSR system.

The PSR system is self-limiting in accuracy because it relies on the self-reporting of dental teams across the DENTAC. Patient Safety Reports do not get entered for three main reasons- forgetfulness, ignorance of the system, or willful avoidance of entering PSRs for various reasons. A potential avenue to understand how the data matches actual conditions would be via an employee survey. It would highlight the staff comfort levels for submitting PSRs without fear of punishment and provide context to staff familiarity with the PSR system as a whole. It is possible that SE and PSR data under-represent actual events, due to employee concerns over being held accountable for mistakes by leadership, or by staff ignorance, laziness or lack of ability on computer systems. Adding qualitative data like this would offer insight in a way that raw numbers alone cannot provide.

Finally, the addition of PSR training frequency numbers for the Dental Corps could determine if there was a correlation with training frequency and PSR submission. If a correlation existed between trainings and PSR submissions any change in training frequency could have a significant impact on results, as it could address some of the issues highlighted in the previous paragraph.

Conclusion

The format of this study allowed for the analysis of the change in SE trends over a 5- year timeframe. Though a statistically significant difference could not be detected, there was a reduction in SEs reported in the latter time period. Instead of the improvement being tied directly to the implementation of MEDCOM Form 741D, the improvement was more likely a collective effort of many factors and individuals. All team members across the MHS—administrative staff members, assistants and providers—have to be competent in their specific roles in order to prevent errors and achieve the title of a HRO. Enhanced communication protocols and training programs also likely contribute to preventing potential sentinel events. In the end, the many efforts surrounding the implementation of Form 741D, combined with the use of the form, seem to have successfully induced positive cultural changes toward safer patient care within the Army Dental Corps. Future studies, including an analysis of the corresponding PSR trends in “good catches” and “near misses” to go along with SE data, are necessary to adequately assess the effectiveness of any individual safety tools and the overall culture of patient safety within the U.S. Army Dental Corps.

Universal Protocol: Dental Procedure Verification Checklist

For use of this form, see MEDCOM Reg 40-54; the proponent agency is MCDS

Patient Last Name, First Name:	DOB:
List of Procedure(s):	**Date:**

1. Sterilization Verification

We verified all instrument packs are sterilized, shown to the patient, and the Class 5 Integrator reached the Accept Zone.

Acceptable | Acceptable | Fail/Reject | Fail/Reject

Note: For items utilizing dry heat sterilization (rare), must verify sterilization based on dry heat indicators - see manufacturer instructions.

Provider and Assistant initials:	
X	X

2. Pre-Procedure Verification

a) Verified the following using the 2 patient identifiers (full name and date of birth).
- ☐ Correct Patient
- ☐ Correct Treatment Record.
- ☐ Correct Radiographs/Images and properly oriented.

b) All relevant pre-procedural checks were completed:
- ☐ Medical history
- ☐ Vital signs applicable to procedure
- ☐ Pre-procedural medications (if required)

Assistant / Witness signature:
X
Provider signature:
X
Patient Signature:
X

••• Evaluations and dental prophylaxis STOP here •••

- ☐ Required or special equipment is available (implants, devices and/or other special equipment)
- ☐ Safety precautions based on patient history, medication use, and procedures identified

c) All relevant documents are available, correctly identified, and verified with full name and DOB:
- ☐ Lab results, diagnostic tests, consultations
- ☐ Informed consent
- ☐ Any other forms necessary - pre-anesthesia, sedation, etc.

d) ☐ Correct Procedure - consistent with clinical exam, radiographs, treatment plan

e) ☐ Correct Site - visually examine the site

3. Mark the Site

a) Provider marked at or near the procedural site (or used Alternative Marking Method).
b) Assistant/witness verified provider marked the site.
c) Team is in agreement of the procedure and site which is consistent with the treatment plan

Provider and Assistant initials:	
X	X

4. Procedure Time-Out

This is the final assessment immediately before beginning any invasive procedure, any injection, and any sedation procedure. All activities are suspended as all team members focus on the time-out and actively confirm correct patient, correct site, and correct procedure. Multiple procedures require a time-out before each procedure.

The provider led the dental team using interactive verbal communication and confirmed the following:

a) Correct patient, correct procedure, correct site
b) Safety precautions based on patient history or medication use identified.
c) All team members agree on procedure to be done.

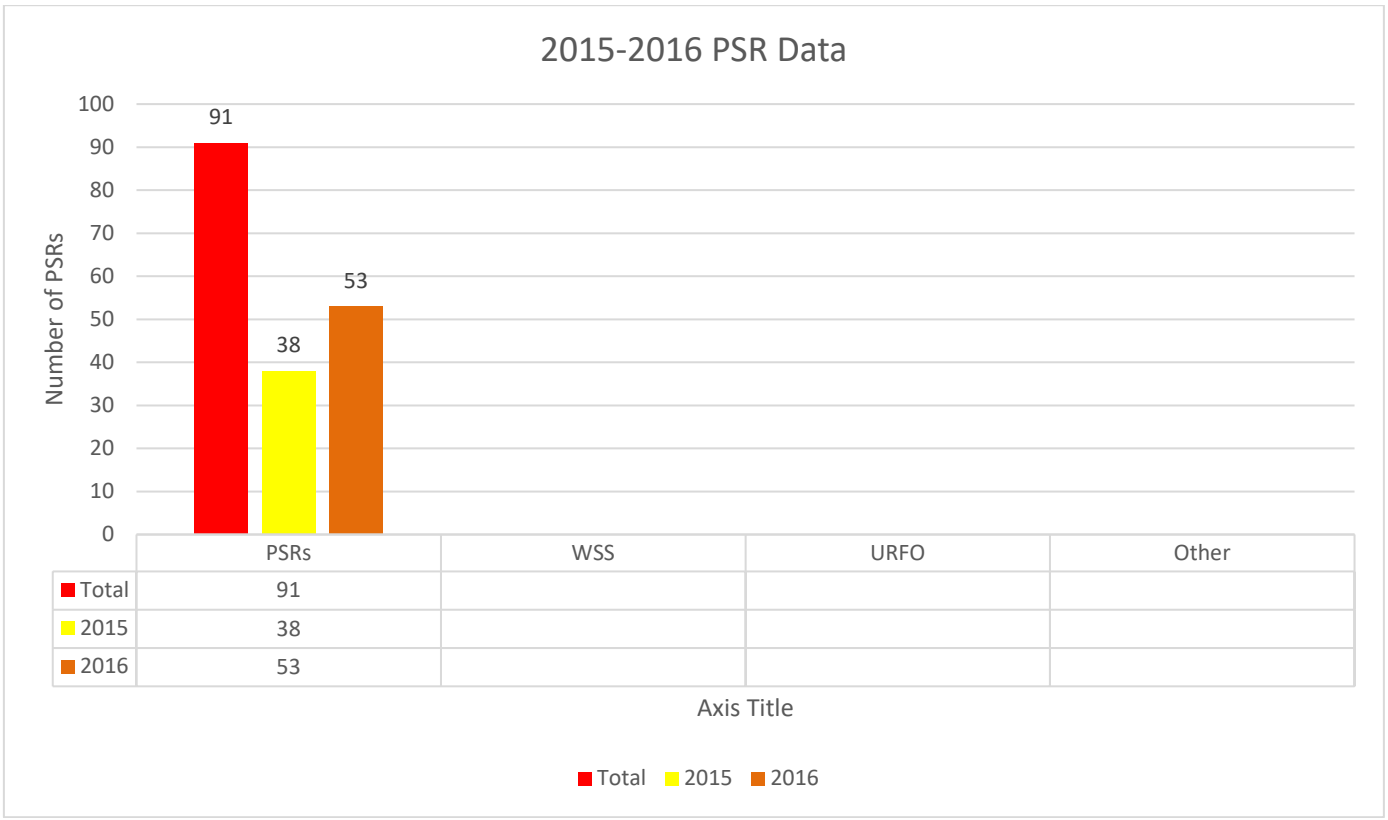
- or -

☐ ***Discrepancy noted and procedure aborted. Signature:*** _____

Provider signature:	
X	
Date:	
Time:	

MEDCOM FORM 741D, JUNE 2017

Figure 1


2015-2016 PSR Data
Number of PSRs
100
90
80
70
60
50
40
30
20
10
0
91
38
53
PSRs
WSS
URFO
Other
Total
91
2015
38
2016
53
Axis Title
Total
2015
2016

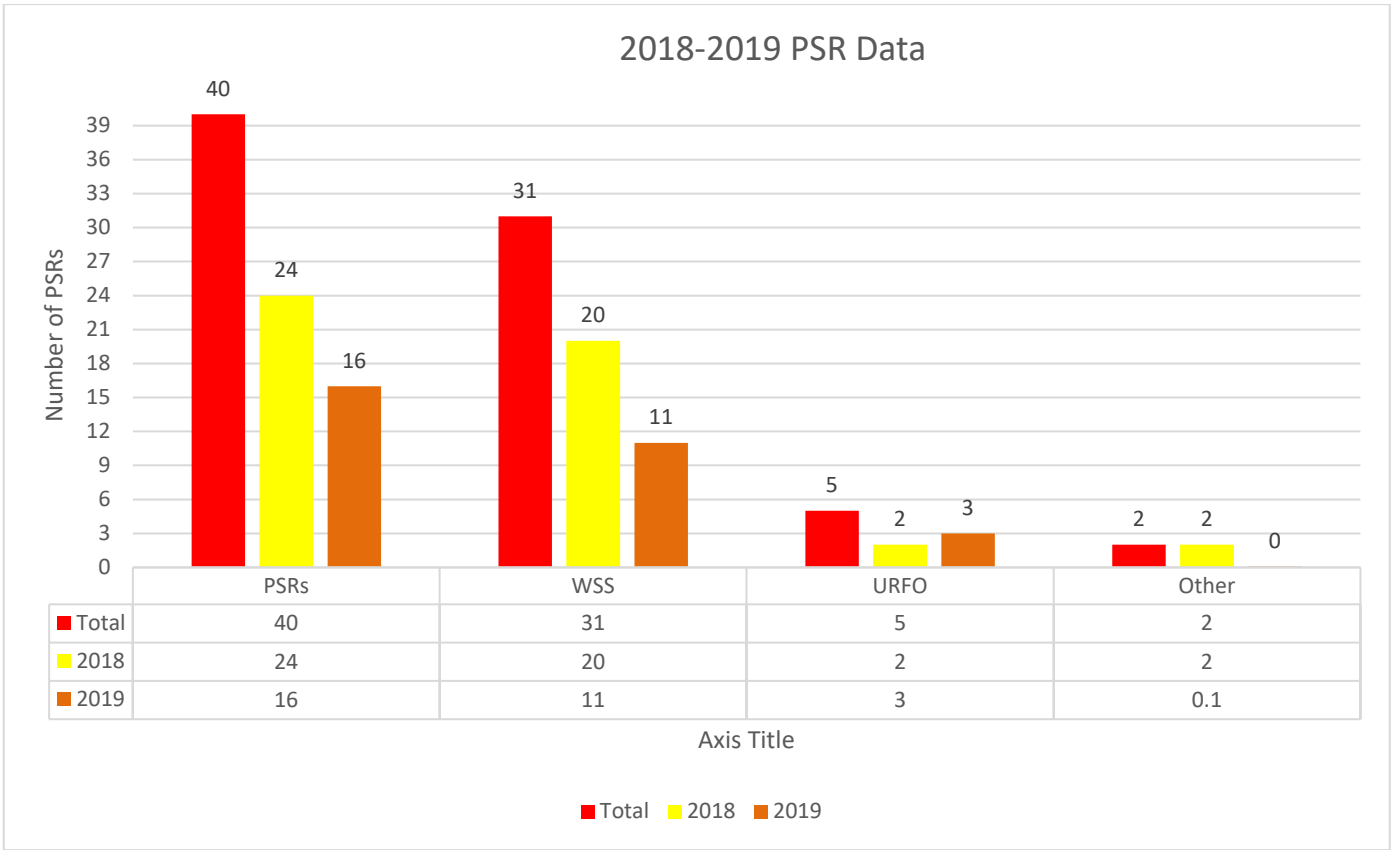

2018-2019 PSR Data
Number of PSRs
40
39
36
33
30
27
24
21
18
15
12
9
6
3
0
40
24
16
31
20
11
5
2
3
2
2
0
PSRs
WSS
URFO
Other
Total
40
31
5
2
2018
24
20
2
2
2019
16
11
3
0.1
Axis Title
Total
2018
2019

Figure 2

Row Labels	Total PSRs submitted
2015	2,701
2016	3,388
2017	3,520
2018	4,152
2019	4,423

Figure 3

References

[1]Anderson JG, Abrahamson K. Your Health Care May Kill You: Medical Errors. Stud Health Technol Inform. 2017;234:13-17. PMID: 28186008.

[2]Achieving zero harm with high reliability organizations –Huron Consulting Group. (n.d.). Retrieved May 11 2022 from https://www.huronconsultinggroup.com/insights/achieving-zero-harm-high-reliability-organizations

[3]Al Hashmi, Waddah S. "Developing High Reliability Organizations (HRO)." Environment, Health and Safety Governance and Leadership, 2017, pp. 4–9., https://doi.org/10.4324/9781315713427-2.

[4]Nance, John J. Why Hospitals Should Fly: The Ultimate Flight Plan to Patient Safety and Quality Care. Second River Healthcare Press,2010.

[5]"Stahl JM, Mack K, Cebula S, Gillingham BL. Dental Patient Safety in the Military Health System: Joining Medicine in the Journey to High Reliability. Mil Med. 2020 Feb 12;185(1-2):e262-e268. doi: 10.1093/milmed/usz154. PMID: 31247091

[6]TeamSTEPPS 2.0: Instructor Manual. Content last reviewed July 2015. Agency for Healthcare Research and Quality, Rockville, MD.https://www.ahrq.gov/teamstepps/instructor/contents.html

[7]Chen TC, Schein OD, Miller JW. Sentinel Events, Serious Reportable Events, and Root Cause Analysis. JAMA Ophthalmol. 2015 Jun;133(6):631-2. [PubMed]

[8]CO-2.011 Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery. (n.d.).

[9]PSAC. Annual Summary 2015–2019. https://info.health.mil/hco/clinicsup/patientsafety/PSLCHome/SitePages/PSAC.aspx; accessed 28 April 2022

[10]"T Test Calculator." GraphPad by Dotmatics, https://www.graphpad.com/quickcalcs/ttest1.cfm.