

BACKGROUND

- Near miss events are defined as errors that did not cause patient harm but had the potential for injury.
- The Institute for Safe Medication Practices (ISMP) reports that 54% of potential adverse drug events and 56% of medication errors are associated with IV medications.
- Injectable medications have been associated with an estimated 1.2 million preventable adverse drug events each year.
- Sterile compounding accuracy is essential to patient safety.

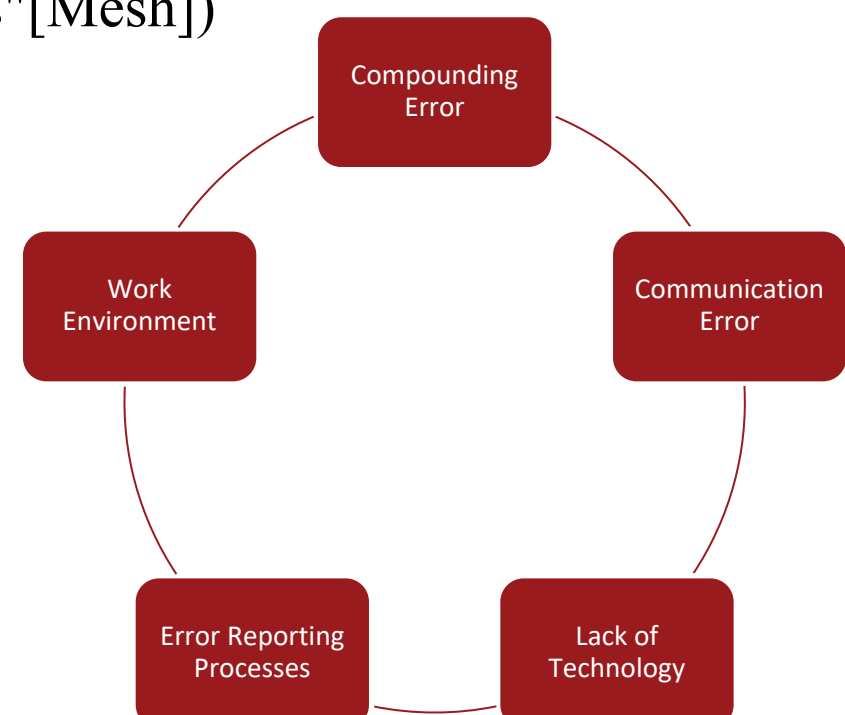
OBJECTIVES Establish different factors leading to near miss events which may have caused the most patient harm.

Analyze trends in near miss events across different journals.

METHODS

A literature review was conducted on PubMed. The result yielded about 115 articles and 7 were included in this review.

- The following MESH terms were used: medication error, pharmacy, infusions, intravenous.
- ("Medication Errors"[Mesh]) AND "Pharmacy"[Mesh]
- ("Infusions, Intravenous"[Mesh]) AND "Medication Errors"[Mesh]



The literature review took into consideration the above factors relating to near miss events.

RESULTS

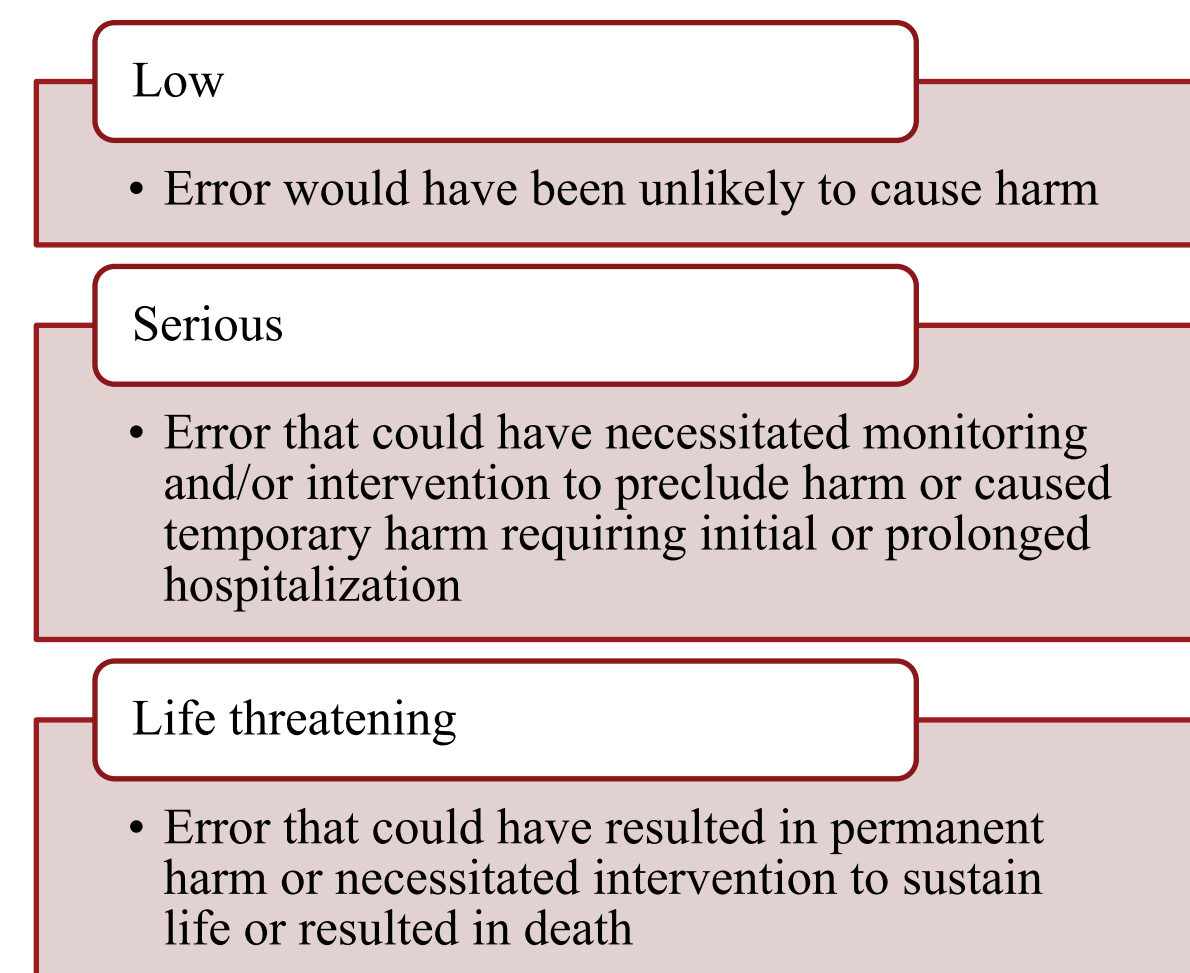


Figure 1: Near miss events defined by possible harm.

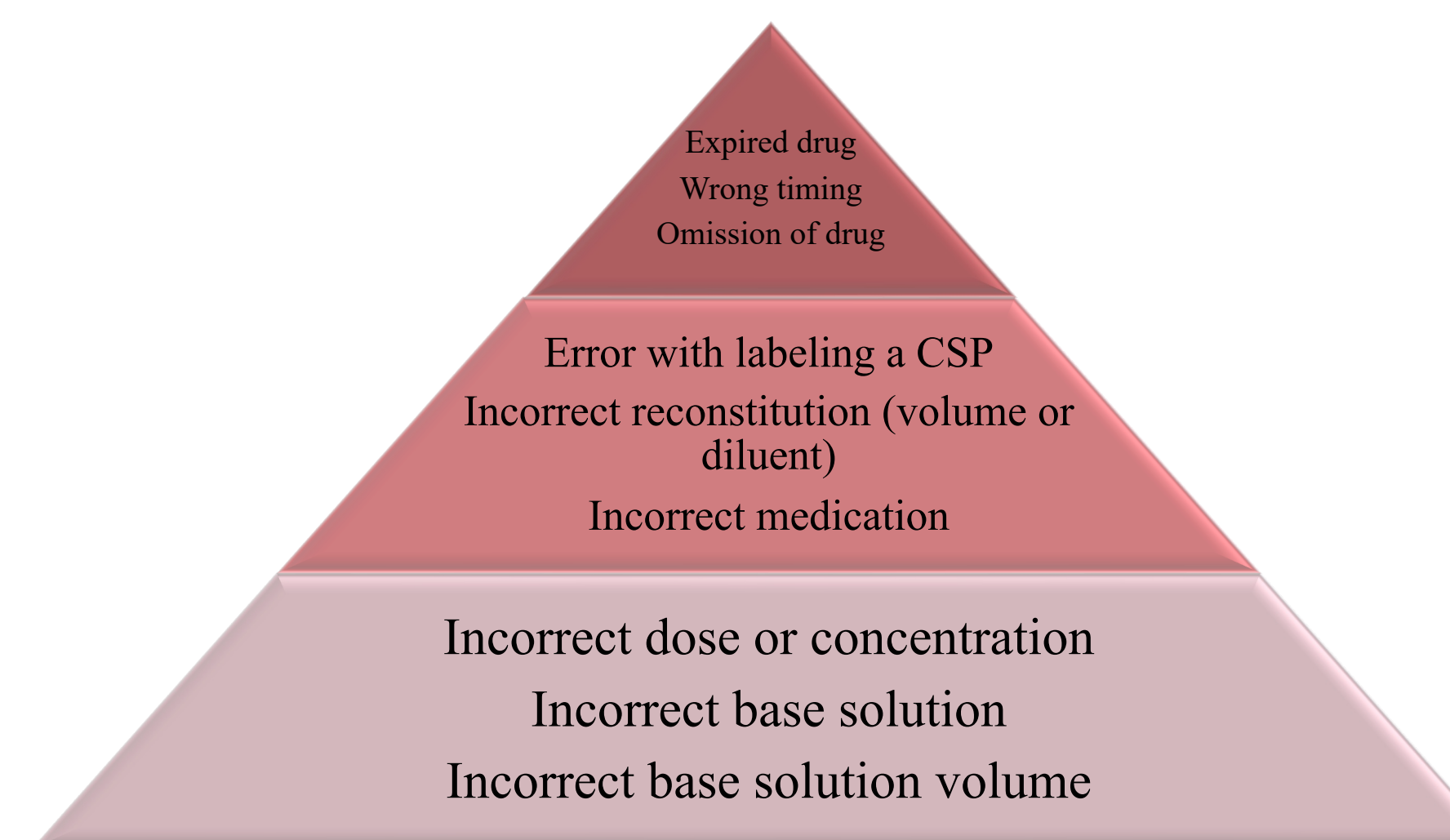


Figure 2: Trends in reported near miss categories. ^{4,7}

Database	Title	Summary	Action Needed
American Journal of Health-System Pharmacy	Use of Automation and Technology ⁶	<ul style="list-style-type: none"> The use of automation and technology to assist sterile drug compounding had a reported increase in 12 percentage points from 2013 to 2020. More than 20% of sites where compounding technology was not adopted indicated their current practice was "safe". 	All sites should adopt technology in their compounding and avoid the previously common practice "syringe pull back method".
American Journal of Health-System Pharmacy	Benefits of technology-assisted workflow on i.v. room efficiency, costs, and safety ⁷	<ul style="list-style-type: none"> Technology-assisted workflow (TAWF) hospital sites detected errors 3.13% more than non-TAWF hospital sites (0.22%) ($p < 0.05$). The top error reporting category for the TAWF sites was <i>incorrect medication</i> (63.30%), while the top error reporting category for the non-TAWF sites was <i>incorrect medication volume</i> (18.34%). 	TAWF has shown to be a safer process given that the only check of the medication use process is by the i.v. pharmacist.
Research in Social and Administrative Pharmacy	Reporting frequency of near-miss errors among hospital pharmacists and perceptions of their work environment ³	<ul style="list-style-type: none"> A near miss was <i>always</i> reported by 32.0% of pharmacists if the error <i>could have harmed</i> the patient, 17.6% of pharmacists if the error had <i>no potential to harm</i> the patient, and 12.3% of pharmacists if it was <i>corrected prior to</i> reaching the patient. Higher near-miss error reporting frequency was shown to be associated with positive perceptions related to managers' actions to promote safety, teamwork, and staffing if the error could have harmed the patient. (OR 1.50; OR 1.27; OR 1.18, $p < 0.05$ respectively) 	Positive work environments should be a factor when considering reporting rates of near miss events. This is crucial for the safety of patients to prevent the occurrence of future similar errors.
Pew Charitable Trusts	U.S. Illnesses and Deaths Associated With Compounded or Repackaged Medications, 2001-19 ²	<ul style="list-style-type: none"> From 2001-2019 there have been a reported 116 deaths due to sterile compounding errors. The most common reasons were due to contamination of sterile products, miscalculations, or mistakes in the compounding process. 	A system wide near miss and adverse event reporting database should be adapted by health systems.

Figure 3: Factors leading to near miss events stratified by database.

DISCUSSION/ CONCLUSION

- Near miss events provide staff with the opportunity to learn from mistakes and lead to safer patient outcomes.
- Significant causes for near miss events include incorrect dose or concentration, incorrect base solution/ volume, and incorrect medication.
- Previous practice included the syringe pull back method which has now been phased out by most health systems but there is still work to be done in this area, noted by ISMP's president as of 1/8/2024.
- Technology has shown to significantly improve safety outcomes due to a higher detection of medication errors.
- Higher near miss reporting was associated with positive perceptions related to managers' actions to promote safety, teamwork, and staffing.

FUTURE IMPLICATIONS

- Educate all pharmacy staff on the trends in near miss events which may have led to the most harm.
- All health systems should adapt TAWF in their sterile compounding workflow to prevent errors.
- A positive work environment is essential for staff to feel comfortable reporting near misses and adverse events.

REFERENCES

- Summa-Sorgini C, Fernandes V, Lubchansky S, et al. Errors Associated with IV Infusions in Critical Care. *The Canadian Journal of Hospital Pharmacy*. 2012;65(1). doi:https://doi.org/10.4212/cjhp.v65i1.1099
- U.S. Illnesses and Deaths Associated With Compounded or Repackaged Medications, 2001-19. *pew.org*. Published March 2, 2020. Accessed April 5, 2023. <https://www.pewtrusts.org/en/research-and-analysis/data-visualizations/2020/us-illnesses-and-deaths-associated-with-compounded-or-repackaged-medications-2001-19>
- Noureldin M, Noureldin MA. Reporting frequency of three near-miss error types among hospital pharmacists and associations with hospital pharmacists' perceptions of their work environment. *Research in Social and Administrative Pharmacy*. 2021;17(2):381-387. doi:https://doi.org/10.1016/j.sapharm.2020.03.008
- ISMP Survey Provides Insights into Pharmacy Sterile Compounding Systems and Practices. Institute For Safe Medication Practices. Accessed April 17, 2023. <https://www.ismp.org/resources/ismp-survey-provides-insights-pharmacy-sterile-compounding-systems-and-practices>
- Failed Check System for Chemotherapy Leads to Pharmacist's No Contest Plea for Involuntary Manslaughter | Institute For Safe Medication Practices. *www.ismp.org*. Published February 13, 2018. Accessed May 2, 2023. <https://www.ismp.org/resources/failed-check-system-chemotherapy-leads-pharmacists-no-contest-plea-involuntary>
- Michael C Gano, Christopher Jerry, Use of automation and technology in sterile preparations: A call to action, *American Journal of Health-System Pharmacy*, Volume 79, Issue 10, 15 May 2022, Pages 711-712, <https://doi.org/10.1093/ajhp/zxac073>
- Stephen F Eckel, Jordyn P Higgins, Elizabeth Hess, Thomas Cerbone, Jennifer B Civiello, Christian Conley, Nilofar Jafari, Shailly Shah, Stephen L Speth, Lynn Thornton, Multicenter study to evaluate the benefits of technology-assisted workflow on i.v. room efficiency, costs, and safety, *American Journal of Health-System Pharmacy*, Volume 76, Issue 12, 15 June 2019, Pages 895-901, <https://doi.org/10.1093/ajhp/zxz067>