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A Review of Medication Errors and the Second Victim in Pediatric Pharmacy

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The concept of the second victim, described as the sense of victimization of health care professionals following the exposure to a traumatic, unanticipated medical error, was first introduced in 2000 by Albert W. Wu. Since then, the concept has gained immense traction and inspired the generation of assistance programs for second victims. With most second victim occurrences resulting from medication errors, pediatric pharmacists are at a high risk of experiencing second victim phenomenon. Second victims may experience both psychological and physical symptoms of distress often akin to post-traumatic stress disorder. Typical trajectories for second victims, as well as typical support needs, have been previously described, with several organizations responding by creating formal programs designed to support their staff in the events of traumatic workplace experiences. Most support programs involve peer-to-peer support, group sessions, and programs designed to increase coping skills. Additional resources are available for health care workers who do not have formalized support programs at their institution, although these are limited. Despite these resources, institutions across the country have room for additional growth in their support of employees who become second victims to tragedy.

ABBREVIATIONS CPOE, computerized provider order entry; MITSS, Medically Induced Trauma Support Services; P2P, peer-to-peer; SVEST, Second Victim Experience and Support Tool

KEYWORDS medication errors; pediatrics; peer-to-peer support; pharmacy; second victim

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Introduction

The term *second victim* was coined by Albert W. Wu in 2000 in his editorial, "Medical Error: the Second Victim. The Doctor Who Makes the Mistake Needs Help Too."[1] Wu described how practitioners are prone to human error, inevitably leading to mistakes during their career. The realization of these mistakes often leads to feelings of guilt, fear, and remorse.[1] Unfortunately, sometimes these mistakes result in severe consequences for the patient and may potentially lead to legal action against the health care worker(s) entrusted with caring for the patient. There are numerous examples of these litigations, including both civil and criminal cases.[2–7] One of the most well-known and publicized cases specific to pharmacy involved an error in the preparation of a dose of etoposide phosphate in 2006. This error led to the death of 2-year-old Emily Jerry and the eventual indictment of the pharmacist for reckless homicide and involuntary manslaughter.[2,3]

Over the past 2 decades, discussion around the topic of the second victim has grown exponentially. At the time of this manuscript, Wu's original article has been cited 167 times on PubMed, along with 278 articles mentioning "second victim" in their manuscript and 132 including the term *second victim* in their title.[8] Many of these articles reference medication errors as the catalyst for the development of the second victim phenomenon. Research has identified the effect that medication errors have had on providers, identifying a significant increase in symptoms of burnout, fatigue, and recent suicidal ideation when compared with providers not experiencing errors.[9,10] While the concept of second victim includes the involvement of traumatic experiences associated with patient care, this article will primarily focus on the second victim phenomenon associated with medication errors, specifically for pediatric pharmacists.

Medication error rates vary widely within the currently available literature. These rates likely vary owing to the range of technologic advancements available between hospital systems, such as computerized provider order entry (CPOE) and barcode scanning, as well as the reliance on voluntary reporting to document errors. Studies have reported anywhere in the range of 5 to 83 errors per 1000 bed-days.[11,12] The quantity of errors also varies depending on the setting within a hospital, with medication error rates as much as 7 times higher in intensive care units than general hospital floors.[12,13] One factor that is consistent in the literature is the higher rate of errors in the pediatric population. The rate of near misses has been reported to be 3 times higher in the pediatric than

adult setting.[14] In a study from the late 1990s, the United States Pharmacopeia found that pediatric patients were more likely to suffer harm or death (31%) than adults (13%) as a result of a medication-related error.[15] On a positive note, as many as 50% to 75% of errors are caught before reaching the patient and of those errors that do reach the patient, few cause significant harm.[11,12,16,17] In one study of errors that occurred, only 9.2% required patient intervention.[13] Kaushal et al[14] and Fortescue et al[18] characterized the rates of errors, identifying 74% to 79% stemming from physician ordering, 6% to 10% from transcribing, 13% due to nurse administration, 1% during dispensing, <1% during patient monitoring, and 2% classified as other. A further breakdown of errors associated to medication orders identified rates of 28% to 34% associated with the prescribed dosing, 18% associated with the prescribed route, and 9% to 12.5% associated with the prescribed frequency.[14,18] These studies illustrate the high likelihood of a pharmacist being involved with a medication error, as nearly 85% of medication errors are related to steps that involve the pharmacist, including ordering, transcribing, verification, and dispensing of medications. Additionally, it has been documented that the number of medication errors is higher than values reported in the literature, because many medications errors go unnoticed or unreported. Manias et al[11] determined that only 15% of medication errors they identified in their study were brought to the attention of health care professionals by the patients or their family members, suggesting underreporting of medication errors.

Complexities unique to the pediatric population predispose them to medication errors and puts them at a higher risk to experience a medication error than adults. Most medications are dosed by patient weight in pediatrics, as opposed to standardized dosing in adults. Children experience rapid growth during the first decade of life and the potential for inadvertently mixing up the unit of measurement for height and/or weight further predisposes younger patients to medication errors.[11,17,18] Even with CPOE, the requirement of weight-based dosing introduces the risk for miscalculations and mistakes.[19,20] CPOE systems and smart infusion pump libraries are often built with adult patients in mind then adapted to fit pediatrics. This can create opportunities for error in systems intended to prevent errors. Additionally, it has been well documented that pediatric patients have a lower physiologic reserve to buffer errors in dosing and compensate for accidental overdoses than adults.[16,19] When it comes to available medications, many lack specific US Food and Drug Administration–approved dosing, pharmacokinetic data, safety considerations, and efficacy data for pediatric patients.[20] Pediatric patients are also more likely to require a medication be compounded owing to lack of appropriate dosage form availability.[20] Further, some medications or their excipients are not appropriate for use in pediatrics and can be harmful.[21] Prior to the creation of "The KIDs List," there was not an extensive reference to identify medications and excipients that should be avoided in this population.[21] Each of these considerations compound to increase the risk of medication errors in pediatrics.

Results of the Second Victim Experience

When it comes to the personal and professional responses that a second victim experiences, there will always be some degree of variation depending on the person and the support system they have available. However, a generally predictable overall recovery trajectory has been identified and described. The University of Missouri's (MU Health) forYOU support program divides this trajectory into 6 stages (Table 1).[22–24] Throughout the 6 stages, second victims experience a range of personal and professional effects. In terms of personal effects, the second victim often experiences post-traumatic stress disorder–like symptoms.[25,26] Physical symptoms can include sleep disturbances, difficulty concentrating, eating disturbances, headache, fatigue, nausea and/or vomiting, diarrhea, rapid heart rate, rapid breathing, and muscle tension.[22–24] Psychological symptoms can include social isolation, frustration, fear, numbness, anger and/or irritability, depression, extreme sadness, self-doubt, flashbacks, and being uncomfortable returning to work.[22–24] Professional effects include the potential for job loss, litigation, loss of professional license, loss of trust from colleagues, and loss of respect from colleagues and community members.[22–24] All of these effects have been identified as leading to increased intentions for turnover and absenteeism.[27] Distraction and lack of confidence related to the second victim response is also a potential source for future error.

Rights of the Second Victim

In 2007, Dr Charles Denham proposed the 5 rights of caregivers, using the acronym "TRUST."[28] Denham believed that the sacred trust of the caregivers who serve in health care organizations must be honored, in addition to the sacred trust of patients. TRUST is an acronym for treatment that is just, respect, understanding and compassion, supportive care, and transparency and opportunity to contribute.[28] Only through a fair analysis of the error, respect for those involved, compassion as the caregiver goes through the stages of grief, personal and professional support, and the ability to help correct the wrong can the caregiver make it through to the more favorable outcomes of Stage 6 of forYOU's recovery trajectory.[28] A full description of the 5 aspects of TRUST can be found in Table 2.

Available Resources for Second Victims

Despite significant time and energy being put into researching and quantifying the second victim

Table 1. MU Health's forYOU Recovery Trajectory*

Phase		Characteristics
Stage 1: Chaos and Accident Response		• Error realized/event recognized • Get help • Stabilize/treat patient • May not be able to continue care for the patient • Distracted • Experience a wave of emotions
Stage 2: Intrusive Thoughts		• Re-evaluate scenario • Self-isolate • Haunted re-enactments of event • Feelings of internal inadequacy
Stage 3: Restoring Personal Integrity		• Acceptance among work/social structure • Managing gossip/grapevine • Fear is prevalent
Stage 4: Enduring the Inquisition		• Realization of level of seriousness • Reiterate case scenario • Respond to multiple "why's" about the event • Interact with many different "event" responders • Litigation concerns emerge
Stage 5: Obtaining Emotional First Aid		• Seek personal/professional support • Getting/receiving help/support
Stage 6: Moving On (1 of the 3 pathways)	Dropping Out	• Transfer to a different unit of facility • Consider quitting • Feelings of inadequacy
	Surviving	• Coping, but still have intrusive thoughts • Persistent sadness, trying to learn from event
	Thriving	• Maintain work/life balance • Gain insight/perspective • Dose not base practice/work on 1 event • Advocates for patient safety initiatives

* The information included in this table was extracted from MU Health Care,[22] Scott and McCoig,[23] and Scott et al.[24]

phenomenon, the resources to support those affected are not always as readily available. There are a variety of resources available, but locating these resources can be challenging. Resources may include, but are not limited to, institution-developed peer support programs, employee assistance programs, and online resources. Each resource may be used by itself, or may be combined with alternative resources, when available. Peer support programs have become one of the most commonly implemented interventions to address the second victim phenomenon. Unfortunately, these require a significant investment to provide appropriate training to front-line team members to handle these difficult peer support scenarios, and there are limited data demonstrating the efficacy of these programs. While there are many peer support programs implemented at various organizations, each program is unique and must be developed specifically to meet the needs of that specific organization. To demonstrate differences between some of these programs, we will further discuss 4 specific programs: MU Health's forYOU, Johns Hopkins' RISE, Nationwide Children's YOU Matter, and Children's Minnesota's (Children's MN's) P2P (peer-to-peer) program. ForYOU is often used as template for creation of programs at other systems, and forYOU, RISE, and YOU Matter each provide workshops for other health care systems to assist them in creating programs.[22,29–31]

ForYOU. ForYOU is a program developed at MU Health to provide one-on-one peer support to second victims within their health system.[22] They provide a "safe zone" for second victims to share their thoughts and reactions to the event, ensure confidentiality, and assure the second victim that what they are experiencing is a normal reaction. The forYOU program uses a 3-tiered approach, starting on Tier 1 with local emotional support from a manager, supervisor, or fellow team member. If further intervention is needed, Tier 2 is available and provides support from trained peer supporters and patient safety and risk management resources. If an employee needs further support

beyond Tier 2, Tier 3 is available and includes access to the employee assistance program, a chaplain, social work, and a clinical psychologist. In addition to these personal services for their employees, the forYOU website provides helpful resources for anyone interested in learning about the typical second victim response. A key lesson from the forYOU program for developing a second victim support program is the importance of having a visible institutional commitment from executive leadership to ensure a reliable and organized support structure is put in place to maintain operability of the program.

RISE. RISE, which stands for Resilience in Stressful Events, is a program developed at Johns Hopkins, first implemented as a pilot program in the hospital pharmacy before being expanded to the rest of the hospital.[29] In its current form, the RISE program offers both one-on-one and group support options depending on the specific needs of the second victim(s). The system uses a 2-tiered call system, with 2 multidisciplinary peer responders on call at any given time. Of note, the RISE program has reported that most encounters are related to adverse events and not necessarily medication errors. They noted that their biggest challenge is identifying and recruiting staff members who could benefit from the program. Following the implementation of the program, a follow-up survey was conducted to determine the success of the program.[29] Of the 57 respondents to the survey, 87.8% believe the program met the second victims' expectation and 82.5% were satisfied with the interaction. As previously mentioned, the RISE program currently hosts a 1-day workshop to train other organizations on how to implement their own peer support programs, already partnering with more than 10 other institutions on developing and implementing new programs.

YOU Matter. YOU Matter is a program developed at Nationwide Children's Hospital. Similar to the RISE program, the YOU Matter program started as a pilot in the pharmacy department before branching out to the rest of the hospital.[30] Prior to expanding the program to the rest of the institution, a follow-up survey identified that 85% of pharmacy staff members felt that the YOU Matter program was beneficial to the department.[31] This program is based on 5 pillars of support, in addition to a newer implanted COVID-19 support pillar. The first pillar, relevant to this review, is the Second Victim Peer Support Program. This program includes 700+ peer supporters, having grown from just 8 in the pilot program, including all disciplines within the hospital. The YOU Matter team also includes a critical response team, which assembles for events that affect more than 5 staff members and/or multiple departments. After expanding the program to the full organization, a follow-up study by Merandi et al[32] evaluating the YOU Matter program identified that between November 1, 2013, and September 1, 2015, there were 232 documented peer encounters for peer support. Of these, 7% of the encounters involved pharmacy personnel. Similar to the forYOU and RISE programs, the YOU Matter program provides training sessions and workshops for other hospital systems looking to implement peer support programs and has already provided guidance to over 35 hospitals.

Children's MN. Based largely on the forYOU and YOU Matter programs, Children's MN has also developed a P2P program.[33] Similar to the forYou program, this program is broken down into 3 tiers: local support, trained peer support, and an expedited referral network.[33] Local support consists of peers, managers, spiritual care, and social work providing "emotional first aid" to affected colleagues. Trained peer support is the next level of support, in which trained peers offer individual and team debriefing wellness support. Individuals from all departments are encouraged to become a trained peer supporter, which requires completion of a 4.5-hour workshop on providing support during difficult scenarios. The expedited referral network is encouraged and used when normal stress responses are exceeded and trained mental health professionals are required. The goal of this program is to tailor the offered support to the specific level of need of each second victim.

Additional Resources for Second Victims

As previously mentioned, additional resources for second victims are not always readily available. Previously, the Medically Induced Trauma Support Services (MITSS) served as a nonprofit organization that offered assistance to victims of medically induced trauma, including both the patients who experienced medical trauma and the health care providers who were involved. Unfortunately, MITSS has discontinued operations and is no longer accessible. In 2019, a team from Yorkshire Quality and Safety Research Group and the Improvement Academy established a second victim website for health care professionals and their organizations affected by the second victim phenomenon.[34] While this resource was designed primarily for clinicians in England, it provides helpful information that can be used by anyone in health care affected by the second victim phenomenon, regardless of location. This includes explaining how to elevate self-esteem, how to use more positive explanatory style, and how to lower perfectionism. The information also includes signs and symptoms a second victim may exhibit and provides guidance for when a second victim should seek help. Much of the information references the programs discussed previously. In addition to this, the Institute for Safe Medication Practices has published tools and recommendations for health care workers to help avoid medication errors in an effort to minimize medication errors.[35] It would be expected that by minimizing medication errors, less individuals will be exposed to the second victim phenomenon.

Table 2. TRUST – The 5 Rights of Second Victims*

TRUST Component	Description
Treatment That is Just	• Cannot presume guilt of negligence or 100% accountability when system errors that predispose human error are present • Social Darwinism often kicks in amongst hospital leaders • System improvements are the focus of a "just culture" • Address collateral damage to caregiver and organization
Respect	• All members of the health care team are susceptible to error • Often fall into name-blame-shame cycle, denying colleagues respect and common decency • All are often silent witnesses to the faults of others. Do not disrespect those if you would have desired respect in the same situation, "the golden rule"
Understanding and Compassion	• The caregiver needs time and compassionate help to be able to grieve: denial, anger, bargaining, depression, and acceptance • Team members must be understanding of system failures • Must understand that events are typically due to a cascade of factors, not 1 single thing • Must understand the pathophysiologic and psychological emergency of the caregiver who unintentionally harms a patient • Reach out to second victims as they would their own patients
Supportive Care	• Psychological and support services • Systemic approach to care in professional and organized way, like any other patient
Transparency and Opportunity to Contribute	• Allowing space for second victim to be open and honest about their mistakes • A culture that promotes openness and understanding is more likely to see those that make mistakes admit it themselves • Learning form errors can only occur after reporting • Often want to help "make things right" but cannot/will not in the face of fear and judgement

* The information included in this table was extracted from Denham.[28]

Unfortunately, outside of these resources, there are minimal additional resources available specifically for second victims. Students who experience second victim phenomenon will often have resources through their school or university. Unfortunately, pharmacists and pharmacy residents will often not have this access. In this case, opportunities may include reaching out to the organization's employee health services or the employee's health insurance company, which will often provide access to employee assistance programs, such as Federal Occupational Health and Thrive.[36,37] For health care employees who do not have access to any of these resources, the most readily accessible additional resource is the National Suicide and Crisis Lifeline.[38]

Resources for Support Staff and Organizations

When it comes to supporting the second victims, The Joint Commission recommends that institutions have in place a program that is easily accessible and promoted within the organization.[39] It can be difficult to comprehend where to start a process of creating a program and how to evaluate the effect of the program once it is implemented. The Second Victim Experience and Support Tool (SVEST) is a tool that helps health care organizations implement and track the performance of second victim support programs.[40] SVEST is a survey that assesses psychological stress, physical stress, colleague support, supervisor support, institutional support, non–work-related support, professional self-efficacy, turnover intentions, and absenteeism.[40] By using this tool, institutions can identify what needs are not currently being met and track progress towards achieving those needs identified.

One of the most well-known leaders on the forefront of peer support programs, the University of Missouri's (MU Health) forYOU program, provides guidance and references for hospitals looking to create their own peer support program. A program can also be created on a department level, which may be more feasible with the limited resources currently available to institutions. Krzan et al[31] provided guidance on the implementation of a peer support program within a

pharmacy department of a pediatric hospital. It should be noted that the authors mention that this program was created without any funding from the organization for the program.

The "Second Victim Support" website created by Yorkshire Quality and Safety Research Group and the Improvement Academy also outlines a 3-level support structure for organizations to provide varying degrees of support depending on the individualized needs of the second victim.[34] They breakdown the primary support structure into a supportive working environment, rapid and appropriate responses, and individualized support.[34] These structural ideas can be used alone or combined with some of the examples provided by other institutions.

Conclusion

While the concept of second victim in health care is not new, the creation of the terminology and the discussion surrounding the phenomenon are still relatively new. Despite this, more organizations are progressively recognizing the need to readily support second victims and assist through providing structural changes to protect health care workers. Although the second victim concept was originally focused around physicians, it has since been recognized that all members of the health care team, including pharmacists, are susceptible to becoming second victims. Sharing this information with new trainees, including students and residents, helps ensure new practitioners understand that this is a common experience in pediatric medicine and provides them with the resources available for when a medication error does occur. Medication errors are far more common and often more dangerous in the pediatric population, thus it is important that pediatric pharmacists remain careful and vigilant on the front-line. Unfortunately, as the Institute of Medicine notes, "To Err is Human," and medication errors will continue despite the advancements in technology.[41] It is essential to ensure our colleagues and friends are continually supported during times of these occurrences.

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