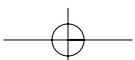
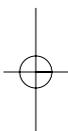
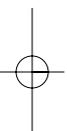
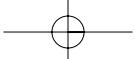


# Part II

## Anatomy of a Safe Medication Use System: Operational Considerations

In Part II, we continue to define the elements of a safe medication use system. However, in this section, we also provide in detail the "how to" of implementing clinical operations that have been sustainable in ensuring quality healthcare in the ED as it pertains to a safe drug ordering and delivery process.



# 7

## Defining a Safe Medication Use System in the Emergency Department

*Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static “snapshots.” It is a set of general principles—distilled over the course of the twentieth century, spanning fields as diverse as the physical and social sciences, engineering, and management.... During the last thirty years, these tools have been applied to understand a wide range of corporate, urban, regional, economic, political, ecological, and even psychological systems. And systems thinking is a sensibility—for the subtle interconnectedness that gives living systems their unique character.*

—Peter Senge

### Objectives

- Introduce elements of the PharmER Pyramid model
- List the components of a safe medication use system in the ED
- Review how to define, characterize, ensure, and sustain safe medication systems in the ED

### PHARMER PYRAMID MODEL

Over the past decade we have been constructing the building blocks to a safe medication use system in the ED. A safe medication use system can be defined and characterized using the PharmER pyramid, as depicted in Chapter 6 (see Fig. 6.2).

The PharmER pyramid includes multiple steps and blocks synonymous with building the foundation; it is a model that uses active surveillance by a pharmacist who triages and prioritizes optimization of care as it pertains to a whole system for use of pharmacotherapy in the ED. This model assures that the pharmacist is facilitating and assuring safety with emergency care, not creating unnecessary barriers to emergency care.

The PharmER pyramid acts to fill the day-to-day gaps within our traditional defenses against medication errors to assure a safe environment, as it pertains to medication use and improved quality. The PharmER pyramid fills the gaps in the Swiss cheese model of adverse outcomes. As depicted in Figure 7-1, gaps in defenses of safe medication use system exist. When gaps in defenses align, as seen in Figure 7-2, adverse outcomes occur and medical injury results. Active surveillance and implementation of the PharmER pyramid fills the gaps that arise in the safeguards used against medication errors, which are associated with the speed-over-accuracy trade off of the ED, as depicted in Figure 7-3.<sup>1</sup>

The PharmER pyramid is a response to the five stages of drug ordering and delivery. The five stages include prescribing, transcribing, dispensing, administration, and monitoring (Fig. 7-4). The PharmER pyramid strengthens each link of the chain so that when weaknesses arise they are detected and prevented.

The pyramid shape forms the backbone where each block (elements of emergency medicine pharmacy) sits. The pyramid shape represents the leadership and advocacy needed from pharmacy to remove barriers associated with creating safeguards to error in the emergency department. As Lucinda Maine, wrote “the time is right for pharmacy leadership” as

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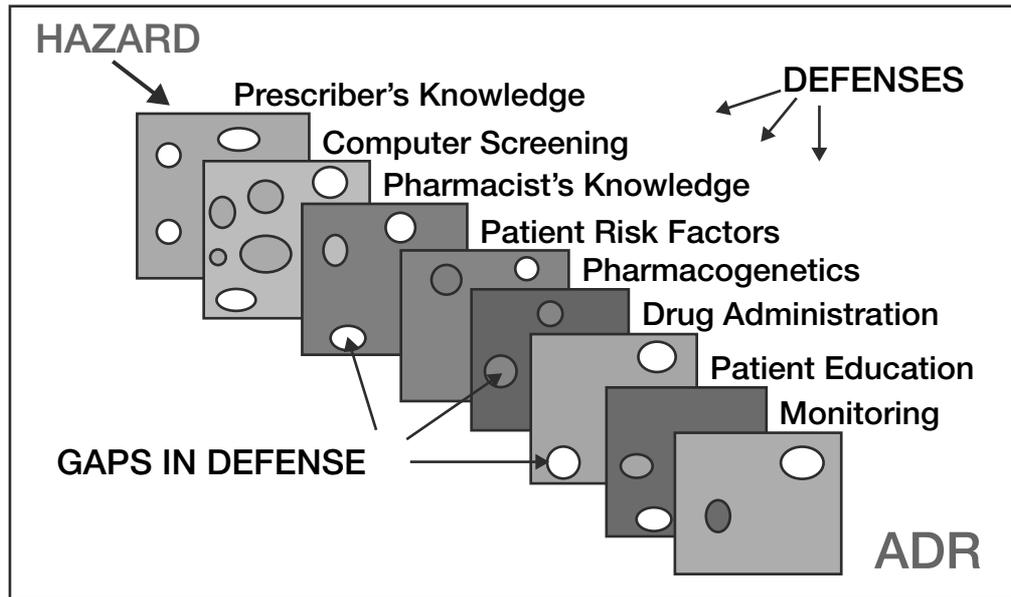


Figure 7-1. Swiss cheese model of adverse outcomes. The holes in the cheese represent gaps in the defenses.

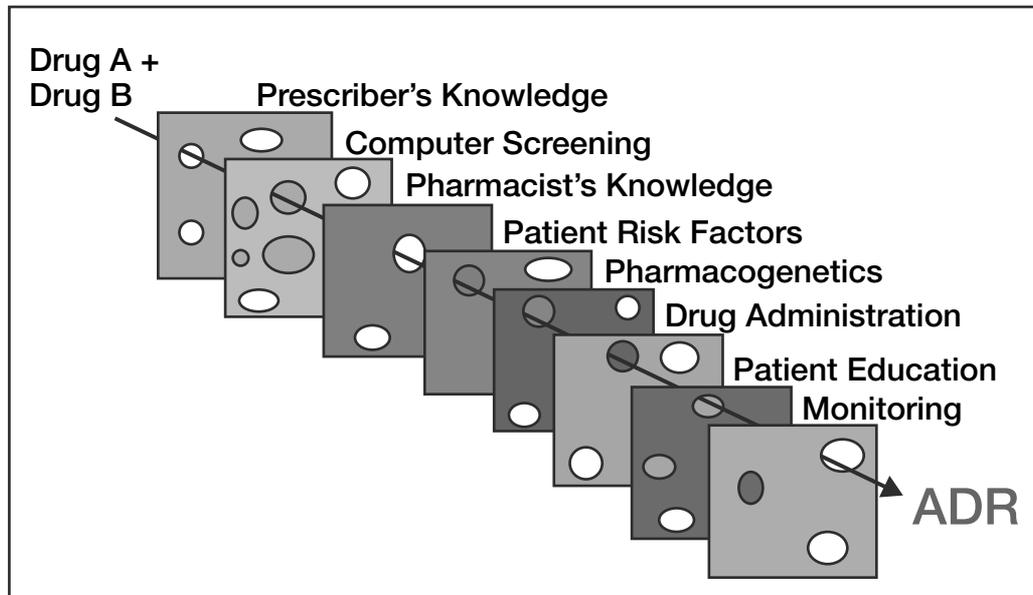
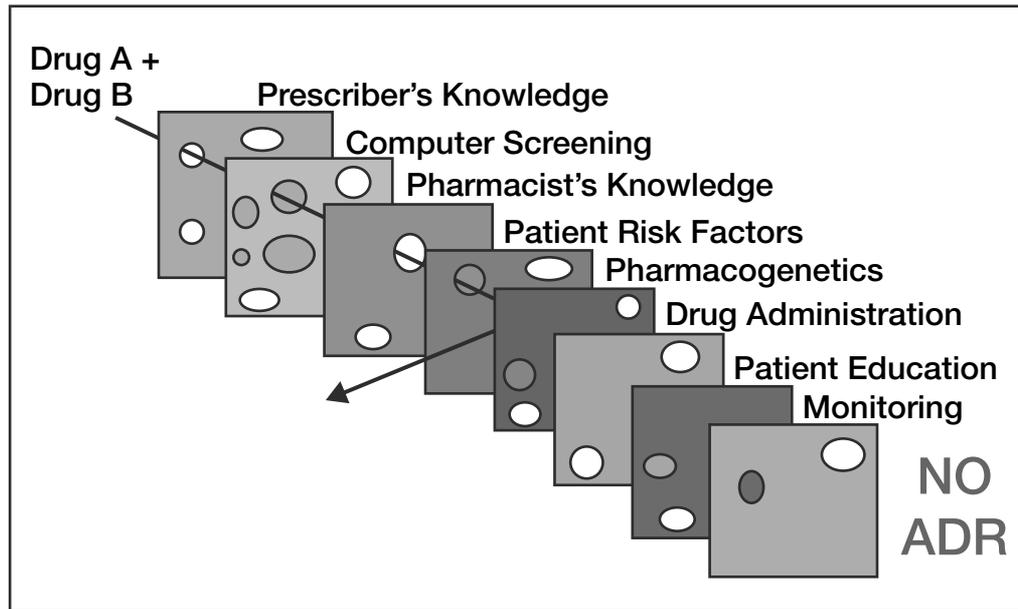


Figure 7-2. Swiss cheese model of adverse outcomes: each safeguard has limitations (holes) called latent failures. When holes line up, adverse drug events occur. ADR = adverse drug reaction.



**Figure 7-3.** Swiss cheese model of adverse outcomes. PharmER Pyramid implemented, and an adverse event is avoided.

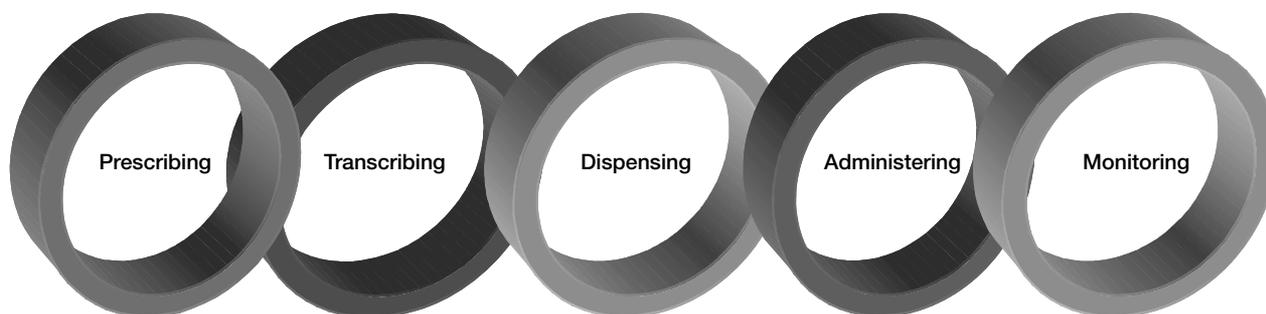
she referred to the Institute of Medicine (IOM) report on quality and safety in healthcare.<sup>2</sup> Maine also warned that if pharmacy as a profession does not step forward to lead needed changes to improve the medication use, someone else will. Establishing a clinical pharmacy service in the emergency department requires courage, leadership, and advocacy, and it's time has come.

The PharmER pyramid is composed of five rows, with each row building on the other leading to the apex of the pyramid, which represents the outcome of a safe medication use system.

The initial row is designed to support the pharmacy navigate the establishment of clinical pharmacy services within the ED. Each block in the row builds the framework and leads to the ultimate outcome of establishing a safe medication use system, which is customized for the unique and specific ED. This book is presented in a manner to permit the pharmacists interested in initiating pharmacy services in the ED a step-by-step process to laying the foundation for a sustainable clinical pharmacy service.

Part II of this textbook represents the first row of the pyramid. These chapters will assist clinical pharmacists in establishing the foundation of a clinical pharmacy service. If each element of the pyramid is implemented, it is likely to assure best practices for a safe medication use system within the ED. For example, in chapter 8 we describe methods for developing a collaborative relationship with emergency staff including medicine and nursing, while chapter 9 describes how to implement information technology to facilitate pharmaceutical care. Chapter 10 describes a customized unit of medication use formulary and unit dose distribution for the ED, and in Chapter 11, we describe current controversies with prospective review of medication orders in the ED and our approach.

The second and third rows of the PharmER pyramid (reviewed in Part III) will assure quality of pharmacotherapy within the emergency department. For example, Chapter 12 describes the implementation of antimicrobial stewardship in the ED that facilitated achieving pay-for-performance initiatives, continuity of care while avoiding overuse. In



**Figure 7-4.** Five stages of drug ordering and delivery process expressed as links in a chain.

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chapter 13, we describe the clinical significance of drug interactions in the ED. In Chapter 14, we discuss the use of antidotes in brief and the role of pharmacist in implementing optimal antidotes and responding to public health emergencies. Chapter 15 describes what to expect during the emergency care of the critically ill patient and provides critical care tools to expedite care. In chapter 16, we describe the role of the ED clinical pharmacy services in informatics to building a decision support system that facilitates implementation of emergency care pharmacotherapy protocols and instructs on procuring, administering, and dispensing critical care drug therapy. Our approach to hospital-wide reconciliation and the role of targeted medication reconciliation to assure safety and quality within the ED setting are reviewed in Chapter 17. Chapter 18 describes the emergency department consideration of the geriatric, pediatric, and obstetric patient and the EDP role.

Clinical pharmacy services navigate the medication use system and give it direction and mobility. In chapter 19, we describe the PGY1 and PGY2 pharmacy practice residents and their role in the day-to-day operations of each stage of the drug order and delivery process.<sup>3</sup> Their roles and their activities will be described, and the academic-based clinical pharmacy services role in fostering this involvement will be reviewed. In chapter 20, we describe an emergency medicine pharmacy intern practice model to foster postgraduate training in emergency care pharmacotherapy. In chapter 21, we describe the role of board-certified pharmacy technicians who facilitate clinical pharmacy services in the ED.<sup>4</sup> The PharmER Pyramid will perpetually adjust itself to assure safety and quality of emergency care pharmacotherapy.

In chapter 22, the frontiers chapter in emergency medicine clinical pharmacy services will be proposed, such as the future of ED clinical pharmacy services including establishing emergency department based medication therapy management services, obtaining reimbursement for clinical pharmacy services in the ED, and establishing a pharmacy-based immunization delivery and other wellness activities.

The PharmER pyramid model provides a primer to those seeking a career in areas of emergency medicine and is not meant to be all encompassing to the practice of emergency care. Ultimately, this textbook provides those interested in emergency medicine pharmacy with the tools that will help them break down barriers to quality of care in the emergency department.

## References

1. Horn JR, Hansten PD. Sources of Error in Drug Interactions: The Swiss Cheese Model. *Pharmacy Times*. 2004 March; [http://www.pharmacytimes.com/issues/articles/2004-03\\_1029.asp](http://www.pharmacytimes.com/issues/articles/2004-03_1029.asp) accessed 10.2007
2. Maine LL. Finding leaders among us. In Boyel CJ, Beasley RS, Holdford DA, eds. *Leadership and Advocacy for Pharmacy*. American Pharmacists Association 2007;15-26.
3. The 2005 Model of Clinical Practice in Emergency Medicine [http://www.abem.org/public/\\_Rainbow/Documents/2005%20Model%20-%20Final.doc](http://www.abem.org/public/_Rainbow/Documents/2005%20Model%20-%20Final.doc). Accessed in October, 2007.
4. Purcell K. How to develop, implement, coordinate and monitor an introductory or advanced internship program. In Cuellar LM, Ginsburg DB, eds. *Preceptor's Handbook for Pharmacists*. Bethesda, MD: ASHP, 2005.