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## CHAPTER 1

# Computerized Provider Order Entry

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### CHAPTER OUTLINE

Key Definitions

What Is Computerized Provider Order Entry?

Why Is Computerized Provider Order Entry Important?

Key Considerations

Implementation and Maintenance Strategies

Unexpected Consequences and Unique Challenges

Future Trends

Conclusion

References

### KEY DEFINITIONS

**Alert**—a patient- and context-sensitive warning presented to the ordering provider at the time an order is being entered. Used to inform the provider of a clinical concern relevant to the patient and order being placed. Alerts are called “order checks” in some EHR systems.

**Clinical Reminder**—a context-sensitive electronic prompt to the provider to perform an intervention or procedure, based on the patient’s specific clinical data as applied to a set of logical conditions.

**Computerized Provider Order Entry**—direct entry of medical orders into a healthcare system’s EHR by licensed independent practitioners or other staff with specific ordering privileges, and not by clinical or administrative support staff.

**Corollary Orders**—orders entered as adjuncts to a primary order, e.g., orders for laboratory tests to monitor effects of a medication order, orders for special diets in preparation for a medical procedure.

**Downtime**—the period of time during which the healthcare facility’s computer system is unavailable and electronic order entry is not possible.

**e-latrogenesis**—patient harm caused at least in part by the application of health information technology.<sup>1</sup>

**Electronic Health Record (EHR) systems**—software programs designed for use by healthcare systems to electronically place, store, and retrieve clinical orders, results, notes, reports, and other information related to the care of patients.

**File Architecture**—also referred to as the *medication masterfile*, a compilation of interconnected files and records that contain data elements that compose the medication and clinical information presented for use in an EHR system.

**Notification**—a patient- and context-sensitive prompt to the ordering provider, attending physician, primary provider, or care team to alert them of new information (i.e., abnormal lab result) or tasks in need of completion (i.e., unsigned order or note).

**Order Menu**—a listing of orders from which clinicians may select individual orders, organized to support a specific purpose, ordering environment, or type of order.

**Order Set**—a group of medication and procedure orders that can be accessed and ordered from a single source in the EHR, to facilitate entry of multiple orders and standardize ordering for a specific purpose. These are analogous to pre-printed paper order forms.

**Quick Order**—a pre-configured order in which the components (e.g., medication, dose, route, schedule, amount, number of refills, etc) are specified, allowing for faster order entry and limiting opportunities for entry errors. These are sometimes referred to as order sentences and may be maintained and standardized across an institution or created by individuals as personal quick orders, user preferences or preference lists.

## Introduction

The Institute of Medicine's landmark 2000 report, *To Err is Human: Building a Safer Health System*, found that as many as 98,000 people die each year in the United States due to medical errors, and propelled Congress, the Joint Commission on Accreditation of Healthcare Organizations, healthcare professions, and the public towards a renewed commitment to patient safety. A central theme of the report is that bad systems cause most errors, not bad people, and this idea has fostered dramatic advances in clinical systems engineering with safety foremost in design, including "no-blame" error reporting and a call for widespread use of electronic health records.<sup>2</sup> Subsequent IOM reports, *Crossing the Quality Chasm: A New Health System for the 21st Century*, and *Patient Safety: Achieving a New Standard for Care*, emphasized the need for "a national health information infrastructure to provide real-time access to complete patient information and decision-support tools for clinicians and their patients, to capture patient safety information as a by-product of care, and to make it possible to use this

information to design safer delivery systems."<sup>3,4</sup> In the Medicare Modernization Act of 2003, Congress mandated the Institute of Medicine to "carry out a comprehensive study of drug safety and quality issues in order to provide a blueprint for system-wide change." This study resulted in the 2007 IOM publication *Preventing Medication Errors: Quality Chasm Series*, in which the Betsy Lehman cyclophosphamide overdose case is used to illustrate how an inferior medication-ordering and delivery system involving minimal double-checks, lack of attending physician oversight, ambiguous protocols, and different dosing expressions in the same order contributed to a tragic patient death; and then how the healthcare system responded, in part by designing a first-class computerized provider order entry interface featuring automatic dose-checking and associated warnings requiring interdisciplinary overrides, extensive point-of-care on-line references, and peer-reviewed templates and protocols.<sup>5</sup> The report further explores sources of medication errors such as gaps in medication knowledge and the lack of timely, easily accessible, and pertinent drug information at the point of ordering; incomplete medication and allergy histories which lack over-the-counter and herbal product information or prescription information from other health care providers; illegible orders; and unavailability of relevant diagnosis and laboratory results at the point of ordering. CPOE has the potential to dramatically reduce these sources of order errors and significantly improve patient care overall.

## What Is Computerized Provider Order Entry?

The term *computerized provider order entry* (CPOE) denotes the direct entry of clinical orders into a healthcare system's electronic health record (EHR) by licensed independent clinicians or others with ordering privileges. The acronym CPOE has differ-