INPATIENT VERBAL ORDERS AND THE IMPACT OF COMPUTERIZED PROVIDER ORDER ENTRY

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Objective To describe the characteristics of verbal orders at a tertiary care children's hospital.

Study design Between August 2003 and January 2004, the computerized provider order entry (CPOE) system was evaluated for the characteristics of verbal orders. The rate of total orders represented by verbal orders and the rate of unsigned verbal orders were examined before, during, and after CPOE implementation.

Results After CPOE implementation, a mean of 19,996 ± 521 orders were generated weekly; of these, 2094 ± 65 (10%) were verbal orders. The greatest rates of verbal orders were from psychiatry (74%) units and involved medication orders (38%; 790/2094). The greatest rates of medication verbal orders were psychotherapeutics (24%; 662/2697). Medical physicians had a larger rate of verbal orders than surgical physicians. The rates of verbal orders and unsigned verbal orders were reduced from 23% and 43% before CPOE implementation to 10% and 9% after implementation, respectively.

Conclusions Medication orders from physicians to nurses are the primary source of verbal orders in this tertiary care children's hospital. CPOE implementation significantly affected both verbal orders and the rate of unsigned verbal orders. This type of data is important for institutions aiming to decrease verbal orders and associated medical errors. *(J Pediatr 2006;149:461-7)*

Medication errors contribute to the morbidity and mortality of hospitalized patients and represent 19% of all medical errors.[1] It has been estimated that 3.7% of hospitalized adults experience a medication error, and that 69% of these errors are preventable.[2,3] Medication errors occur in 6.5 of 100 adult hospital admissions and in 5 of 100 adult medication orders.[4] According to a 2000 Institute of Medicine report estimate, preventable adverse drug events affecting hospitalized patients carry a significant economic burden and may account for about $2 billion in health care costs nationally.[5]

Medication errors can be attributed to any part of the medication use cycle, including prescribing, transcribing, preparing, dispensing, administration, and documentation.[6,7] Most medication errors in adults occur during the prescribing component of the cycle.[1,4,7,8] Data on medication errors in children are sparse, however. A recent study of medication errors in pediatric intensive care units found that 11% of the orders had a prescribing error.[9] Kaushal et al[7] noted that 74% of medication errors occurred during the prescribing process in children. Fortescue et al[6] noted that 78% of medication errors occurred during the prescribing stage, 13% during the administration stage, and 6% during the transcribing stage in children.

Prescribing errors may occur when orders are written into a patient's chart by a physician, entered directly into a computerized prescribing system, or given verbally, usually to a nurse, who then writes or enters the order. The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines verbal orders as prescriptions or medication orders that are communicated as oral, spoken communications between senders and receivers face to face, by telephone, or by another auditory device.[10] There are limited data regarding the epidemiology of verbal orders and their impact on patient safety. According to the *United States Pharmacopeia*, "verbal orders carry the risk of introducing an error from many sources and, therefore, should be minimally used."[11]

Several solutions have been proposed to reduce the error rate associated with verbal

CCHMC	Cincinnati Children's Hospital Medical Center	MAR	Medication administration record
CPOE	Computer Provider Order Entry	NCC MERP	National Coordinating Council for Medication Error Reporting and Prevention
ICIS	Integrating Clinical Information System		
JCAHO	Joint Commission on Accreditation of Healthcare Organizations	NDC	National Drug Code

See editorial, p 435

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orders. These include repeating back the verbal order to the physician for confirmation, providing more accurate identification of the prescriber and the patient, and immediately transcribing the order into the medication administration record (MAR).[10] A recent Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standard requires that verbal orders be "read back" to the prescribing physician.[12] In addition, the American Academy of Pediatrics recommends that prescribers avoid using verbal orders whenever possible.[13] It is important to identify the prescribers using verbal orders to target them in an effort to reduce verbal orders.

At Cincinnati Children's Hospital Medical Center (CCHMC), CPOE, electronic clinical documentation, and an electronic MAR were recently implemented in all inpatient units. All patient care orders are now entered into the computer either directly by physicians or advance practice nurses or indirectly through the nursing staff who enter verbal orders. The primary purpose of the present study was to delineate the characteristics of verbal orders in a tertiary care children's hospital. We hypothesized that the rate of verbal orders would be reduced after implementing a CPOE system.

METHODS

Institutional Background

CCHMC is a 423-bed tertiary care children's hospital with more than 760,000 patient visits each year. The hospital serves the southern Ohio, northern Kentucky, western West Virginia, and eastern Indiana region.

CPOE system

The CPOE application is part of a larger Integrating Clinical Information System (ICIS), whose core applications include a web-based portal, CPOE, clinical documentation, and a data repository (INVISION; Siemens Medical Solutions, Malvern, PA). ICIS is a proprietary system that has been embellished with both local applications and other proprietary applications residing on the intranet and the internet. Medication orders generated in the CPOE system populate an electronic MAR. These core applications interface with other hospital-based information systems, including the radiology picture archiving and communication system, laboratory, pharmacy, admissions, dietary, and other systems. ICIS is linked to numerous intranet- and internet-based resources and clinical decision support tools, such as hospital policies, the medication formulary, a discharge summary system, internet search engines, and others. The system is accessed through both fixed and wireless workstations throughout the institution. All orders at CCHMC, including medication, diet, physical or occupational therapy, and radiology orders, are generated through the CPOE system. Currently, more than 104,000 patient care orders are generated each month, and no paper orders are accepted at CCHMC.

Evaluation of Verbal and Unsigned Verbal Orders Before, During, and After CPOE Implementation

CPOE was implemented between April 2002 and December 2002 (the CPOE implementation/transition period). Before April 2002, all patient care orders were either written by physicians or advance practice nurses on a standardized paper order sheet or given through a verbal order. From December 2001 to August 2002, data on verbal orders and unsigned verbal orders were collected by a weekly audit of 100 randomly selected paper charts on patients discharged from the hospital. The audits were performed by the coding staff of the Health Information Management team, a group of professional chart auditors accredited through the American Health Information Management Association. All orders in each sampled chart were counted and categorized as verbal or nonverbal orders. A verbal order was identified as an order with the notation "verbal order" or "vo" next to it. Verbal orders were further categorized by those that had been cosigned and those that remained unsigned. The rate of verbal orders was defined as the number of verbal orders divided by the total number of orders sampled. Similar calculations were made for unsigned verbal orders. After August 2002, all data regarding orders and verbal orders were collected electronically from the CPOE system; paper orders were excluded. Data were collected for the rate of total orders represented by verbal orders before and after implementation of the CPOE from December 2001 to January 2004.

CPOE System Implementation and Verbal Order Policy

After a 2-year planning period, the CPOE system was implemented throughout the hospital sequentially between April 2002 and December 2002 in all inpatient care units except Hematology-Oncology, in which it was implemented in December 2003. For this reason, Hematology-Oncology data were not included in any data analysis. System users throughout the hospital were educated on the CPOE system, and during the implementation period, support personnel were available 24 hours a day in each unit to assist users with the new system. Each CPOE user was given a unique log-in name and password. The use of verbal orders after the implementation of CPOE was strongly discouraged, and nurses were instructed not to accept verbal orders except in urgent or emergent situations. A verbal order entered by a nurse appears to the physician in red as "orders requiring cosignature" on his or her next log in. In addition to this direct feedback and related to our study, a program was put in place in June 2002 to provide feedback from the Health Information Management department to the CPOE system users if orders were unsigned after 7 or more days, which is consistent with hospital policy. This program included a weekly system query of all physicians and advance practice nurses with outstanding unsigned verbal orders and an e-mail sent from the Health Information Management department to these individual providers reminding them to sign these outstanding orders.