

Pharmacist Participation on Physician Rounds and Adverse Drug Events in the Intensive Care Unit

Lucian L. Leape, MD

David J. Cullen, MD

Margaret Dempsey Clapp, MS, RPh

Elisabeth Burdick, MS

Harold J. Demonaco, MS, RPh

Jeanette Ives Erickson, MSN, RN

David W. Bates, MD, MSc

IN TRADITIONAL HOSPITAL PRACTICE most of the burden of drug therapy decision making falls on the physician. However, studies have shown that physicians sometimes make errors in prescribing drugs.^{1,2} While most errors are harmless or are intercepted, some result in adverse drug events (ADEs). The pharmacist's role in prescribing is typically reactive: responding to prescription errors long after the decision has been made for patients about whom he or she has little direct clinical knowledge. Thus, the specialized knowledge of the pharmacist is not utilized when it would be most useful: at the time of ordering.

Studies show that pharmacist retrospective review of medication orders prevents errors.³⁻⁵ However, the pharmacist's impact might be substantially greater if he or she could provide input earlier, at the time of prescribing. It has been shown that pharmacist consultation with physicians and others in an intensive care unit (ICU) resulted in a net saving from reduced drug use of \$10 011 in a 3-month period.⁶ How-

See also Patient Page.

Context Pharmacist review of medication orders in the intensive care unit (ICU) has been shown to prevent errors, and pharmacist consultation has reduced drug costs. However, whether pharmacist participation in the ICU at the time of drug prescribing reduces adverse events has not been studied.

Objective To measure the effect of pharmacist participation on medical rounds in the ICU on the rate of preventable adverse drug events (ADEs) caused by ordering errors.

Design Before-after comparison between phase 1 (baseline) and phase 2 (after intervention implemented) and phase 2 comparison with a control unit that did not receive the intervention.

Setting A medical ICU (study unit) and a coronary care unit (control unit) in a large urban teaching hospital.

Patients Seventy-five patients randomly selected from each of 3 groups: all admissions to the study unit from February 1, 1993, through July 31, 1993 (baseline) and all admissions to the study unit (postintervention) and control unit from October 1, 1994, through July 7, 1995. In addition, 50 patients were selected at random from the control unit during the baseline period.

Intervention A senior pharmacist made rounds with the ICU team and remained in the ICU for consultation in the morning, and was available on call throughout the day.

Main Outcome Measures Preventable ADEs due to ordering (prescribing) errors and the number, type, and acceptance of interventions made by the pharmacist. Preventable ADEs were identified by review of medical records of the randomly selected patients during both preintervention and postintervention phases. Pharmacists recorded all recommendations, which were then analyzed by type and acceptance.

Results The rate of preventable ordering ADEs decreased by 66% from 10.4 per 1000 patient-days (95% confidence interval [CI], 7-14) before the intervention to 3.5 (95% CI, 1-5; $P < .001$) after the intervention. In the control unit, the rate was essentially unchanged during the same time periods: 10.9 (95% CI, 6-16) and 12.4 (95% CI, 8-17) per 1000 patient-days. The pharmacist made 366 recommendations related to drug ordering, of which 362 (99%) were accepted by physicians.

Conclusions The presence of a pharmacist on rounds as a full member of the patient care team in a medical ICU was associated with a substantially lower rate of ADEs caused by prescribing errors. Nearly all the changes were readily accepted by physicians.

JAMA. 1999;282:267-270

www.jama.com

Author Affiliations are listed at the end of this article.

Corresponding Author: Lucian L. Leape, MD, Department of Health Policy and Management, Harvard School of Public Health, 677 Huntington Ave, Boston, MA 02115.

Reprints are not available from the author.

Caring for the Critically Ill Patient Section Editor: Deborah J. Cook, MD, Consulting Editor, *JAMA*. **Advisory Board:** David Bihari, MD; Christian Brun-Buisson, MD; Timothy Evans, MD; John Heffner, MD; Norman Paradis, MD.

ever, we know of no controlled studies that have evaluated the effect of pharmacist participation on the key outcome measure of error prevention—the rate of ADEs.

For these reasons, we conducted a controlled clinical trial of the efficacy of pharmacist participation in physician rounds in a medical ICU as part of a continuing study of systems changes to prevent ADEs. The ADE rate is higher among patients in ICUs, both because they have pathophysiological abnormalities and often receive many drugs.

We asked the following questions: (1) Is pharmacist participation on rounds associated with a reduction in the rate of preventable ADEs? (2) What types of interventions does the pharmacist make? and (3) Is pharmacist participation on ICU rounds accepted by physicians and nurses?

METHODS

The study was carried out in 2 medical ICUs at Massachusetts General Hospital, a large tertiary care hospital in Boston, during 2 periods: February 1, 1993, through July 31, 1993 (phase 1, preintervention), and October 1, 1994, through July 7, 1995 (phase 2, postintervention).

The study unit was a 17-bed medical ICU and the control unit was a 15-bed coronary care unit (CCU). The average daily census was 13.9 in the medical ICU and 12.9 in the CCU during phase 1 and 12.4 and 11.9, respectively, during phase 2. Nurse and physician staffing ratios were similar in the 2 units. Patients in the medical ICU had a range of acute and chronic medical illness other than primary cardiac disease, while those in the CCU were primarily cardiac patients. Each unit frequently admitted both categories of patients when the other unit was full. Patients receiving ventilatory support constituted 70% of patients in the medical ICU and 60% of patients in the CCU.

Sample

We compared outcomes in the study unit before and after the intervention, and between the study unit and a con-

trol unit during the same period after the intervention. Using a random number generator, we selected 75 patients from each of 3 groups: all patients admitted to the study unit during phase 1 and phase 2 and all patients admitted to the control unit during phase 2. To detect whether unmeasured variables may have altered the rate of ADEs (secular trend), we also randomly selected 50 patients from all those admitted to the control unit during phase 1.

The intervention was the assignment of an experienced senior pharmacist to make rounds with the patient care team in the study ICU. The pharmacist made rounds with the residents, nurses, and attending staff each morning, was present in the unit for consultation and assistance to the nursing staff during the rest of the morning, and was available on call as necessary throughout the day. The total commitment was approximately half of the pharmacist's time. In the control ICU, as is the usual practice, another pharmacist was available in the unit for part of the day but did not make rounds with physicians and nurses. The intervention began in May 1994. Data collection began in October 1994 and continued through July 1995.

Outcome Measures

We assessed the effect of pharmacist participation with 2 measures: (1) the change in the rate of preventable ADEs in the ordering stage and (2) the number and acceptance of interventions recommended by the pharmacist. We defined an ADE as an injury related to the use of a medication. A preventable ADE is an injury caused by an error in the use of a medication (eg, hypotension or hypoglycemia, changes in mental status, bleeding, or cardiac arrest).¹

Adverse Drug Events

Using previously described methods,⁷ trained and experienced investigators (1 nurse and 1 pharmacist) identified incidents (apparent medication errors or ADEs) by review of medical records in which they examined all progress notes, orders, and laboratory results during the index admission.

Incidents were evaluated independently by 2 physician reviewers (L.L.L. and D.W.B.) who classified them according to whether or not an ADE or potential ADE was present. Using pre-established criteria,⁷ they also made judgments of severity, preventability, and, if an error was present, the type of error and the stage in the process at which the error occurred. When there were disagreements the reviewers met and reached consensus. If consensus could not be reached, a third reviewer evaluated the incident. Reliability for these judgments has previously been reported⁷ (for judgments about whether an incident was an ADE, $\kappa = 0.81-0.98$; for preventability, $\kappa = 0.92$; and for severity, $\kappa = 0.32-0.37$). All reviewers and investigators were blinded to patient group assignment.

Pharmacist Interventions

To develop descriptive information about changes suggested by the pharmacist, we measured the number of interventions, the type of intervention, and the percentage of recommendations accepted. For this purpose, the pharmacist completed a report form for each intervention that could potentially lead to a change in orders, noting the date, drug, nature of the order, the specific recommendation, and whether or not it was accepted by the physicians. The type of intervention was then classified as shown in TABLE 1. The pharmacist also recorded events that did not involve order changes, such as errors in the pharmacy system or identification of ADEs.

Analysis

The primary measure used to assess the effect of the interventions was the rate of preventable ADEs due to prescribing errors. We conducted comparisons at 2 points in time in the study unit, before and after the intervention, and between the study and control units after the intervention.

For the before-after evaluation, we compared the rate of occurrence of preventable ordering ADEs among patients in the study unit during phase 1

with the rate in the same unit during phase 2. For the between-unit comparison, we compared the rate in the study unit during phase 2 with the rate of occurrence in the control unit in phase 2. To assess potential secular trends, we also compared the rate in the control unit in phase 1 with its rate in phase 2.

Comparisons between rates in phases 1 and 2 in the study unit (before and after) and between the study unit and the control unit in phase 2 (contemporaneous) were made using unpaired *t* tests. Analyses were performed using SAS statistical software.⁸

RESULTS
ADE Rates

The overall rates, expressed as preventable ordering ADEs per 1000 patient-days, are shown for both phases for both units in TABLE 2. In the before and after comparison, the rate of preventable ordering ADEs per 1000 patient-days decreased in the study unit by 66% from phase 1 to phase 2 (10.4 [95% CI, 7-14] to 3.5 [95% CI, 1-5]; *P*<.001).

When the intervention unit was compared with the control unit during the same time period (phase 2), the rate of preventable ordering ADEs in the study unit was 72% lower than in the control unit (3.5 [95% CI, 1-5] vs 12.4 [95% CI, 8-17] per 1000 patient-days; *P*<.001). The preventable ordering ADE rate in the control unit rose slightly from phase 1 to phase 2 (10.9 [95% CI, 6-16] to 12.4 [95% CI, 8-17]), but this change was not significant (*P* = .76).

When results were calculated in terms of number of patients (admissions), the differences in rates were similar: in the study unit, the rate of preventable ordering ADEs decreased by two thirds, from 12% in phase 1 to 4% in phase 2, while it was essentially unchanged in the control unit (10% to 11%).

The rate of all ADEs also decreased substantially in the study unit from phase 1 to phase 2 (33.0 [95% CI, 27-39] to 11.6 [95% CI, 8-15]; *P*<.001). However, the rate rose in the control unit by 34.3% (34.7 [95% CI, 26-43] to 46.6 [95% CI, 38-55]; *P*<.001).

Pharmacist Interventions

During phase 2, a total of 398 pharmacist interventions were recorded (Table 1). Of these, 366 were related to ordering, of which 362 (99%) were accepted by the physicians. Nearly half (178/389 [46%]) were pharmacist-initiated clarification or correction of a proposed or previous order. These errors included incomplete orders, wrong dose, wrong frequency, inappropriate choice, and duplicate therapy. Examples were a recommendation to reduce the dose of intravenous phenytoin from 300 mg 3 times per day, the correct oral dose, to 100 mg 3 times per day and reduction of the dose of ampicillin administered to a patient with renal failure.

In 100 instances, the pharmacist provided drug use information, most often at the time the decision was being made about whether to order a drug. Examples were education of the house staff on the selection of sedatives in patients receiving ventilatory support and the risk of extrapyramidal adverse effects from excessive doses of droperidol.

The pharmacist recommended alternative therapy in 47 cases, suggesting drugs that were safer or cheaper but equally effective, such as changing from intravenous to oral metoclopramide. Potential problems relating to drug interactions and drug allergies were identified by the pharmacist in 22 cases and use of alternative drugs was recommended.

Thirty-two of the pharmacist interventions did not relate to ordering. Among these, the pharmacist provided

special order drugs or approved nonformulary use of a drug in 14 instances, identified 6 previously unrecognized ADEs, and uncovered 12 systems errors in the pharmacy dispensing system. One example of dispensing errors was that a medication was prepared for peripheral intravenous infusion when a smaller volume was required for central administration to minimize fluid load.

COMMENT

In previous studies, we demonstrated that nearly half of preventable ADEs resulted from errors in the prescribing process.¹ Prescribing errors frequently have a cascade effect, causing errors downstream in dispensing or administration. The major cause of prescribing errors was physicians' lack of essential drug

Table 1. Pharmacist Interventions

Intervention	No. (%)*
Clarification or correction of order†	178 (45)
Provision of drug information	100 (25)
Recommendation of alternative therapy	47 (12)
Identification of drug interaction	14 (4)
Identification of "systems error"	12 (3)
Identification of drug allergy	8 (2)
Approval of nonformulary use of drug	7 (2)
Provision of special order drug	7 (2)
Identification of adverse drug event	6 (2)
Miscellaneous or unspecified	19 (5)
Total	398

*Percentages sum to more than 100% because of rounding.

†Four dose corrections recommended by the pharmacist were not accepted by the physicians. All were recommendations for dose reduction in patients with some evidence of renal failure. Three of the 4 were immunocompromised patients (acquired immunodeficiency syndrome, leukemia, and lung transplantation) for whom the physicians believed the benefit of continued treatment outweighed the risk of drug toxicity or further renal damage. All were carefully monitored and none suffered progressive damage.

Table 2. Adverse Drug Event Rates*

	Study Unit		Control Unit	
	Phase 1	Phase 2	Phase 1	Phase 2
Average daily census	13.9	12.4	12.9	11.9
Total patient-days No.	787	861	461	644
No. of patients	75	75	50	75
All adverse drug events, No.	35	10	16	30
Rate per 1000 patient-days†	33.0 (27-39)	11.6 (8-15)‡	34.7 (26-43)	46.6 (38-55)
Preventable ordering adverse drug events, No.	11	3	5	8
Rate per 1000 patient-days†	10.4 (7-14)	3.5 (1-5)‡	10.9 (6-16)	12.4 (8-17)

*Phase 1 (preintervention) February 1, 1993-July 31, 1993; phase 2 (postintervention) October 1, 1994-July 7, 1995.

†Data expressed as percentage (95% confidence interval).

‡*P*<.001 for comparison with both phase 1 in the study unit and phase 2 in the control unit.

and patient information at the time of ordering.²

One method of providing such information is computerized physician order entry, which has been shown to reduce the rate of serious medication errors by more than half.⁹ Evans et al¹⁰ have demonstrated that a computer-assisted management program for antibiotics can substantially reduce excessive use and misuse of antibiotics as well as reduce length of hospital stay and costs. However, most hospitals do not yet have computerized ordering by physicians, so incorporation of the pharmacist into the patient care team is a more feasible alternative at present, especially in units with high medication use.

We estimated the financial impact of the 66% reduction in ADEs. The cost of an ADE has been estimated at \$2000 to \$2500 per event in 1993.^{11,12} However, the cost of a preventable ADE, one due to an error, was estimated at \$4685.⁹ For the year 1995, we estimate that 58 ADEs were prevented. At \$4685 each, the cost reduction in this single unit would be approximately \$270 000 per year. The intervention required no additional resources and represented a different use of the existing pharmacist's time. Rather than spending time checking and correcting orders after they had been sent to the pharmacy, the pharmacist was involved at the time the order was written. While participating in rounds as a member of the patient care team, the pharmacist reduced ADEs both by preventing errors and by intercepting them. He prevented errors by providing information about doses, interactions, indications, and drug alternatives to physicians at the time of ordering. He intercepted errors by immediately reviewing all orders and correcting deficiencies before the orders were transmitted to the pharmacy. In addition, the pharmacist prevented nursing medication errors by providing ready consultation to the nursing staff and teaching drug safety.

Finally, the on-site pharmacist took overall responsibility for medication safety, spotting unsafe conditions and identifying needs for process improve-

ment. For example, during the study period the pharmacist identified 12 systems errors in pharmacy function and 6 ADEs that probably would not have otherwise been discovered.

The presence of the pharmacist on rounds was well accepted by physicians, as evidenced by the fact that 99% of the recommendations were accepted. While staff perceptions were not evaluated systematically, in our experience, nurses also accepted this role easily, appreciating the reduction in extra work, such as telephoning physicians to have orders corrected. The pharmacist in this study had to overcome the traditional impression of the medical staff that pharmacists may be primarily concerned with costs. This academic medical ICU environment had the added challenge of dealing with a new group of house staff, fellows, and attending physicians every few weeks. In ICUs where the attending physicians are permanent and fellows are assigned for many months, acceptance might be enhanced.

Our study has several limitations. We studied only 1 ICU in 1 teaching hospital. Adverse drug events are more common in teaching hospitals than in community hospitals¹³ and occur more frequently in ICUs,¹ so these findings are not generalizable to all types of units or all types of hospitals. However, the magnitude of the impact of the pharmacist's presence was so great that a substantial effect would probably be found in ICUs in other hospitals. Second, our results do not represent the full extent of preventable ADEs, since record review does not capture all events, nor does it capture most potential ADEs, the "near misses," because they are seldom recorded in patient charts. Third, physicians and nurses in this ICU function as a team and make rounds together. Pharmacist participation would be more difficult to arrange in units where multiple physicians make rounds at different times. Finally, the success of the pharmacist intervention depends on interpersonal relationships. Thus, the personality and cooperativeness of the pharmacist and the medical staff are critical factors in making this system work, es-

pecially at the beginning. Similar prevention of ADEs prompted by a designated ICU pharmacist probably would be less likely to occur in ICUs in which staff are not part of a multidisciplinary team and when ICU staff are not open to the important role that the pharmacist can play in optimizing ICU management.

We conclude that participation of a pharmacist on medical rounds can be a powerful means of reducing the risk of ADEs.

Author Affiliations: Department of Health Policy and Management, Harvard School of Public Health (Dr Leape and Ms Burdick); Departments of Anesthesia (Dr Cullen), Pharmacy (Ms Clapp and Mr Demonaco), and Nursing (Ms Erickson), Massachusetts General Hospital; and Division of General Internal Medicine, Brigham and Women's Hospital (Dr Bates), Boston, Mass.

Funding/Support: This study was supported by grants from the Risk Management Foundation, Boston, Mass, and the American Society of Health-System Pharmacists Foundation, Bethesda, Md.

Acknowledgment: We would like to thank Christopher Lyman, RPh, Theresa Gallivan, RN, B. Taylor Thompson, MD, and Barbara Cockerill, MD, for their assistance in the study.

REFERENCES

1. Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events implications for prevention. *JAMA*. 1995;274:29-34.
2. Leape LL, Bates DW, Cullen DJ, et al. Systems analysis of adverse drug events. *JAMA*. 1995;274:35-43.
3. Folli HL, Poole RL, Benitz WE, Russo JC. Medication error prevention by clinical pharmacists in two children's hospitals. *Pediatrics*. 1987;79:718-722.
4. Broyles JE, Brown RO, Vehe KL, et al. Pharmacist interventions improve fluid balance in fluid restricted patients requiring parenteral nutrition. *Ann Pharmacother*. 1991;25:119-122.
5. Kilroy RA, Iafrate RP. Provision of pharmaceutical care in the intensive care unit. *Crit Care Nurs Clin North Am*. 1993;5:221-225.
6. Montazeri M, Cook DJ. Impact of a clinical pharmacist in a multidisciplinary intensive care unit. *Crit Care Med*. 1994;22:1044-1048.
7. Bates DW, Leape LL, Petrycki S. Incidence and preventability of adverse drug events in hospitalized adults. *J Gen Intern Med*. 1993;8:289-294.
8. *SAS Procedures Guide*. Release 6.03. Cary, NC: SAS Institute Inc; 1988.
9. Bates DW, Leape LL, Cullen DJ, et al. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. *JAMA*. 1998;280:1311-1316.
10. Evans RS, Pestotnik MA, Classen DC, et al. A computer-assisted management program for antibiotics and other anti-infective agents. *N Engl J Med*. 1998;338:232-238.
11. Bates DW, Spell N, Cullen DJ, et al. The costs of adverse drug events in hospitalized patients. *JAMA*. 1997;277:307-311.
12. Classen DC, Pestotnik SL, Evans RS, et al. Adverse drug events in hospitalized patients. *JAMA*. 1997;277:301-306.
13. Brennan TA, Leape LL, Laird N, et al. Incidence of adverse events and negligence in hospitalized patients. *N Engl J Med*. 1991;324:370-376.

2. Centers for Disease Control and Prevention. Provisional Public Health Service recommendations for chemoprophylaxis after occupational exposure to HIV. *MMWR Morb Mortal Wkly Rep.* 1996;45:468-472.
3. Centers for Disease Control and Prevention. Public Health Service guidelines for the management of health-care worker exposures to HIV and recommendation for postexposure prophylaxis. *MMWR Morb Mortal Wkly Rep.* 1998;47(RR-7):1-33.
4. Gumodoka B, Favot I, Berege ZA, Dolmans WM. Occupational exposure to the risk of HIV infection among health care workers in Mwanza Region, United Republic of Tanzania. *Bull World Health Organ.* 1997;75:133-140.
5. De Graaf R, Houweling H, van Zessen G. Occupational risk of HIV infection among western health care professionals posted in AIDS endemic areas. *AIDS Care.* 1998;10:441-452.

Pott Puffy Tumor Associated With Intranasal Methamphetamine

To the Editor: Pott puffy tumor (PPT) is an anterior extension of a frontal sinus infection that results in frontal bone osteomyelitis and subperiosteal abscess. Since the advent of antibiotics, PPT has been rarely reported and most cases have been described in children and adolescents. We report a case of PPT associated with use of intranasal methamphetamine hydrochloride.

Report of a Case. A 34-year-old woman presented with fever, chills, photophobia, and neck pain for 9 days. Nine months previously, she had developed swelling on her forehead that gradually enlarged over 5 days and then spontaneously drained purulent material. Over several weeks, a fistula developed at the site of the forehead swelling, and was accompanied by intermittent bloody, purulent drainage for approximately 9 months. The patient had no other contributory medical illnesses. However, she had used intranasal and inhaled methamphetamine weekly for 15 years and reported continued intranasal use immediately prior to the development of the forehead lesion. She reported no history of intravenous or other drug use.

Physical examination revealed a sinocutaneous fistula in the midline of the forehead with seropurulent drainage but no local erythema or tenderness. The patient had nuchal rigidity, but findings of the neurologic examination were within normal limits. The remainder of the physical examination was noncontributory. The white blood cell count was $15.3 \times 10^9/L$ (77 neutrophils and 9 bands). Examination of cerebrospinal fluid, obtained by lumbar puncture, revealed a white blood cell count of $0.5 \times 10^9/L$ (91% neutrophils, 2% lymphocytes), glucose level of 63 mg/dL (3.5 mmol/L), and a total protein level of 81 mg/dL. A Gram stain showed no organisms and the cerebrospinal fluid cultures and blood cultures were sterile. Computed tomographic scan of the head showed complete opacification of all sinuses with a 1-cm connection between the anterior frontal sinus and the skin. There were no epidural fluid collections or underlying brain parenchymal lesions.

The patient was treated with intravenous clindamycin and ceftriaxone sodium, and oral ciprofloxacin for osteomyelitis with presumed bacterial meningitis secondary to a

contiguous focus of infection. On day 5 of her hospital stay, she underwent endoscopic sinus surgery. A second surgical procedure for debridement of the infected frontal bone, ablation of the frontal sinus, and repair of the frontal sinocutaneous fistula was also performed. Aerobic and anaerobic cultures of the purulent drainage from the maxillary sinuses grew *Streptococcus milleri* and *Candida albicans*. At the end of 2 weeks, antibiotics were changed to intravenous ceftazolin and oral metronidazole and this therapy was continued for 4 additional weeks at home. No further complications occurred at 2 months. The patient was then lost to follow-up.

Comment. Osteomyelitis of the frontal bone is most commonly caused by trauma and frontal sinusitis.¹ We propose that the use of intranasal methamphetamine by this patient contributed to chronic sinus inflammation, which led to the frontal bone osteomyelitis and subperiosteal abscess. Noskin and Kalish² have implicated the use of intranasal cocaine as a cause of chronic sinusitis associated with PPT in a 34-year-old man. The sympathomimetic effects of methamphetamine cause vasoconstriction of the mucosal vessels that may result in ischemic injury to the sinus mucosa, and thereby could provide an environment conducive to bacterial growth. We propose that PPT is a potential complication of methamphetamine use.

Peyman Banooni, MD
Leland S. Rickman, MD
David M. Ward, MD
University of California, San Diego

1. Koch SE, Wintroub BU. Pott's puffy tumor: a clinical marker for osteomyelitis of the skull. *Arch Dermatol.* 1985;121:548-549.
2. Noskin GA, Kalish SB. Pott's puffy tumor: a complication of intranasal cocaine abuse. *Rev Infect Dis.* 1991;13:606-608.

CORRECTIONS

Incorrect Value and Wording: In the Caring for the Critically Ill Patient article entitled "Pharmacist Participation on Physician Rounds and Adverse Drug Events in the Intensive Care Unit" published in the July 21, 1999, issue of THE JOURNAL (1999;282:267-270), there was an incorrect value in a table. On page 269, in Table 2, the number of total patients days for Phase 1 in the Study Unit should be 1061 and not 787 as listed. In the "Results" section on the same page, the statement that 300 mg 3 times per day is the correct oral dose of phenytoin is erroneous. It should read "Examples were a recommendation to reduce an excessive dose of intravenous phenytoin from 300 mg 3 times per day to 100 mg 3 times per day. . . ."

Omissions: In the Original Contribution entitled "Sertraline in Children and Adolescents With Obsessive-Compulsive Disorder: A Multicenter Randomized Controlled Trial" published in the November 25, 1998, issue of THE JOURNAL (1998; 280:1752-1756), Hans Steiner, MD, of the Department of Psychiatry, Stanford University, Stanford, Calif, was omitted from the list of authors. Additionally, on page 1754, at the end of the second paragraph under the heading "Sample Characteristics," the following sentences were omitted: "The mean CY-BOCS score at baseline was 23.4 for patients randomized to sertraline and 22.2 for patients randomized to placebo. The mean NIMH GOCs score at baseline was 9.2 for patients randomized to sertraline and 9.1 for patients randomized to placebo. The mean CGI-5 score was 4.7 for patients randomized to sertraline and 4.6 for patients randomized to placebo."