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ISMP

Nurse AdviseERR®

Educating the Healthcare Community About Safe Medication Practices

Part 1: Results of Survey on Pediatric Medication Safety

More is needed to protect hospitalized children from medication errors

As many as 1 in 10 hospitalized children are impacted by a medication error.[1,2] Up to 35% of these errors are serious or life threatening.[3] The challenge is to learn from these events and to adopt effective strategies to prevent harmful errors from happening again. Based on the results of a recent ISMP survey, it appears we still have a long way to go to meet that challenge. The survey results make it clear that more needs to be done to protect pediatric patients from harmful medication errors.

During March and April 2015, 1,463 clinicians, mostly pharmacists (45%) and nurses (43%), completed our online ***Survey on Pediatric Medication Safety Practices***. Respondents were asked to select the frequency with which they employed key error-prevention strategies. Most respondents worked in pediatric hospitals (43%) or general hospitals where pediatric patients are treated (41%). In **Part 1** of our analysis of the survey, we discuss the aggregate findings from all respondents and also compare the 2015 results to a similar survey we conducted 15 years ago. In **Part 2**, to be published in a subsequent issue, we will compare subsets of data based on the respondents' care setting, practice site, patient care unit, and professional designation.

Aggregate Findings from 2015 Survey

General strategies. The survey included five general error-prevention strategies involving all phases of the medication use process (**Table 1**, on page 4). With four of the strategies, 90% or more of the respondents reported implementation at least 90% of the time. Three of these strategies included using metric units of measure to: 1) express the volume of liquid medications; 2) weigh patients; and 3) document the weight on medical records and prescriptions. The fourth strategy was to standardize and limit the concentrations and dosage strengths of pediatric high-alert medications.

The fifth strategy, and the one that scored lowest in this section, involved storing adult, pediatric, and neonatal medications in separate storage locations. Only about half of the respondents reported full compliance with this strategy. Five percent of respondents said that adult, pediatric, and neonatal medications were never separated or sequestered at their practice sites, and another 5% reported employing this precaution less than 20% of the time, leaving clinicians particularly vulnerable to product selection errors.

Strategies when prescribing medications. The survey included six error-prevention strategies associated with prescribing pediatric medications (**Table 1**, on page 4). A large number of respondents (85%) reported that, at least 90% of the time, their organizations require: 1) the use of metric doses when ordering pediatric liquid medications; and 2) the entry/verification of the patient's weight in the computerized prescriber order entry (CPOE) system *before* entering medication orders. The remaining respondents reported implementation of these practices less consistently, which could lead to serious dosing errors.

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SAFETY wires

Is it calcium gluconate, sterile water, or 0.9% sodium chloride? We want to sound a cautionary note about a potential drug selection error now that calcium gluconate 1 g/10 mL from Fresenius Kabi is available in plastic vials instead of the previous glass vials. Although the label appearance has not changed, the product now appears similar to 10 mL sterile water for injection vials from Hospira. Each vial is about the same size, with a similar cap color (**Figure 1**).

Figure 1. Photo shows similarity of sterile water (left) and calcium gluconate (right) vials.

Recently, we received a report regarding similarities between the Fresenius Kabi's 10 mL vials of calcium gluconate and the company's own 0.9% sodium chloride injection vials (**Figure 2**). However, the sodium chloride vials have a pink cap, helping to dif-

Figure 2. Photo shows similarity of sterile water (left), calcium gluconate (middle), and 0.9% sodium chloride (right) vials.

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Baxter

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BD

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Dose range checking software was always available and enabled to provide alerts to prescribers about unsafe doses in only 61% of the respondents' CPOE systems; 7% reported that dose range checking was never available and/or enabled with their CPOE systems. For the remaining 32% of respondents, the dose checking capabilities appear to be inconsistent. Two other prescribing strategies involved parenteral nutrition (PN) or other complex electrolyte solutions. On units where these products were prescribed, only 64% of respondents reported that prescribers always ordered each ingredient as weight/kg/day for younger children, and 53% reported that prescribers always ordered each ingredient per day for older children. Using variable units of measure and ways of expressing doses when prescribing PN or electrolyte ingredients could be a source of serious errors.

Surprisingly, the lowest scoring error-prevention strategy requires minimal prescriber effort and is one that ISMP has long endorsed: including the mg/kg, mg/m^2, or other basis for the dose and the calculated amount per dose with pediatric drug orders. In the survey, we allowed exceptions for drugs that do not lend themselves to weight-based dosing. Despite this, only 37% of respondents reported full compliance with the strategy. Another 27% reported implementation of the strategy for 90-99% of applicable orders. The remaining 36% of respondents reported inconsistent practices, making it difficult for pharmacists and nurses to verify the patient's dose and detect a prescribing error.

Strategies when dispensing medications. The survey included fourteen error-prevention strategies encompassing the dispensing process (**Table 1**, on page 4). It is within this category that both the highest and lowest scoring error-prevention strategies were found. For half of the strategies, at least 87% of respondents reported that they always (>99%) or almost always (90-99%): 1) use automated compounding devices to prepare PN/complex electrolyte solutions; 2) enter PN/electrolyte solution orders into the pharmacy system and compounding software exactly as each ingredient is prescribed without needing unit conversions; 3) enter/verify the patient's weight in the pharmacy computer system before entering medication orders; 4) verify the mg/kg or mg/m^2 dose (or other basis for the dose) before preparing the medication; 5) recalculate the patient's dose before dispensing medications; and 6) dispense patient-specific doses of liquid oral/enteral medications in cups or oral syringes. Yet, full compliance with these strategies ranged between 63-77%, leaving serious gaps in practice and room for improvement even with the highest scoring dispensing strategies.

For the two lowest scoring strategies, less than one-quarter of respondents reported full compliance. These low-scoring strategies were associated with having a clinical pharmacist present on patient care units, and having pharmacists who prepare parenteral solutions spend time in neonatal and pediatric units to observe prescribing and administration procedures. About one-quarter of respondents told us that these two strategies are never implemented in their practice areas. Pharmacists who spend time in clinical areas may have a better understanding of how physicians and nurses prescribe and administer medications, and may subsequently dispense medications in a ready-to-administer form, reducing manipulation of the drug on the unit and the risk of contamination or an error.

For the next two lowest scoring strategies, only about half of respondents reported implementation at least 90% of the time, and only 40-41% reported full compliance. These strategies included: 1) requiring a pharmacist to verify components of pediatric and neonatal compounded sterile preparations prior to adding them to an admixture (syringe pull-back method is not acceptable); and 2) verification of the ingredients using barcode scanning during preparation of intravenous (IV) and oral liquid doses. Deficiencies in these pharmacy practices make it nearly impossible to detect

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ferentiate it, at least until the cap is removed. All three vials are well labeled, and no errors have been reported. But overall appearance sometimes plays a role in medication errors, especially when a clinician fails to read the full label of a partially turned vial (**Figure 3**) when returning an unused item to stock or retrieving it from a labeled storage bin. A

Figure 3. Photo shows similarity of sterile water and calcium gluconate vials when partially turned away from the front labels.

mix-up in the pharmacy or on the nursing unit could lead to an adverse outcome. We would normally advise purchasing another manufacturer's product for one product or the other, but that may not help given the persistent calcium gluconate shortage situation. Barcode scanning, increasing awareness of the risk, and storing these products far apart can help prevent errors. Fresenius Kabi is aware of the reports and has informed us of its plans to make changes to reduce vial similarities.

Control new ropivacaine minibags. In January, Fresenius Kabi launched ropivacaine (**NAROPIN**) 0.2% in 100 and 200 mL premixed *freeflex* bags (**Figure 1**, on page 3). The new dosage form is for patients requiring continuous epidural infusions or local infiltration. The drug is also available in vials and plastic ampuls, and has also been available in 100 and 200 mL glass bottles. However, since ropivacaine should never be given intravenously (IV) because of the risk of severe adverse cardiac effects, we want to caution hospitals that purchase the new *freeflex* bag product about its similarity to minibags holding medications intended for IV infusion. The label includes a statement about its infiltration and epidural use, and the product will also have an overwrap with a message about its intended use. A sticker will be included in the packaging to affix to the bag. There is a

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a drug preparation and selection error because the applied label may still list the correct prescribed ingredient(s). Numerous harmful and fatal pediatric events have been reported to ISMP over the years, each with similar practice deficiencies.

Similar to dose range checking capabilities with CPOE systems, only 57% of respondents said their pharmacy system consistently provided alerts about potentially incorrect doses; 7% reported that dose range checking was never available and/or enabled with their pharmacy systems. It is also concerning that all pharmacists/technicians who prepare pediatric parenteral solutions have not undergone specialized training and demonstrated competencies. Surprisingly, 10% of respondents reported that such training and competency validation never occurs, and another 6% indicated that it rarely takes place.

Strategies when administering medications. The survey included eight error-prevention strategies associated with the drug administration process (**Table 1**, on page 4). For most of these strategies, more than 86% of respondents reported implementation at least 90% of the time. These strategies included: 1) calculating patient-specific doses of emergency drugs and common medications, and making them available for reference for each patient during hospitalization; 2) providing nursing units with oral syringes that do not connect to IV tubing; 3) using a smart infusion pump with an activated library to administer pediatric parenteral solutions that contain (or are) high-alert medications; 4) requiring an independent double check before administering parenteral high-alert medications; 5) using bedside barcode scanning systems for medication administration; and 6) requiring nurses to undergo specialized training and demonstrate competency associated with pediatric medication administration.

Only 3% of respondents do not use smart pumps in any locations across all care areas for all high-alert medications. However, 35% reported partial compliance, perhaps suggesting that smart pumps are not used in all locations or that the drug library is not activated, diminishing the safety benefits of this technology. Independent double checks prior to administration of high-alert medications occurred consistently in only 65% of respondents' practice sites, making this an unreliable strategy in the remaining 35% of respondents' practice sites. Eleven percent of respondents have not implemented bedside barcode scanning with pediatric drug administration.

The relatively simple strategy of tracing the line from the medication/solution source to the patient (or vice versa) to verify line attachment before IV drug administration only garnered full compliance by about half of the respondents, leaving patients at the remaining half of respondents' practice sites exposed to the risk of life-threatening wrong route/wrong site errors and other types of errors. The lowest scoring strategy included the use of barcode scanning at the bedside to verify breast milk before each feeding. Despite the complexity associated with implementing this practice, almost half of all respondents (46%) for whom the strategy was applicable reported full compliance with this technology, and another 14% reported compliance 90-99% of the time.

Comparison Between 2000 and 2015 Survey Findings

In 2000, in cooperation with the Pediatric Pharmacy Advocacy Group (PPAG), ISMP distributed a survey to newsletter subscribers about pediatric medication safety practices. Nine of the 33 current strategies are the same as in the 2000 survey and can be compared to the 2015 survey (**Table 2**, on page 5). The 2000 survey data are available in aggregate as well as by setting. Thus, we have compared the findings from the 2015 survey using the same setting categories, although **Part 2** will cover these findings in more detail. For comparison, the 2015 categories of *Almost Always* and *Often* were combined to represent the 2000 category of *Frequently*, and the

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port on the new bag that allows medications to be added to the ropivacaine, such as fentaNYL or morphine. If this is done, relabeling must be ensured. If the new *freeflex* bags are purchased, we highly recommend pharmacy oversight and distribution. For added safety, the bags should be dispensed with a special **EPIDURAL OR INFILTRATION USE** auxiliary label along with suitable warnings about the proper route of administration. Hospitals may also find it helpful to have pharmacy provide epidural tubing with the product when dispensing it. Hopefully, we will soon begin to see all premixed products for epidural or infiltration use in bags with special connectors that won't allow attachment to an IV administration set.

Figure 1. New premixed bags of epidural Naropin can look similar to minibags holding IV medications.

Avoid mix-ups between hydroxyprogesterone and medroxyprogesterone. A medication error was reported to ISMP that involved confusion between hydroxyprogesterone caproate injection (**MAKENA**) and medroxyprogesterone acetate injectable suspension (**DEPO-PROVERA**). Makena is used to prevent preterm labor and is often given as an intramuscular (IM) injection of 250 mg. Depo-Provera is a contraceptive with a dose of 150 mg also given IM. It should never be given to pregnant women (currently pregnancy category X). A 400 mg/mL preparation of Depo-Provera is also available for use as adjunctive therapy and palliative treatment of inoperable, recurrent, and metastatic renal or endometrial carcinoma. Given that both medications are commonly used in obstetrics and gynecology patients, there is a

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> Pediatric survey

Table 1. Frequencies of Implementing Pediatric Medication Error-Prevention Strategies (N=1,463)

Pediatric Medication Error-Prevention Strategies	Always	Almost Always	Often	Some-times	Rarely	Never
	>99%	90-99%	50-89%	20-49%	1-19%	<1%
General Strategies						
Metric units of measure are standard nomenclature for pediatric weights documented on medical records and prescriptions.	88	8	2	1	<1	1
The volume of liquid pediatric medication doses is expressed using metric units.	81	14	4	1	<1	<1
Pediatric patients are weighed using metric units of measure.	80	13	3	2	1	1
Concentrations/strengths of high-alert drugs are standardized and limited.	65	25	8	1	1	<1
Adult, pediatric, and neonatal medications are not stored near one another.	54	20	10	6	5	5
Strategies When Prescribing Medications						
Patient's weight in kg or g is entered in the computerized prescriber order entry (CPOE) system before orders are entered.	59	29	8	3	<1	1
Prescribers order pediatric liquid medications in metric doses.	51	34	10	4	1	<1
Prescribers order each ingredient of PN/complex electrolyte solutions as weight/kg/day for younger children.	64	18	7	3	3	5
Dose range checking software is available and enabled in the CPOE system.	61	21	7	3	1	7
Prescribers order the total amount of each ingredient of PN/complex electrolyte solutions per day for older children.	53	21	8	4	4	10
Prescribers include both the mg/kg or mg/m^2 dose (or other basis for the dose) and the calculated amount per dose for pediatric drug orders.	37	27	21	8	6	1
Strategies When Dispensing Medications						
Automated compounding devices are used to prepare PN/complex electrolyte solutions (or solutions are outsourced).	77	13	4	1	1	4
PN/complex electrolyte solutions are entered into compounding software exactly as each ingredient is prescribed (no unit conversions).	72	20	5	1	1	1
PN/complex electrolyte solutions are entered into the pharmacy computer exactly as each ingredient is prescribed (no unit conversions).	68	20	7	1	1	3
The pharmacy dispenses patient-specific doses of liquid oral/enteral medications in cups or specially designed oral/enteral syringes.	72	15	6	2	2	3
The patient's weight in kg or g is entered/verified in the pharmacy computer before entering/verifying medication orders.	65	25	7	1	1	1
Pharmacists verify the mg/kg or mg/m^2 dose used (or other basis for the dose) to calculate the final dose of a drug before preparing/dispensing medications.	64	24	5	3	2	2
Pharmacists recalculate the dose before preparing/dispensing medications.	63	27	5	3	1	1
Dose range checking software is available and enabled in the pharmacy computer.	57	22	8	3	3	7
The pediatric patient's age is available in the pharmacy computer before entering/verifying medication orders.	50	25	10	6	5	4
Pharmacists/technicians who prepare pediatric parenteral solutions have undergone specialized training and have demonstrated competency.	47	20	9	8	6	10
Preparation of IV/oral liquid doses includes barcode verification of ingredients.	41	15	7	5	5	27
Pharmacists verify components of pediatric/neonatal sterile preparations prior to adding to the solution (syringe pull-back method afterwards not acceptable).	40	14	8	7	14	17
A clinical pharmacist is present on patient care units to participate in rounds and provide input when prescribing/administering medications.	23	23	15	10	9	20
Pharmacists who prepare pediatric parenteral solutions spend time in the neonatal/pediatric units to observe prescribing and administration.	20	11	13	10	20	26
Strategies When Administering Medications						
Oral syringes that do not connect to IV tubing are available in patient care units.	81	12	2	2	1	2
Doses for emergency drugs and common medications have been calculated for each pediatric patient and are available for reference.	72	16	4	3	1	4
Nurses who administer medications to pediatric patients have undergone specialized training and have demonstrated competency.	67	21	6	3	2	1
Before administering high-alert parenteral drugs, a second nurse independently verifies the patient, drug, dose, line attachment, pump settings, and infusion rate.	65	24	6	3	1	1
Bedside barcode scanning is used to verify patients and medications/solutions before administration.	63	23	2	1	<1	11
A smart infusion pump with an activated drug library is used to administer pediatric parenteral solutions that contain (or are) high-alert medications.	62	26	6	2	1	3
Before administration of pediatric infusions, nurses trace the line from the medication/solution to the patient (or vice versa) to verify attachment.	54	32	11	2	1	<1
Bedside barcode scanning is used to verify patients and breast milk before each feeding.	46	14	3	2	1	34

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2015 categories of *Sometimes* and *Rarely* were combined to represent the 2000 category of *Sometimes*. The categories of *Always* and *Never* remained unchanged.

When comparing the survey findings, we found that three of the strategies showed marked improvement, three of the strategies showed modest gains, and three of the strategies actually worsened in compliance over time (**Table 2**).

The strategies that showed marked improvement included: 1) listing the mg/kg or mg/m^2 dose (or other basis for the dose) and the calculated dose with pediatric drug orders; 2) requiring an independent double check before administering parenteral high-alert medications; and 3) having a clinical pharmacist present in clinical areas. In 2000, only 4% of respondents reported full compliance with including the mg/kg or mg/m^2 dose (or other basis for the dose) and the calculated dose with pediatric drug orders; another 21% reported that the strategy was implemented frequently. In 2015, 37% reported full compliance, and another 48% reported frequent implemen-

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Table 2. Comparison of 2000 and 2015 Survey Results on Pediatric Medication Safety Practices

Pediatric Medication Error-Prevention Strategies	Rating (%)	2000 Survey*					2015 Survey*				
		ALL	GPU	NUR	PICU	NICU	ALL	GPU	NUR	PICU	NICU
Marked Improvements Between 2000 and 2015											
Prescribers include both the mg/kg or mg/m^2 basis for the dose and the calculated amount per dose for all pediatric drug orders.	Always	4	1	6	5	8	37	31	47	28	52
	Frequently	21	18	24	23	25	48	53	41	52	39
	Sometimes	51	53	50	46	50	14	15	6	19	10
	Never	24	28	21	26	17	1	1	6	1	0
Before high-alert parenteral medications are administered to pediatric patients, a second nurse independently verifies the patient, drug, dose, line attachment, pump settings, and infusion rate.	Always	30	21	40	32	43	65	63	91	61	68
	Frequently	17	21	10	18	13	30	32	9	37	26
	Sometimes	29	34	27	24	23	4	4	0	2	5
	Never	24	25	23	26	21	1	<1	0	1	0
A clinical pharmacist is present on the patient care unit to participate in daily rounds and provide input into the selection and administration of medications.	Always	18	14	3	24	31	23	15	10	34	30
	Frequently	22	18	12	39	26	38	40	16	49	43
	Sometimes	12	13	3	24	7	19	21	26	14	13
	Never	48	55	82	13	36	20	24	48	3	15
Modest Improvements Between 2000 and 2015											
The pediatric patient's weight is available in the pharmacy computer system before medication orders are entered and drugs are dispensed.	Always	54	45	71	68	59	65	64	95	63	63
	Frequently	34	42	21	32	26	32	34	5	36	35
	Sometimes	8	9	6	0	9	2	2	0	1	1
	Never	4	4	3	0	7	1	0	0	0	1
Pharmacists verify the mg/kg or mg/m^2 dose used to calculate the final dose of a drug before preparing and dispensing pediatric medications.	Always	54	47	58	67	63	64	66	71	67	65
	Frequently	31	37	27	28	23	29	29	18	28	27
	Sometimes	9	10	9	3	7	5	4	11	4	4
	Never	6	6	6	3	7	2	2	0	2	4
Pharmacists recalculate the pediatric patient's actual dose before preparing and dispensing medications.	Always	50	45	50	51	60	63	62	77	64	65
	Frequently	32	36	31	28	26	32	34	16	36	33
	Sometimes	14	16	9	18	10	4	2	7	1	3
	Never	4	3	9	3	4	1	1	0	0	0
Worsening Compliance Between 2000 and 2015											
The pediatric patient's age is entered or verified in the pharmacy computer system before medication orders are entered and verified.	Always	85	80	91	95	87	50	52	82	43	45
	Frequently	12	17	6	5	7	35	34	12	39	40
	Sometimes	2	2	3	0	0	11	14	4	13	9
	Never	1	0	0	0	6	4	1	2	5	5
Pharmacists/technicians who prepare pediatric parenteral solutions have undergone specialized training and have demonstrated competency.	Always	55	51	47	59	67	47	47	51	43	44
	Frequently	24	22	28	31	23	29	28	31	37	33
	Sometimes	9	12	16	3	1	14	12	11	14	12
	Never	12	15	9	8	9	10	13	7	6	11
Nurses who administer medications to pediatric patients have undergone specialized training and have demonstrated competency.	Always	76	66	82	89	88	67	65	87	73	80
	Frequently	18	23	18	11	11	27	30	13	26	18
	Sometimes	5	9	0	0	0	5	3	0	1	2
	Never	1	2	0	0	1	1	2	0	1	1

**Key: GPU=general pediatric unit; NUR-level 1 and 2 nurseries; PICU=pediatric intensive care unit (level 3 and 4 nurseries); NICU=neonatal intensive care unit*

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strong possibility of confusing these medications with one another due to their look- and sound-alike names, and similar dosages and routes of administration.

One way to prevent errors between these products would be to use the brand name Makena, the only US Food and Drug Administration (FDA)-approved hydroxyprogesterone product, when prescribing the drug. Although medroxyprogesterone is available generically, it might be ordered by the brand name, too, with the pharmacist substituting a generic product as appropriate. In the hospital where this error happened, the staff have adjusted their computerized prescriber order entry (CPOE) screens to reflect the indication for each drug to guide prescribers to the appropriate agent depending on patient circumstances. It's important to be sure that relevant hospital staff are aware of this potential mix-up.

Outside of baclofen syringe is not sterile. Baclofen injection is used to treat severe spasticity associated with multiple sclerosis, cerebral palsy, and spinal cord injuries. It is administered by the intrathecal route via an implantable pump such as the Medtronic SynchroMed II Programmable Pump or other pumps for intrathecal administration of baclofen. A patient was prepped for an intrathecal pump insertion using **GABLOFEN** (baclofen injection) in a prefilled syringe. The sterile field was established, a Gablofen package with a prefilled baclofen syringe was obtained, and the circulating nurse opened the package onto the sterile field, believing it was sterile.

Actually, it is not sterile, although the carton of baclofen and the peel-off label on the inner package are labeled "sterile solution for intrathecal use only" (**Figure 1**, on page 6). It is sealed as if the contents of the package are sterile. Looking at the label and the way the syringe is packaged, many would think the inside contents (syringe holding the drug) were sterile too. But the syringe is supposed to be used as a refill kit to inject baclofen through the skin into a port on the pump, and the risk of contamination due to a nonsterile external surface of the syringe is noted in the package insert.

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tation. In 2000, 30% of respondents reported full compliance with an independent double check prior to administering high-alert parenteral medications, and another 17% reported frequent implementation. In 2015, 65% reported full compliance, and another 30% reported frequent implementation. Having a clinical pharmacist present on the unit always or frequently increased from 40% in 2000 to 61% in 2015, with the most significant gains in general pediatric units (23 percentage points), PICUs (20 percentage points), and NICUs (16 percentage points).

The three strategies with modest gains included: 1) entering/verifying the patient's weight in the pharmacy system before preparing and dispensing medications; 2) verifying the mg/kg or mg/m^2 dose (or other basis for the dose); and 3) recalculating the patient's actual dose before preparing and dispensing pediatric medications (**Table 2**, on page 5).

The three strategies that worsened in compliance included: 1) verifying the patient's age in the pharmacy computer system before entering medication orders; 2) requiring pharmacists/technicians who prepare pediatric parenteral solutions to undergo specialized training and competency validation; and 3) requiring nurses to undergo specialized training and competency validation (**Table 2**, on page 5).

Full compliance with confirming that the patient's age is in the pharmacy system before entering orders decreased from 85% in 2000 to 50% in 2015 in the aggregate data, with the smallest decrease in nurseries (91% to 82%), and the greatest decrease in PICUs (95% to 43%). The decreases in full compliance related to specialized training and demonstrated competency for pharmacists/technicians who prepare and dispense pediatric parenteral solutions, and nurses who administer medications to pediatric patients, are less dramatic but still significant. There was an average decrease of 10 percentage points, with one exception: respondents who provided services for NICU reported a decrease of 23 percentage points in full compliance with pharmacists'/technicians' training and competency verification between 2000 and 2015.

Conclusion

While compliance with several safety practices is high, and some improvements can be noted between 2000 and 2015, further efforts are needed to implement safety strategies in pediatric settings since pediatric patients are at risk of harm from errors because of their size, immature renal and hepatic function, and an inability to communicate signs of the adverse effects of drugs. Look for **Part 2** of the survey analysis in an upcoming issue for additional insight into differences in recommended practices between settings and among various professional disciplines.

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Although the drug solution and pathway in the Gablofen prefilled syringes are sterile, the external surface of syringes in all

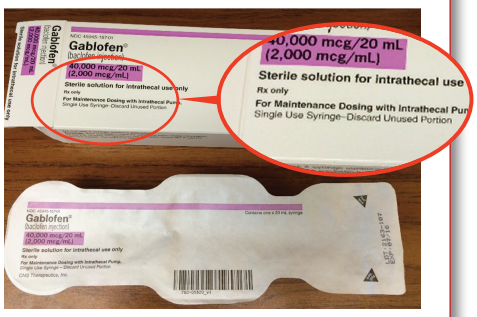

Figure 1. The carton and inside tray state "sterile solution," which led an OR nurse to believe the syringe could be placed in the sterile field.

strengths is nonsterile. The label states the use of a Gablofen prefilled syringe in an aseptic setting (e.g., operating room [OR]) to fill sterile intrathecal pumps prior to implantation is not recommended, unless the external surface of the prefilled syringe is treated to ensure sterility. Gablofen in vials may be used with conventional aseptic technique to fill intrathecal pumps prior to implantation. If the prefilled syringe must be used, the package must be opened and the medication from the syringe dispensed into a properly labeled receptacle on the sterile field.

The error above was caught by a surgeon who came to review the back table in the OR. Surgical staff had previously been told that the syringe was not sterile, but the circulating nurse in the room did not usually work with pump implant cases and was not aware of the issue. As a result, the sterile field was compromised, and all new supplies had to be opened, including a pump. The manufacturer, Mallinckrodt, is working to update the labeling and packaging of the prefilled syringes. The company has also alerted customers that the syringes are not sterile and referred them to a video describing proper technique when handling the syringe (http://is.gd/UhVrfx).

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Editors: Ann Shastay, MSN, RN, AOCN; Judy Smetzer, BSN, RN, FISMP; Michael Cohen, RPh, MS, ScD (hon), DPS (hon); Russell Jenkins, MD. ISMP, 200 Lakeside Drive, Suite 200, Horsham, PA 19044. Email: ismpinfo@ismp.org; Tel: 215-947-7797; Fax: 215-914-1492.