

PHARMACY  
CHAMPIONS  
FOR CHANGE:

**Wrong Medication,  
Bad Chemistry**



ROOTS

# INTRODUCTION

The pages that follow describe how our Pharmacy Agents for Change used medication reconciliation — discrete review of a patient’s complete medication regimen during a transition to a new care setting (e.g., hospital admission) — to boost patient health and reduce patient harm due to medication mistakes. But in the words of one of our clinical team leaders, “Medication reconciliation makes sure that the drugs are consistent during transfer from one venue to another, but a comprehensive medication review looks at everything the patient is taking.” Such comprehensive medication management done systematically — *medication integration* — is essential to high quality: the right medication, including appropriate use of generics, or combinations of medications, in the right dosages, administered at the right time, and coordinated across all care settings.

Medications have been integral to the healing arts for millennia. Recipes for herbal remedies survive on 6,000-year-old Sumerian cuneiform clay tablets,<sup>1</sup> although medicinal practice is thought to extend to the dawn of man. Today’s pharmaceutical arsenal contains genuine wonder drugs that, taken properly, can curtail illness, prolong life and improve its quality.

However, the flip side to the modern pharmaceutical miracle includes medication errors, incompatibilities, adverse side effects and patient harm. In fact, every year in the United States, medication-related problems result in 200,000 deaths and cost some \$200 billion.<sup>2</sup> The elderly, and others with multiple chronic conditions requiring multiple medications, suffer the most. One-third of hospital admissions among the elderly, and a significant number of readmissions, are medication-related.

<sup>1</sup> J. K. Borchardt, “The beginnings of drug therapy: ancient mesopotamian medicine,” *Drug News & Perspectives* 15, no. 3 (2002): 187–192.

<sup>2</sup> M. Zagaria, “Polypharmacy and potentially inappropriate medication in the elderly across the practice-setting spectrum,” *U.S. Pharmacist* 10 (2006): 112–116.

Polypharmacy, the administration of multiple medications, is a key contributor to medication-related problems. People who suffer from diabetes, high blood pressure and congestive heart failure are especially subject to complications of polypharmacy. Complex and improperly managed drug regimens contribute to delirium, falls and generalized impairment.<sup>3</sup> For HIV/AIDS patients, missing just one dose of medication can reduce the effectiveness of whole classes of drugs.

Such complications are not unexpected in a system in which medication use is complex, multidisciplinary and largely manual,<sup>4</sup> and care is delivered in a fragmented way with insufficient communication among disparate caregivers.

Admission and discharge are particularly vulnerable times, when nearly half of all medication errors occur.<sup>5</sup> Yet outright prescribing errors are only part of the problem. Patients are often admitted to the hospital without thorough review of their current medications and supplements. While hospitalized, patients may be prescribed a host of new medications that they are expected to manage after discharge, yet they are unlikely to consult with a hospital pharmacist who could explain and demystify the new regimen. In the confusion surrounding hospital discharge, patients with complicated medications may not receive or understand all the information. Sometimes patients receive duplicate or conflicting prescriptions from multiple physicians. Sometimes patients don't realize that new prescriptions are supposed to replace those they already are taking. One study of newly discharged patients showed that 35% were hoarding previously prescribed medications, and 21% had reduced a medication to minimize costs.<sup>6</sup>

The confusion has a price: adverse drug reactions and hospital readmissions. If there's any good news, it's that half of the illness, disability and premature death caused by medication-related problems is preventable.<sup>7</sup>

3 M. J. Krauss, B. Evanoff, E. Hitcho et al., "A case-control study of patient, medication, and care-related risk factors for inpatient falls," *Journal of General Internal Medicine* 20, no. 2, February (2005).

4 J. D. Rozich, C. R. Haraden, R. K. Resar, "Adverse drug event trigger tool: a practical methodology for measuring medication-related harm," *Quality and Safety in Health Care* (2003), <http://qhc.bmj.com>. Accessed April 15, 2009.

5 P. Pronovost, B. Weast, M. Schwarz et al., "Medication reconciliation: a practical tool to reduce the risk of medication errors," *Journal of Critical Care* 18, no. 4, December (2003): 201–205.

6 S. Stewart, S. Pearson, "Uncovering a multitude of sins: medication management in the home post acute hospitalization among the chronically ill," *IMJ* 29, no. 2 (2003): 220–227, published online March 25, 2008.

7 *Ibid.*, Zagaria.

## JHF sponsors early pharmacy study

The Jewish Healthcare Foundation (JHF) and University of Pittsburgh recognized the opportunity for improvement back in 1999. The study, “Pharmacist involvement in a multidisciplinary inpatient medication education program,”<sup>8</sup> confirmed that patients with multiple medical conditions could benefit from the intervention of hospital pharmacists and nurses.

Conducted by researchers at the University of Pittsburgh Center for Research on Health Care, the study concluded that patients often were able to take fewer medications when pharmacists reviewed their prescriptions and that dosing regimens often could be streamlined to achieve better outcomes. Acting as educators, nurses played an important role in assessing patients’ understanding of their complex regimens. Such enhancements to care also resulted in cost reductions.

## Joint Commission safety goal reveals system problems

In 2005, six years after this pioneering study, the Joint Commission spurred examination of medication safety across the nation by creating a list of National Patient Safety Goals (NPSG). On that list was Goal 8:

“Accurately and completely reconcile medications across the continuum of care.”<sup>9</sup>

The sub-goals specifically asked hospitals to use only necessary medications; to compare a patient’s current and newly ordered medications; to provide a reconciled medication list to the patient; and to communicate all medications to the next provider.

Few could argue that Goal 8 and its sub-goals were anything but laudable and necessary. Few could argue that medications should not be reconciled correctly every step of the way, 100% of the time. Nobody wants themselves or their loved ones to be in that segment of the patient population that is released from the hospital with a conflicting medication list or with little idea how to follow the regimen.

And yet, four years later, few hospitals have come close to implementing medication reconciliation.

A 2006 survey of practitioners conducted by the Institute of Safe Medication Practices (ISMP) revealed that while 82% of respondents believed that medication reconciliation (“med rec”) is of great value to patient safety, a quarter of survey comments showed a high level of frustration with process implementation.<sup>10</sup> To their shock, healthcare

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8 In 1999, physicians Wishwa Kapoor and Mark Roberts of the University of Pittsburgh Center for Research on Health Care completed a study entitled “Pharmacist involvement in a multidisciplinary inpatient medication education program,” with partial funding from the Jewish Healthcare Foundation.

9 United States, The Joint Commission, “Chapter: National Patient Safety Goals (NPSG), Program: Hospital,” Standards Improvement Initiative (SII), Chapter Outline 2008, 1 Apr. 2009 <[http://www.jointcommission.org/NR/rdonlyres/D619D05C-A682-47CB-874A-8DE16D21CE24/0/HAP\\_NPSG\\_Outline.pdf](http://www.jointcommission.org/NR/rdonlyres/D619D05C-A682-47CB-874A-8DE16D21CE24/0/HAP_NPSG_Outline.pdf)>.

10 Institute for Safe Medication Practices, “Practitioners agree on medication reconciliation value, but frustrations and difficulties abound,” Institute for Safe Medication Practices Medication Safety Alert! 11 (2006): 14.

institutions discovered that “there are no plug-and-play models for medication reconciliation; therefore, each hospital must design and implement an individualized approach to medication reconciliation and measure its effectiveness.”<sup>11</sup>

The medication reconciliation requirement has proven so difficult, in fact, that the Joint Commission has backed down. In an unprecedented statement issued March 11, 2009, the commission said that, “given the difficulties that many organizations are having in meeting the complex requirements of Goal 8, the Accreditation Committee agreed that the Joint Commission should evaluate and refine the expectations for accredited organizations. While this evaluation is being conducted, survey findings from NPSG 8 will not be factored into the organization’s accreditation decision.”<sup>12</sup>

### **Guidelines tell “what” to do; Perfecting Patient Care<sup>SM</sup> shows “how”**

As with most national guidelines, the NPSG provides a plethora of unarguably good ideas, but without instructions on how they might be implemented. Turning guidelines into practice requires processes and systems. Healthcare institutions that have learned rapid-cycle improvement processes like Toyota/Lean-based Perfecting Patient Care<sup>SM</sup> (PPC) are at an advantage because they increase their chances of incorporating new ideas into the way work is done, usually without adding cost or complexity.

Through Perfecting Patient Care<sup>SM</sup> University, healthcare organizations learn how to eliminate errors, inefficiency and waste in their complex systems through continuous improvement and standardization of work practices. The PPC approach empowers people at every level of an organization to improve and redesign their own work to fulfill a common mission. Nurses, physicians, lab technicians and health librarians from across the country have attended PPC University. The results are satisfied customers and patients, satisfied and engaged staff, and an organization that can adjust to a constantly changing environment with a constancy of purpose.

PPC helps workers at the front line design work processes in a way that reveals problems rather than hiding them, and tackle problems immediately through root-cause analysis and rapid-cycle experimentation. The approach yields continual improvements in care, reduction in waste and errors, and lower costs.

For the past eight years, the Pittsburgh Regional Health Initiative (PRHI) has offered a curriculum for teaching PPC principles through an open university and customized sessions designed to help frontline workers improve their work, with full support and

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<sup>11</sup> K. K. Thompson, PharmD. “Medication Reconciliation: Challenges and Opportunities,” *American Journal of Health-Syst. Pharm.* 64, September 15 (2007).

<sup>12</sup> “Medication reconciliation National Patient Safety Goal to be reviewed, refined,” [http://www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals/npsg8\\_review.html](http://www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals/npsg8_review.html). Accessed April 1, 2009.

engagement of leadership. The curriculum, developed and taught by PRHI staff, puts southwestern Pennsylvania on the map as an intellectual center for the healthcare quality engineering movement.

In other words, goals like medication reconciliation provide the *what*; PPC provides the *how*.

### **Pharmacy Agents for Change Fellowship builds on a community model**

Nine pharmacists from seven hospitals throughout the region conducted year-long demonstrations to show how expanding the role of clinical pharmacists in medication management and administration can improve safety and quality of care for patients and reduce cost. The work was conducted through PRHI with grants from the JHF's Pharmacy Agents for Change (PAFC) Fellowship. Through the fellowship, the pharmacists began to transform their current roles into those of patient educators, therapeutic consultants and multi-medication managers.

With their deep understanding of the way medications work, pharmacists can be invaluable to the clinicians who actually administer them. Having pharmacists round with physicians is becoming a standard practice. As the following essays demonstrate, pharmacists also have a role to play, from admission – assessing patients' fall risk – through discharge – making sure they understand their medications when they go home.

Host institutions received a \$15,000 grant to support the demonstrations and training. Fellowship participants received training in work redesign and process improvement through PRHI's PPC University, which trains participants to use Toyota-based methods to implement change. Participants also received on-site coaching support from PRHI staff members Barbara Jennion, MEd, and Maureen Saxon-Gioia, BSN, RN.

The PAFC Fellowship builds on several important prior programs initiated by JHF, including the work of Drs. Wishwa Kapoor and Mark Roberts, and the Nurse Navigator and Physician Champion programs. The latter programs demonstrated the role of leaders in conceiving, testing and evaluating new care models, and supported individual nurses and doctors in leading dramatic improvements in several units and specialties.

The Pharmacy Agents for Change, whose projects are outlined in this edition of *RxOTs*, include:

<b>Julie Nowak</b>	The Pharmacist's Role in Integrated Medication Management	Magee-Womens Hospital of UPMC
<b>Irina Sheyko</b>	Increasing the Pharmacist's Role in Managing Medication Use through Improved Communication with Physicians	Jefferson Regional Medical Center
<b>Jamie L. Montgomery</b>	Bridging the Transition from Hospital to Home: Implementation of a Medication Discharge Program	Western Psychiatric Institute and Clinic of UPMC
<b>Lori Mezeivtch</b>	Improving the Continuity of Care through Medication Reconciliation	UPMC Pittsburgh AIDS Center for Treatment
<b>Rhonda Horton &amp; Cindy Powers</b>	Comparison of Medication Lists to Reduce Polypharmacy	Allegheny General Hospital
<b>Karen Fielding</b>	Fall Risk Assessment in Elderly Psychiatric Patients	Western Psychiatric Institute and Clinic of UPMC
<b>Eric Yarnell</b>	Implementing a Concurrent Medication Intervention Process to Decrease Hospitalized Patient Falls	The Western Pennsylvania Hospital
<b>Karen Steinmetz Pater</b>	Medication Reconciliation and Patient Empowerment at the Comprehensive Lung Center	UPMC Comprehensive Lung Center

## Reimbursement is changing

In addition to improving outcomes, the PAFC Fellowship projects were intended to shed light on the kinds of payment changes needed to optimize pharmacists' participation in patient care. As the following essays show, many problems occur in the pharmacy because of insufficient communication among physicians, pharmacists, patients and discharge planners – problems that might be alleviated if pharmacists played a greater coordinating role and were paid for doing so.

In the past, many healthcare reimbursements were not structured to support expanded roles for pharmacists. However, under Centers for Medicare and Medicaid Services (CMS) guidelines, Medicare Advantage plans must pay pharmacists for meetings with certain patients to discuss the importance of taking the proper medications at their appropriate times. CMS guidelines often precede and prompt similar changes in other insurance plans.

In 2010, expanded CMS guidelines will broaden the pharmacy consultation benefit to include a mandatory quarterly review to identified eligible members. Health plans will be required to provide access to the benefit, regardless of the number of chronic health conditions and medications a patient may have. More people will become eligible because the qualifying annual drug cost will decline from \$4,000 to \$3,000. Pharmacists will be paid to review a beneficiary's medications and make recommendations to the physician. Pharmacists will receive additional payments if they recommend a less costly therapeutic equivalent to the patient.

## Systems thinking

The following pages profile the challenges and successes of the eight pharmacy fellowships. All of the pharmacists were trained in the Toyota-based Perfecting Patient Care<sup>SM</sup> system, a method for understanding and solving problems that impede the flow of work. Each experiment yielded new information and pointed the way toward innovation.

Some of the solutions may seem blindingly simple, like accounting for every medication the patient is taking when assessing their fall risk. But too often the spirits of innovation and experimentation are casualties of the chaos of daily work and the pressure of the status quo.

The champion programs – Nurse Navigator, Physician Champion and Pharmacy Agents for Change – have been successful at reinvigorating the spirits of curiosity, investigation and systematic improvement that characterize the science of health care. Applying scientific thinking to healthcare systems leads to sustainable improvement.

The Pittsburgh Regional Health Initiative (PRHI) offers a full complement of courses teaching the tenets of Perfecting Patient Care<sup>SM</sup> (PPC), a Toyota/Lean-based method applied to health care. Pharmacy Agents for Change completed the four-day PPC University course, followed by several on-site coaching visits during the following year.

As a non-profit, community-based organization, PRHI is able to offer these courses at a reasonable cost, and is able to customize and personalize on-site courses according to the most pressing needs of each organization. Here are the course descriptions.

## PPC Open University

As the four-day course unfolds, participants begin to apply what they learn to their own, real-world examples, which they bring to class with them. The learning then has immediate context and importance, and participants leave with an idea about how to proceed. The course includes a workbook filled with exercises tied to each session.

**Day One:** The first day lays a foundation for understanding the values and philosophy of PPC. Participants learn the 14 business principles of the Toyota Production System as outlined in *The Toyota Way* by Jeffrey Liker, and discover how they have been applied in Pittsburgh hospitals, as described in *The Pittsburgh Way to Efficient Healthcare* by Naida Grunden. Instructors provide an overview of “Decoding the DNA of the Toyota Production System” by Steven Spear and teach the Rules of Work Design. Participants then apply what they have learned in a hands-on, team learning exercise developed by Alcoa.

**Day Two:** Participants complete a learning exercise developed by the Harvard Business School, designing assembly and distribution lines of a circuit board factory. They apply PPC principles and follow the Rules of Work Design learned on Day One.

**Day Three:** Participants delve more deeply into the Rules of Work Design, observing videotapes of healthcare professionals at work and then applying the rules to what they see. In teams, participants draw process maps of the work they observed and learn to develop “A3 diagrams” to identify any problems and develop solutions. Each participant also draws a process map of the specific example they brought to class.

**Day Four:** Participants conduct first-hand observations at a healthcare facility and draw process maps of current conditions. They then develop an A3 diagram from the process maps drawn on Day Three, kick-starting their own improvement opportunity upon their return to work.

### On-Site Customized PPC University

The PRHI instructional team will visit the host organization and delve into intensive pre-work and planning for a customized four-day PPC University. The goal is to provide an organization with the most useful observations and to ensure that participants are prepared to begin implementing work redesign principles immediately and continuously when they return to their daily work.

PRHI staff work with the organization to identify the most meaningful opportunities and situations to use in class discussion, and to which participants can apply their daily lessons. Often organizations with no clinical venues (such as a health insurer) seek on-site PPC training. For these organizations, PRHI arranges observations in nearby healthcare settings.

The curriculum for a customized four-day university is usually sequenced just as it is in PPC Open University, but it can be modified to suit the needs of the host institution. On-site programs also feature the same excellent workbook, readings, videos and teaching tools.

### On-site Introduction to Lean Healthcare

This introductory one-day course lays the foundation for understanding the values and principles of Lean and PPC methods.

### On-site Customized Kaizen Events

Once the key participants in an organization have a firm grasp of the Rules of Work Design, and have begun embarking on a continuous improvement cycle using A3 problem solving, further breakthroughs may result from the use of Kaizen events. These intensive, three- to five-day experiences are carefully designed ahead of time to tackle a single, large, complex or particularly vexing problem that spreads across multiple disciplines and departments.

# THE PHARMACIST'S ROLE IN INTEGRATED MEDICATION MANAGEMENT

**Julie Nowak, RPh, CGP**  
**Magee-Womens Hospital of UPMC**

Mrs. J., an elderly woman who has Parkinson's disease, could not move well in the early mornings, and even had episodes where her body "froze," making movement impossible. It required at least two people to get Mrs. J. out of bed, bathed, dressed, fed and taking her first dose of medication on time at 9 a.m.

While she mourned the loss of independence, Mrs. J.'s chief regret was her inability to enjoy her morning coffee with her husband.

To pharmacist Julie Nowak, Mrs. J.'s case is emblematic of the need for comprehensive medication review by a pharmacist.

"Medication reconciliation makes sure that the drugs are consistent during transfer from one venue to another," explained Nowak. "But a comprehensive medication review looks at everything the patient is taking, sees whether it is appropriate to the disease state, looks at subtle drug interactions and whether the patient is getting the maximum benefit from each drug. It can improve the patient's quality of life."

## **Current condition**

Nowak's team, which included nurse practitioners, physicians and other clinicians, selected a medical/surgical unit located close to the pharmacy to begin doing comprehensive medication reviews. It was important to keep the scope of the study small so clinicians could accomplish the reviews in the course of ordinary work.

Because the patient mix on that unit was so diverse, they decided to focus on people who were 65 or older. Elderly patients have an increased potential for drug misadventures because they often have numerous co-morbid conditions and routinely take many medications.

"During order entry, pharmacists do a great job of dealing with red-flag items like drug allergies or blatant drug interactions on admission," said Nowak. "We wanted to take that extra 15 or 20 minutes and delve more deeply into the ways that pharmaceuticals could work better for the patient. All patients deserve this."

Initially, they discovered that comprehensive medication reviews were done sporadically, which could increase fall risk and side effects, and could lead to impaired cognitive abilities. In addition to finding problems like duplicate medicines, the medication review can help the pharmacist reduce the number of pills a patient needs to take by looking for multiple medications that could be combined.

“It’s those subtle things that contribute to patients’ quality of life,” Nowak said. “Just reducing the pill burden can make a big difference for people.”

Why were the comprehensive medication reviews inconsistently done? One reason was the lack of a standard method for doing them. Another was fluctuating staffing levels, caused by uneven distribution of work and lack of attention to scheduling of lunches and breaks.

## Getting started

Nowak’s team conducted a retrospective study of medications. Of the 90 patients included, the team made 53 potential recommendations for the medications of 30 patients.

The group began its live study and found that the 15 to 20 minute reviews yielded a similar number of recommendations. Nowak points out that, in addition to streamlining the drug regimen, the medication review can impact other drug-related effects like depression, weight gain or loss, renal function, cardiac symptoms, and one medication’s impact on the effectiveness of another.

## Countermeasures

Nowak’s team experimented with two sets of countermeasures, both essential elements for systematic coordination of medical therapy management in and across all care settings: standardizing the evaluations and balancing the workflow. Every person potentially affected was involved in decision-making. All countermeasures were designed to be easy to include in everyday work, and so were not perceived as “something extra to do.” Including staff in the decisions, and following up with education and outreach, ensured acceptance of the countermeasures.

“First, we standardized the communication between pharmacists and medical staff,” explained Nowak. “We created a procedure for delivering and retrieving recommendations, and closed the loop about whether clinicians responded to the recommendations. We made sure it was easy to do—actually, it was easier than what they’d been doing.”

Including everyone in workload leveling and scheduling created a sense of teamwork, according to Nowak. First, the pharmacists’ schedules were synchronized to ensure that coverage was always present. Then the technicians were invited to look at their own scheduling. The pharmacy team ensured that staff needs, including lunches and breaks, were attended to.

“Our feedback told us that staff really appreciated this,” said Nowak. “By paying attention to their needs, as well as the needs of the patients, we were telling them how important they are. It was the right thing to do, but it also created buy-in.”

## Results

Pharmacists continue to make recommendations based on their comprehensive medication review, and clinicians accept the recommendations most of the time. In fact, Nowak said, “Nurse practitioners stop us in the halls now and ask, ‘Do you have anything for us to look at?’ We’re always so used to dealing with the next thing, and then the next, like a firefighter. Doing these reviews gives us a chance to step back and ask ourselves, ‘Have we missed anything?’ Those 20 minutes a day give us a fresh perspective.”

And what about Mrs. J., that elderly patient with Parkinson’s disease? Mrs. J. became a patient on the surgical floor where the comprehensive medication reviews were being conducted for this project.

Mrs. J.’s medication review revealed an important, overlooked detail: she was taking a long-acting drug at 9 a.m., which meant that the maximum results would occur near noon. The pharmacist conferred with the physician and made a recommendation. By giving Mrs. J. an immediate-acting drug first thing in the morning, she was able, with minimal assistance, to get out of bed, perform her morning routine herself and, most important, enjoy that cup of coffee with her husband.

## Learning

Comprehensive medication reviews are spreading. Nowak points out that the availability of pharmacy students helps expand the scope of the work.

Staff members, who had been included in scheduling their own work, reported increased job satisfaction. Patients like Mrs. J. were very satisfied. And there has been a subtle but definite shift in how pharmacists are perceived by other clinicians as team leaders and resources.



### Pharmacist Recommendations & Clinical Response

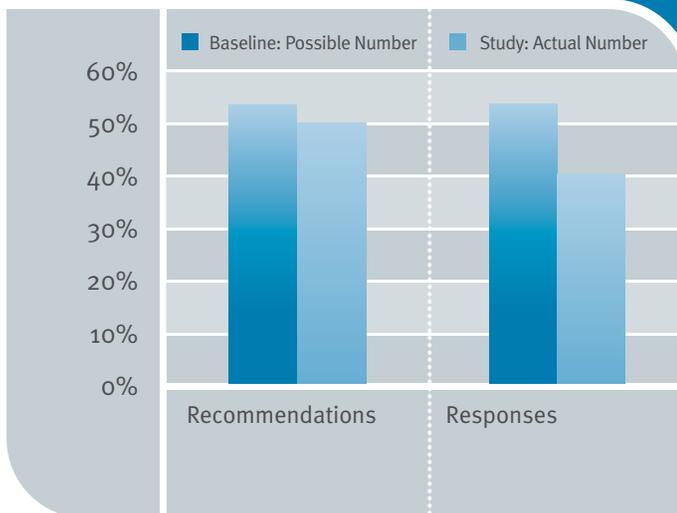


Chart shows the number of recommendations the pharmacists offered to clinicians during the study period, and the number of times clinicians responded.

# INCREASING THE PHARMACIST'S ROLE IN MANAGING MEDICATION USE THROUGH IMPROVED COMMUNICATION WITH PHYSICIANS

**Irina Sheyko, PharmD, Clinical Pharmacist**  
**Jefferson Regional Medical Center**

The Institute of Medicine estimates that medication errors harm at least 1.5 million Americans every year, adding at least \$3.5 billion per year in healthcare cost, not counting lost wages and productivity or additional healthcare costs.<sup>1</sup> Sixty-four percent of medication errors happen during admission or discharge from a hospital. Failure to note discrepancies in medications often stems from miscues and miscommunication among staff members, and between staff members and patients.

The Toyota principles underpinning Perfecting Patient Care<sup>SM</sup> (PPC) call those critical communications “connections” and state that they must be direct, unambiguous and that all concerned need to know whether the message was received (*see Rule 2, page 12*).

Clinical pharmacist Irina Sheyko believed that improved two-way, yes-or-no communications between physician and pharmacist would lead to better patient care. Improving communications took two forms for her Pharmacy Agents for Change program:

- **Goal 1: Perfect written communication with physicians.** Written communication with physicians was suboptimal because it was not standard: notes from pharmacists to clinicians were found in several locations on the chart, not easily identified and with unclear content. There was no feedback loop (yes-or-no) back to the pharmacy, so pharmacists had no way to know whether or not a note had been read or acted upon.
- **Goal 2: Increase the pharmacist's role in patient care.** Pharmacists' capabilities in the medication administration system were not being used to the fullest extent. Without side-by-side consultation with physicians and access to patients' charts, pharmacists were at a disadvantage when looking for drug interactions and generally reviewing how medication was to be given. And studies have shown that when pharmacists conduct medication reviews after physicians have prescribed, medication errors drop by more than half. Clearly, here was an opportunity for improvement.

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<sup>1</sup> *Committee on Identifying and Preventing Medication Errors, Philip Aspden, Julie Wolcott, J. Lyle Bootman, Linda R. Cronenwett, eds., Preventing Medication Errors: IOM Quality Chasm Series (2007).*

## Rules of Work Redesign, from Kent Bowen and Steven Spear, Harvard Business Review

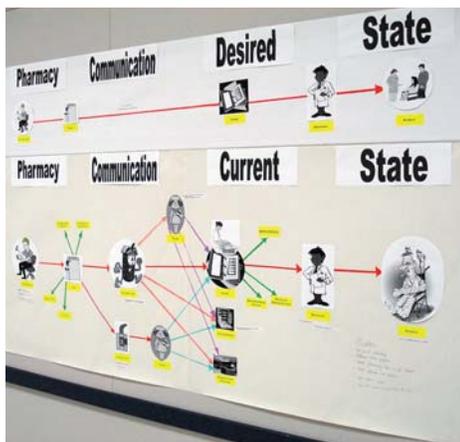
Adapted for Perfecting Patient Care<sup>SM</sup>

### Mapping the current condition

Armed with knowledge of PPC, Sheyko and her colleagues began to map out the current condition—the way work actually takes place, as observed and verified by the workers themselves. This kind of mapping requires intense observation to chart objectively how communication flows.

“Mapping the current condition was perhaps the most valuable part of the work,” said Sheyko. “The broken connections were not exactly where we thought. It was much more complex than we thought, and more complex than it needed to be. Once we knew how work actually took place, we knew we could make pharmacy communications simpler and more effective.”

The current condition map and observations revealed that 37% of the time clinicians could not find pharmacists’ written notes on the patient’s chart. These notes might include suggestions for changing or consolidating medicines, or might call out potential problems with the medication regimen. There were multiple ways for such a note to be written and delivered, and no feedback loop. Sometimes, in an effort to be “heard,” pharmacists would enter a note in more than one place on the chart, on non-standard paper, inadvertently creating more confusion. Physicians complained that sometimes they didn’t really understand what the notes meant—but since there was no mechanism for the note to come back to a pharmacist as a follow-up, those problems went unnoticed.



Sheyko and colleagues understood that loops, forks and multiple ways to do the work only confused things. The closer they could get to continuous flow, the more reliable the system would be.

**01 Rule 1:**  
All work shall be highly specified as to content, sequence, timing and outcome.

**02 Rule 2:**  
Every customer – supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses.

**03 Rule 3:**  
The pathway for every product and service must be simple and direct.

**04 Rule 4:**  
Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level of the organization.

The column on the right replaced the terms on the left.

## Standardizing the pharmacist note

Sheyko and colleagues understood that the closer they could get to continuous flow—one way for communication to be sent, received and acted upon, and a feedback loop to the pharmacy—the better and more reliable that communication would be. The first step would be to standardize:

- What the pharmacy notes say
- Where the notes can be found in the chart
- How the pharmacist will know if the physician has questions or comments

**What the pharmacy notes say.** The team consolidated all pharmacy notes into one. The task involved first conducting an audit of the written notes to assess their content and determine the most frequently addressed conditions, and then consulting with physicians to design a more effective note. This resulted in two pre-typed recommendations plus a structured format for free-text interventions (Facts, Assessment, Recommendation and Monitoring, or FARM).

“In working with the physicians,” said Sheyko, “we discovered that some of our nonstandard terminology frustrated them. We went over the terms, sometimes word by word, to arrive at the best way to give the information. We found out that tone matters. So no more exclamation marks!”

For example, the words in the column on the left have been replaced by the terms on the right. (*See the chart to the left.*)

The tedious work paid off. Within three months, effective content of the pharmacists’ notes increased from 24% to 94%, and it continues to inch up from there.

“Going to the customer and doing a word-by-word note analysis not only created standard ways to communicate,” Sheyko said. “We pharmacists built better relationships with the physicians.”

**Where the notes can be found in the chart.** Sheyko’s group developed a standard shape and color for the pharmacy note, and included a marginal tab that called it out, making it easily identifiable every time. Notes were now always placed in the chart the same way.

**How the pharmacist will know if the physician has questions or comments.** Closing the communication loop required activating an unused area of the pharmacy computer system.

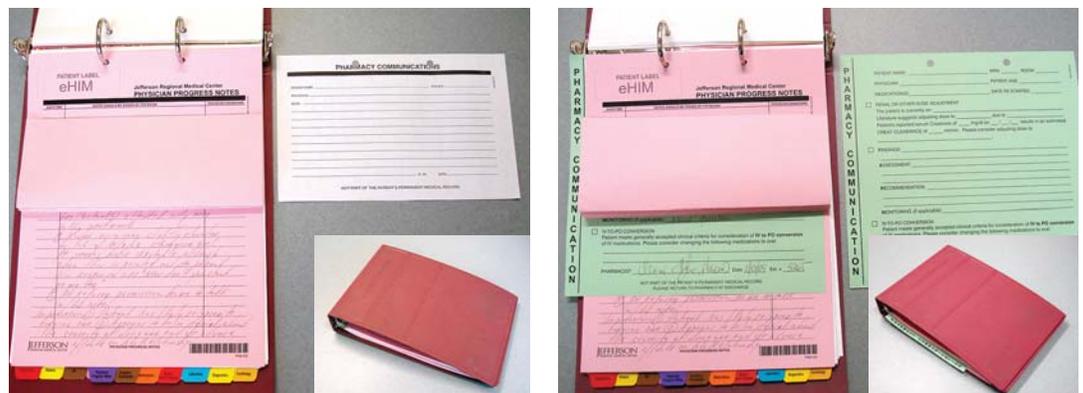
“Now when we send a note to the chart,” explained Sheyko, “we plug it into the computer. We had not used the software for this kind of routine operation. Now we can get in and close each one out.”

### LEFT IMAGE

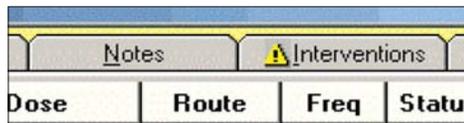
Before: The white pharmacy communications sheet was easily lost. When closed (insert), the patient chart gives no clue as to whether a pharmacist’s note is waiting.

### RIGHT IMAGE

After: A larger, green pharmacy note with a flag at the left margin leaves no doubt that the pharmacist has something to say. Even when closed (insert), the patient chart shows a flag at the margin.



Every afternoon, one person on the shift in the pharmacy runs a report to determine which notes have been viewed, whether interventions were recommended and which items remain open.



Notes		Interventions	
Dose	Route	Freq	Status

Making full use of an existing computer system created a way for pharmacists to see any open interventions—marked with a yellow triangle—that need to be addressed. (See screen shot to the left.)

## Results for Goal 1: Perfecting pharmacist communication

Notes are now in the correct place on the chart 98% of the time, up from just 33% at the beginning of the improvements. Average turnaround time on pharmacists' notes is now one day, with pharmacists able to address any questions or comments from physicians.

The teamwork required to work through the wording and presentation of the notes has paid off in enhanced credibility for the pharmacists: 70% of addressed pharmacy notes resulted in a drug modification—up from 40% when improvements began. Sheyko stated that changes are made in the care of 14% of all admitted patients simply from the written notes, not from phone calls or other forms of communication. And now that the system for leaving notes offers a reliable and direct connection with physicians, the pharmacists can leave notes with confidence.

Pharmacists are now seen as a source of information and clarification for the medical staff. Seventeen new physicians have asked for pharmacy consults to review dosage adjustments, drug interactions, potential adverse effects and drug information.

## Goal 2: Increase the pharmacist's role in patient care

The enhanced credibility created during the work on pharmacists' notes provided a springboard for Sheyko to build the role of the clinical pharmacist. Sheyko began rounding with physicians from the area's large physician practice, South Hills Family Medicine.

"It helped me to get out of the pharmacy and round with physicians," said Sheyko. "Interacting with healthcare providers allowed me to discuss patients' individual cases. I discovered things I wouldn't have known if I'd been in the pharmacy. About 98% of the recommendations I made that required action were taken."

As a clinical pharmacist, Sheyko began offering comprehensive medication profile reviews, which optimized effective medication therapy. These reviews also help identify and solve problems associated with polypharmacy, the prescribing of multiple drugs to a patient, which increases the risk of interactions and other problems.

The clinical pharmacist also offers comprehensive patient reviews, which are more in-depth than pharmacy medication review at order entry. For a patient review, the clinical pharmacist reviews the patient's chart and collaborates with other members of the healthcare team.

"The visibility of the clinical pharmacist helps build a collaborative relationship," Sheyko said. "They know me. They know our work. Physicians are likely to implement the actions we recommend."

In fact, physicians act on pharmacists' recommendations 65% of the time now, as compared to just 41% when improvements began. Clinical pharmacist services offered through face-to-face interaction with physicians increases the acceptance rate to 90%. Sheyko believes that implementing pharmacists' recommendations not only optimizes medication therapy, but also reduces the potential for medication errors, and can even reduce costs.

The clinical pharmacist is now a fixture at Jefferson Regional. More and more physicians are availing themselves of value-added pharmacy services through pharmacy consultations, which are more frequent now that the broken connections in the system of communication have been mended.

# BRIDGING THE TRANSITION FROM HOSPITAL TO HOME: IMPLEMENTATION OF A MEDICATION DISCHARGE PROGRAM

**Jamie L. Montgomery, RPh**  
**Western Psychiatric Institute and Clinic of UPMC**

Few patients are more vulnerable than those being discharged from the hospital following an acute episode of mental illness. Jamie Montgomery, a pharmacist at Western Psychiatric Institute and Clinic (WPIC), knows the importance of providing patients with the tools and assistance needed to adhere to their medication regimen when being discharged from the hospital.<sup>1</sup>

“Patients with schizophrenia are at particular risk,” said Montgomery. “If they don’t take their medications as prescribed, they are at high risk for relapse, which usually brings them right back into the hospital. That’s not the outcome we want. It’s bad for patients, plus it increases the cost of treatment.”

About one-half of those suffering from schizophrenia are not taking their medications according to plan.<sup>2</sup> The problem is insidious: people with the disease often have poor insight into their condition and may harbor negative attitudes about medications in general. Substance abuse may also play a role in noncompliance. Furthermore, patients with schizophrenia who skip their first outpatient appointment following hospitalization double their chance of being rehospitalized.

In deciding on the scope of her project, Montgomery focused on an area of the discharge planning process that she and her colleagues felt they could actually improve. Pharmacists are uniquely positioned to educate patients about their medications and to help make the right medications accessible to them. Ultimately, the goal is to improve adherence to medications and thereby increase the odds that patients will remain in care and attend that critical first outpatient appointment following discharge.

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<sup>1</sup> Christian Dolder, Laura B. Dunn, Dilip V. Jeste, Jonathan P. Lacro, Susan G. Leckband, “Prevalence of and Risk Factors for Medication Nonadherence in Patients with Schizophrenia: A Comprehensive Review of Recent Literature,” *Journal of Clinical Psychiatry* 63.10 (2002): 892-909.

<sup>2</sup> Michael T. Compton, Jason Crow, Dwight Antonio Owens, Bruce E. Rudish, Tina Thompson, “Predictors of Missed First Appointments at Community Mental Health Centers After Psychiatric Hospitalization,” *Psychiatric Services* 57.4 (2006): 531-7.

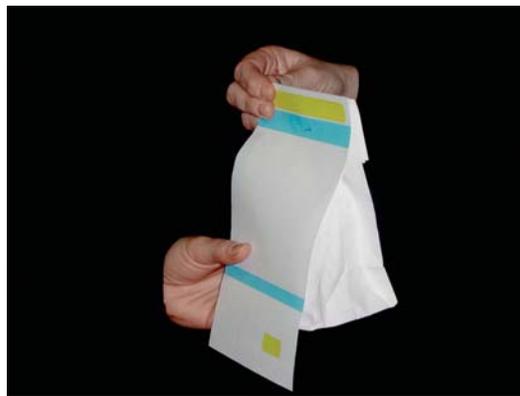
## THE TWOFOLD GOAL OF THIS PROJECT:

- Goal #1:** Provide patients with medication education one to two days before discharge using standardized written materials to enhance patients' knowledge about their medications and treatment expectations and increase adherence to their medication regimens.
- Goal #2:** Eliminate the need for patients to visit a pharmacy immediately after discharge by sending patients home with enough medication to see them through to that all-important, first outpatient appointment.

### Current condition

In charting the patient's journey through the system at WPIC, Montgomery's team noted that their best chance to prevent relapse and rehospitalization came in the days leading up to discharge. Upon discharge, patients typically receive multiple prescriptions and leave the hospital with a "to do" list. This includes an immediate trip to a pharmacy, where they may have to deal with a wall of questions and problems with insurance. Even if patients are able to navigate the system and obtain medications, perhaps the most daunting challenge remains in managing their own care in contrast to the inpatient unit, where medications are administered by a nurse each day. Thus, the chance for failure was already built in. Montgomery's team thought that promoting treatment compliance would require having both education and medication in hand. Establishing standardized education and access to needed medication, therefore, became a priority for the team.

"Until this project came about, the pharmacist was not involved in discharge planning," said Montgomery. "The doctor wrote prescriptions and the patient was discharged. We found that the pharmacist has a very important role to play."



**LEFT IMAGE**  
Before: Patients left with a medication list, a stack of prescriptions and a chance to fail.

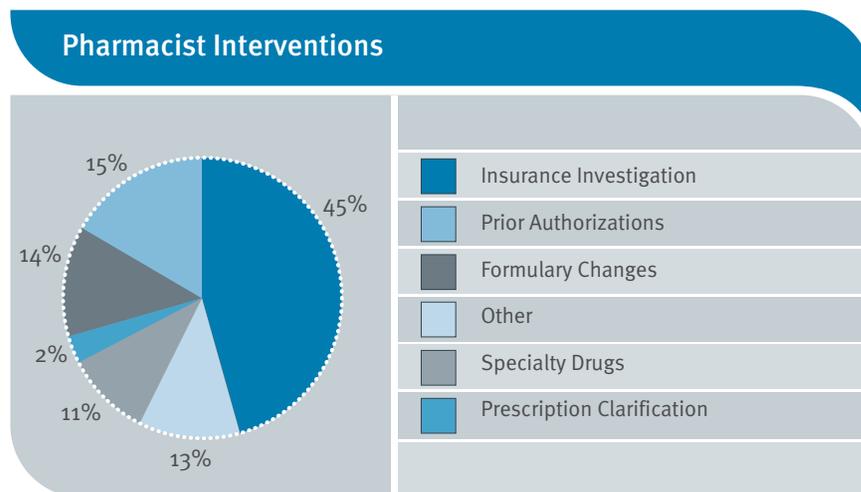
**RIGHT IMAGE**  
After: Patients left with enough medication to see them through to that all-important first appointment, plus the knowledge of how to use the drugs properly.

## Countermeasures

To extend education and medication to every patient on discharge, the team first found a way to flag every patient whose discharge was impending within the next day or two. WPIC's designated outpatient pharmacy, Forbes Pharmacy, is located a few blocks away—nearby, but not actually on-site.

Pharmacists intervened in a number of ways on behalf of the patients to ensure that their prescriptions could be filled. This included determining whether a patient had prescription coverage, pursuing insurance companies' requirements and assisting with medication formulary changes that required prior authorization. Of the 464 discharge medications provided, interventions were required for 142 of them, nearly one-third of all prescriptions processed.

“Before, patients often had to run the gauntlet just trying to get prescriptions filled,” said Montgomery. “No wonder they had so much trouble adhering to their medication regimens: simply getting their medications could be a difficult proposition.”



Pharmacists performed a number of interventions on behalf of patients to ensure they received the right medications on discharge.

After pharmacists clear away the red tape and fill the prescriptions, the medications are couriered from Forbes Pharmacy to WPIC, where the inpatient pharmacist provides counseling and educational materials. The patient leaves the unit with medication in hand and knowledge about its proper use, its importance in their treatment plan and what side effects to expect.

Toyota discipline teaches that new techniques should be rolled out deliberately, as experiments, only as fast as quality permits. The WPIC pharmacist group did just that, rolling out the first experiment on one unit in December 2007, then providing discharge medications to the entire 7th floor a month later. By May 2008, discharge counseling accompanied the medications on the 7th floor.

## Results

The program affected 92 patients on discharge, 74 of whom received their medications and 18 of whom did not. Over half of the patients (48), were counseled about their medications on discharge.

- Of the 74 patients discharged with medications in hand, 31 arrived for their first visit; only 11% required ER visits or readmission.
- Of the 18 patients discharged with prescriptions but without medications, only three arrived for their first visit; 42% required ER visits or readmission.

Although the project was undertaken for the benefit of patients, it has had another positive side effect: revenue has been generated from the filling of the prescriptions. This unanticipated outcome ensures that the program will be sustainable.

In October 2008, the discharge program expanded to the 9th floor. Montgomery says plans are being made to expand it to other units as well. Given the high number of pharmacist interventions required in the pilot study, another key result of this project was identifying the need for a full-time Pharmacy Case Manager.

“This key position was created in February 2009 after reviewing the time that staff pharmacists were devoting to resolving formulary and insurance issues,” said Montgomery. “The addition of a devoted Pharmacy Case Manager has been an invaluable asset for the program. Every day, this pharmacist looks at the census, reviews upcoming discharges and helps ensure that needed medications and patient counseling are delivered prior to patients leaving the hospital.”

Patient-centered initiatives, such as the medication discharge program, help physicians, nurses and social workers recognize the value of having a pharmacist on their team. As part of their new pharmacy practice model, WPIC had planned to increase the number of pharmacists rounding with physicians on the units. This discharge planning project has reinforced the need for pharmacist involvement in patient care and has accelerated those plans.

“Every opportunity to increase the pharmacist’s direct participation in patient care moves us closer to a practice model that will offer the best quality care for patients,” Montgomery said.

Development of a Medication Therapy Management service will provide specialized pharmaceutical care for patients with mental illness. Once patients make the initial transition from the hospital to the community, they continue to need assistance and support to manage and adhere to their medication therapy. Patients with mental illness often have co-morbid medical illness and may see multiple physicians and specialists. Unfortunately, therapy decisions are not always communicated between prescribers, and problems such as noncompliance or side effects are not always discussed. As experts in medication management, pharmacists are able to review and reconcile medication lists, identify drug therapy problems and bridge the gaps in pharmaceutical care that can lead to negative patient outcomes.



# IMPROVING THE CONTINUITY OF CARE THROUGH MEDICATION RECONCILIATION

**Lori Mezeivtch, RPh**  
**UPMC Pittsburgh AIDS Center for Treatment**

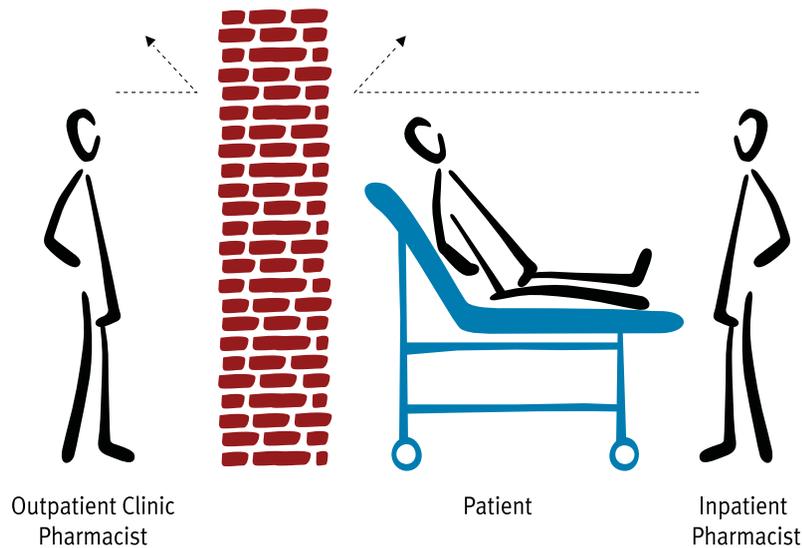
Missing a dose of antacid would not endanger your health. Missing an antibiotic would be more significant, potentially encouraging resistance to the drug. But missing a dose of an HIV/AIDS drug can lead to serious harm, and can even alter the course of treatment.

“HIV/AIDS medications are tricky,” said Lori Mezeivtch, a pharmacist at the Pittsburgh AIDS Center for Treatment (PACT). “They are highly resistant. Missing just one or two doses can dramatically decrease the effectiveness of an entire class of medication. The worst part is, each time a patient has to change drugs, that’s one less weapon in the arsenal.”

Mezeivtch added that missed medications can lead to further immune deficiency and an increase in the viral load in these patients, which can lead to poor outcomes for them, and increase the chance of transmitting the virus to others, including healthcare workers.

Polypharmacy among HIV/AIDS patients is the norm: Mezeivtch says it’s not unusual to find patients who must take 20 or more medications each day. Taking 95% or more of HIV/AIDS medications properly appears to improve outcomes. Conversely, missing just one can have major negative consequences.

“Strict adherence to the anti-HIV/AIDS medication regimen is extremely important,” said Mezeivtch. “It’s more critical than with almost any other disease.”



Lack of interoperable computer systems between inpatient and outpatient pharmacists resulted in 78% of patients at inpatient admission having at least one medication discrepancy.

## Current condition

As she looked at inpatient medication reconciliation on HIV/AIDS patients being admitted to the hospital, Mezeivtch noticed a surge in the number of discrepancies. In fact, 78% of patients had a medication discrepancy on admission, many of which would have resulted in harm had they not been discovered.

One study showed a reduction in medication errors of 76% when medication reconciliation was implemented at admission, transfer and discharge.<sup>1</sup> Toyota-based philosophy, at the root of Perfecting Patient Care,<sup>SM</sup> rejects reliance on inspection as the chief mode for rooting out error. While safety inspections like medication reconciliation are necessary, of course, when they reveal errors, it is a signal to look further upstream in the process to discover the source.

Mezeivtch's team began asking why three-fourths of patients had a discrepancy on admission, and discovered:

- The hospitalist taking the patient history may rely on the medication list from the most recent prior admission, despite changes made during subsequent routine visits to the outpatient clinic.
- The connection between the outpatient and inpatient clinic was broken; the computer systems are not interoperable.
- The communication was not reliable. Because work was not standard, people did their work in different ways. Without standard work, if someone was filling in for another person, important tasks could slip through the cracks.

“Not having the current medication list led to more work on the inpatient side,” said Mezeivtch, “because inpatient pharmacists didn’t have the benefit of the most recent information from the clinic.”

<sup>1</sup> M. Colquhoun, E. Etchells, T. Vira. “Reconcilable Differences: Correcting Medication Errors at Hospital Discharge,” *Quality & Safety in Health Care* 15 (2006): 122-126.

## THE GOAL OF THIS PROJECT:

The goal of the project was to ensure that the inpatient pharmacist always received the current medications list when a patient was admitted to the hospital. Through medication reconciliation, the pharmacist would then be able to complete interventions and ensure that the patient received the proper medication without delay.

### Countermeasures

In the ideal world, an interactive software system would allow instantaneous electronic communication between outpatient and inpatient settings. But since Toyota-based improvements rely on low-cost, low-tech ways of fixing problems immediately, they are ideal for situations like these that can't wait for the ideal situation of the future. In fact, working on problems this way allowed Mezeivtch some insights she would not have gained otherwise.

Mezeivtch and the team recognized the “people first” aspect of the work, and began by discussing the problems and establishing relationships with the people in the work pathway, including the inpatient pharmacist. The chart below reflects the deliberate roll-out, with each step first proposed as an experiment and adjusted as indicated by the people doing the work.

When an HIV/AIDS patient enters the hospital, a standardized alert goes to the outpatient clinic, which then faxes over that patient's medication list. The team created a new inpatient form for medication reconciliation specifically for HIV/AIDS patients. The hospital sends alerts to the outpatient clinic when drug interventions are made, and provides the new list of medications to the clinic when the patient is discharged.

Establish relationship with inpatient RPh

Standardize communication alert

Implement intervention

Reconcile medication lists

Alert providers of interventions

Maintain current medication list



“My big ‘aha’ moment came when I realized that the Mandatory Order Set for inpatients with HIV/AIDS had stopped being used,” said Mezeivtch. “This order set listed the groups of medications for HIV/AIDS patients, as a way to ensure they would stay on their drugs until further adjustments could be made.”

After the Mandatory Order Set had been discontinued, five HIV/AIDS discrepancies occurred; when it had been in use, only one had occurred. So the team agreed to reinstate it.

## Results

Without the fax from the outpatient pharmacist, the inpatient pharmacist could not intervene or make sure the HIV/AIDS patient received the correct medication. Without the Mandatory Order Set, it was difficult to ensure that the medications were always adjusted correctly.

Now, acting on a reliable alert when a patient is admitted to the hospital, the outpatient pharmacist faxes the drug list to the inpatient pharmacist every time. The inpatient pharmacist is able to intervene within 24 hours, ensuring that each patient receives the correct, adjusted doses.

“I learned so much during this project,” said Mezeivtch. “Understanding the current condition helped us understand the problem with the Mandatory Order Sets. And standardizing the work flow means that anyone can fill in and there won’t be any confusion about getting drugs to HIV/AIDS patients.”

# COMPARISON OF MEDICATION LISTS TO REDUCE POLYPHARMACY

**Rhonda Horton, PharmD, BCPS**  
**Cindy Powers, PharmD, BCPS**  
**Allegheny General Hospital**

Pharmacists Rhonda Horton and Cindy Powers realized that many patients were being admitted without current medication lists available to the inpatient physicians. Without a standard way to transfer medication lists to and from their primary care physicians' (PCP) offices and Allegheny General Hospital (AGH), patient safety was less than ideal.

“It was more than a matter of inconvenience and numerous phone calls for the pharmacists,” said Powers. “We know that lack of communication between the PCP’s office and the hospital can lead to adverse drug events – something no patient should have to go through.”

Research shows that drug-related problems often occur because physicians, nurses and pharmacists have inadequate access to complete medication profiles,<sup>1</sup> or lack coordinated communication about a patient’s medications. The Joint Commission’s National Patient Safety Goal 8 requires medication reconciliation at points of patient transition: at admission and discharge. Horton and Powers note from their literature search that about half of adverse drug events occur at these transitions.<sup>2</sup>

The cost of confusion is high (see The Seven Mudas on page 24). It adds to pharmacists’ workloads, as they phone, fax and wait for the current information from physicians’ offices. The rework increases the odds for error. And should a patient suffer an adverse drug event while in the hospital, it is likely to add at least two days to his or her stay, with its attendant exposure to additional risk. In dollars and cents—the least reflective measurement of the actual waste—the cost of extending the stay amounts to about \$2600 per day.<sup>3</sup>

Horton and Powers decided to work with the PCP office with whose physicians they round at AGH, so they established a direct connection with Pittsburgh General Medicine Associates (PGMA). Working together, the pharmacists and physicians’ office created a standardized way to transfer information when a patient was admitted (from office to hospital) and discharged (from hospital to office). The emphasis on discharge is appropriate, since an average of 53% of drugs change during the course of a hospital stay.

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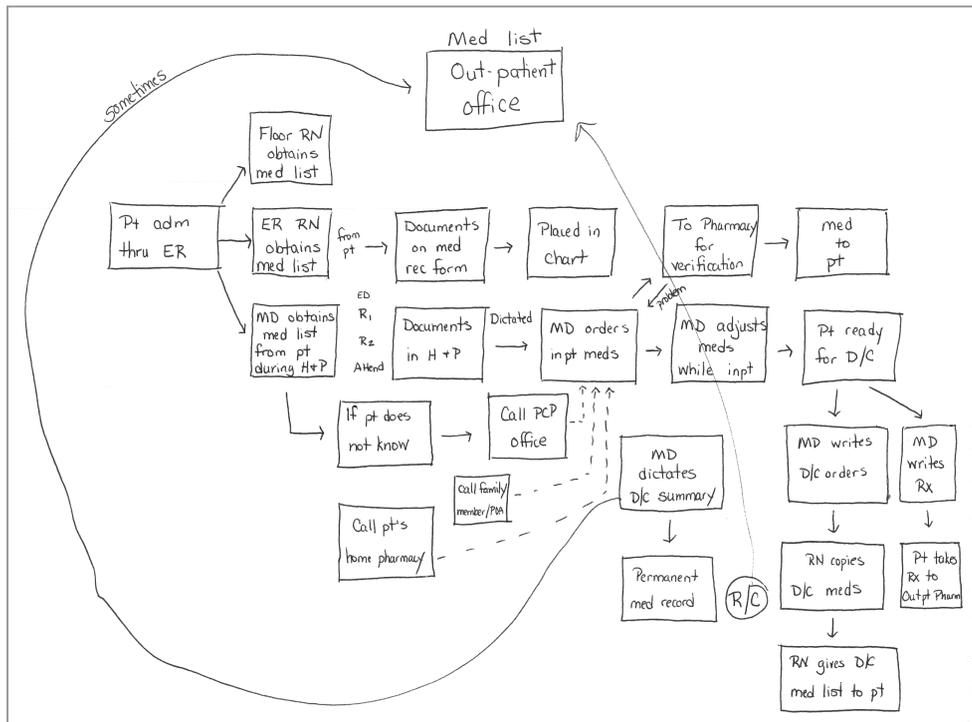
<sup>1</sup> *The Joint Commission Perspectives on Patient Safety 8, no. 4, April (2008): 10–11.*

<sup>2</sup> *J. D. Rozich and R. K. Resar, “Medication safety: one organization’s approach to the challenge,” Journal of Clinical Outcomes Management 8, no. 10 (2001): 27–34.*

<sup>3</sup> *K. W. Trettin, “Medication reconciliation,” Topics in Patient Safety 10, no. 5, Sept/Oct (2007): 1, 4.*

## Current condition

The current condition drawing is a graphic way to show the confusion, rework and other forms of waste in the system. When words like “sometimes” appear on the graph, it is a sure sign of an unstable system.



## THE SEVEN MUDAS

Toyota recognizes seven forms of workplace waste, which the Japanese call “muda.” Each waste represents the opportunity to introduce error into the system. Efficiency is sought not only because it makes work easier, but also because it makes patients safer.

- Confusion
- Motion
- Waiting
- Processing
- Inventory
- Defects
- Overproduction

## Countermeasures

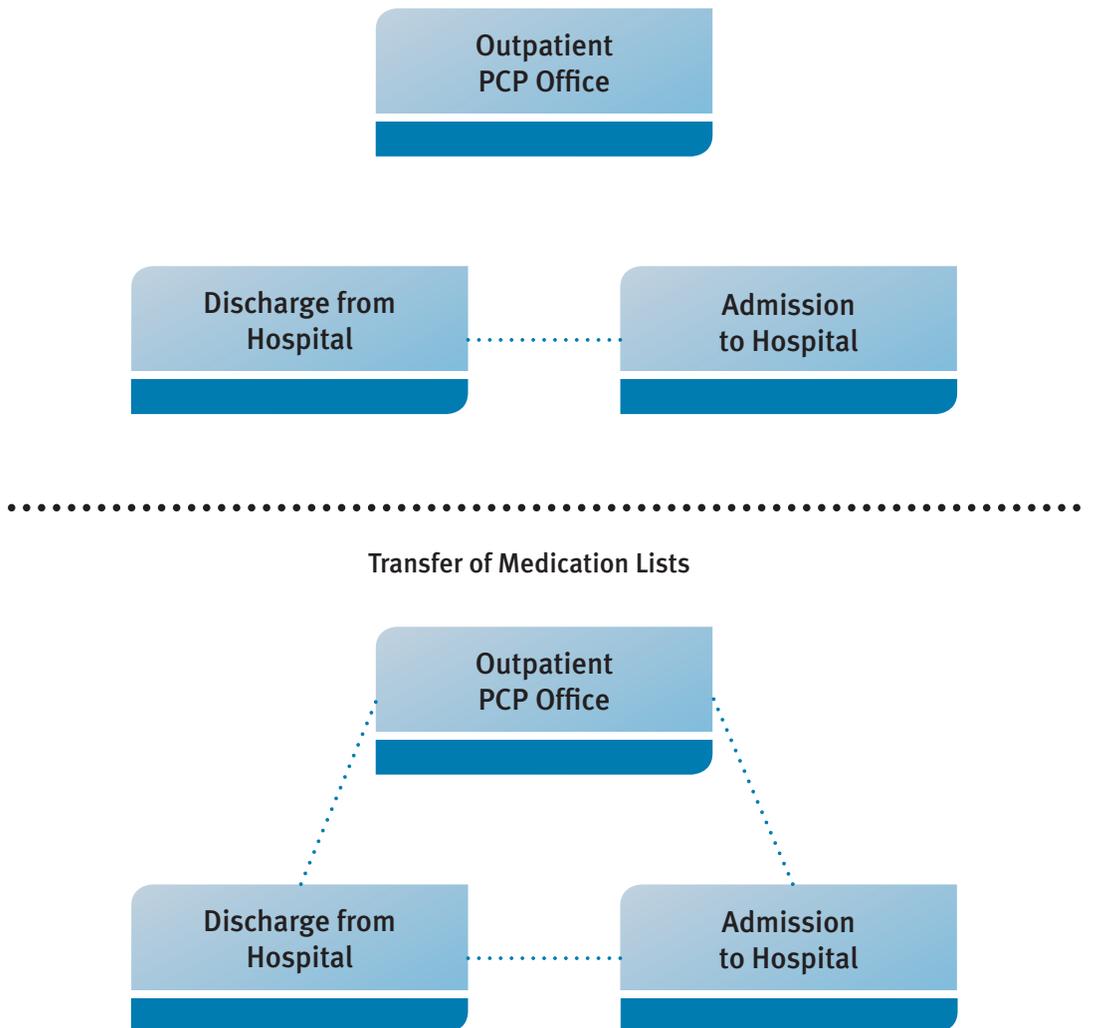
The PGMA office had a useful form for charting all patients' outpatient medications for easy reference in the outpatient chart. Now the form is being used consistently, and is placed in the front of every patient chart. If a patient is admitted to the hospital, the hospital pharmacist calls PGMA, which then faxes the current medication form.

For its part, the AGH pharmacy created a Discharge Medication List template to communicate the patient's medication list to PGMA as soon as the patient is discharged from the hospital. At the office, a nurse and physician review the medication list and place it in the front of the outpatient chart.

"This all may sound deceptively easy," said Powers. "But we hadn't understood our current condition, so we had very little hope of making progress. Once we drew out the convoluted process—really understood it—and then asked our colleagues at PGMA if they could help us with it, the ideas began to flow."

TOP  
Before: No reliable communication existed with the PCP office about the medications patients were taking.

BOTTOM  
After: A consistent, reliable way of communicating between PCP and hospital pharmacist.



## Results

Analyzing medication lists on admission and on conclusion of the history and physical came to light as areas for improvement during the project. Those problems highlight the importance of communication between pharmacists in the inpatient and outpatient settings. Discrepancies—any glitch that occurs with an order, whether or not an outright error results—are the warning signs of system failure. Thirty-nine percent of discrepancies were medications missing from the lists; another 22% were failure to note an additional medication. Another 36% of discrepancies were missing or differing dose or frequency.

“Our project has shown that pharmacists can have a crucial role in the transfer of medication lists from the hospital to the PCP’s office,” said Powers.

	Yes	No
Outpatient medication list received	18	9
Outpatient medication list complete	5	22
History and Physical (H&P) medication list complete	10	17
Discharge (D/C) medication list complete	22	5

Understanding the current condition is a continuing assignment. In this table, pharmacists show where the most significant weaknesses occur in the system: (1) completing and reviewing the outpatient medication list, and (2) reviewing the medication list after the history and physical are completed.

# FALL RISK ASSESSMENT IN ELDERLY PSYCHIATRIC PATIENTS

**Karen Fielding, PharmD**

**Western Psychiatric Institute and Clinic of UPMC**

Accurately assessing a patient's risk of falls helps staff members take appropriate action. A patient on numerous or high risk medications is at increased risk of falling, a fact that is often too lightly weighted on traditional fall risk evaluations. Pharmacist Karen Fielding discovered this problem in a geriatric inpatient psychiatric unit. During the last three months of 2007, 30 patients fell, and four of them were injured.

"We know from the literature that when people over the age of 65 fall, 20 to 30% suffer injuries that decrease their independence and increase their risk of death," said Fielding. "Geriatric psychiatric patients are particularly vulnerable."

Also fueling the urgency are the Joint Commission's goals of reducing the risk of falls and reconciling medications. Fielding sees these two goals converging in the pharmacy.

## Current condition

Initially, pharmacists were not involved in the patient's fall risk assessment. The fall risk evaluation form did not consider polypharmacy, but instead gave a single score—two points—regardless of the number of medications a patient may be taking in the same category. Psychiatric patients may take several medications in the same category, such as antidepressants. But the evaluation form gave the same weight, two points, regardless of how many types of antidepressants the patient took. Failing to account for the number of medications means the assessment tool consistently underestimated fall risk.

## Medications

Anticonvulsants (2)

Anticoagulants (2)

Cathartics or diuretics (2)

Anti-hypertensives/cardiac (2)

Narcotics/pain meds/opiates (2)

Benzodiazepines/sedatives/antipsychotics/antidepressants (2)

Hypoglycemics (2)

Current condition: Medications were given the same weight by type, regardless of how many drugs in the same class the patient may be taking. The result was chronic underestimation of fall risk.

## Goal: Enhance fall risk assessment

Fielding's team knew that the pharmacists' prospective review of medications would make the fall risk assessment more accurate. Their recommendations for drug therapy could also increase caregivers' awareness of the degree to which medication can increase the risk of patients falling.

The pharmacists devised a "sliding scale" to give the proper weight to medications that patients were taking. Points were assigned for each medication that could raise fall risk, rather than assigning points based only on the category of medicine.

In the Toyota Production System, the power of observation is often manifested by the difference between how people believe the work is being done, and how it is actually being done. In the case of the fall risk assessment, the existing scoring system, which staff believed to be accurate, led them to underestimate patients' fall risk consistently by as much as 50%. The new tool led to fall reduction strategies for many more patients.

The creation of a more accurate fall risk assessment tool spurred additional work by the clinical pharmacists. When pharmacists assessed the medications of 140 patients between October and December of 2008, they made 135 therapy recommendations, which included 50 measurable changes to the drug regimen. Of those recommendations, 54% were accepted.

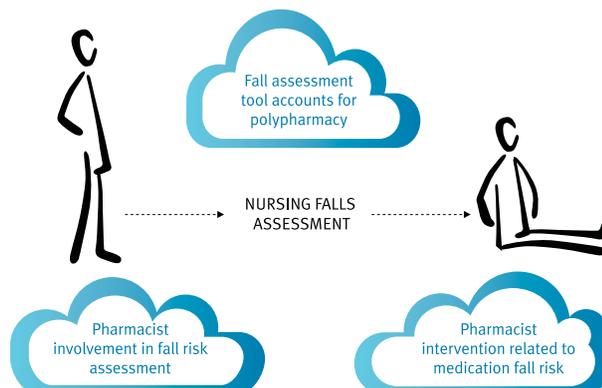
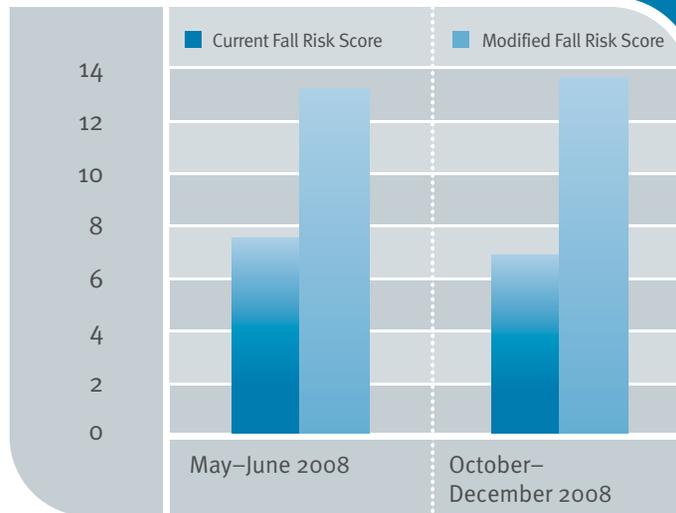
## Looking ahead

Fielding sees opportunities for further improvement in fall risk assessment and believes the whole process can be streamlined.

"We know we can decrease the time to conduct a fall assessment. We can refine the assessment process and improve efficiency in the pharmacists' work flow," said Fielding. "It's all about eliminating waste, a valuable [lesson] from PPC."

Fielding hopes to use this information to foster the understanding of the value that pharmacists add, not only in reviewing medications, but in looking at consequences, such as falls.

### Average Fall Risk Score on Admission



## Awards

- Poster presented at the 2009 American Society of Health-System Pharmacists (ASHP) Mid-Year Clinical Meeting
- Received letter of recognition from the Executive Vice President, UPMC

# IMPLEMENTING A CONCURRENT MEDICATION INTERVENTION PROCESS TO DECREASE HOSPITALIZED PATIENT FALLS

Eric Yarnell, RPh  
The Western Pennsylvania Hospital

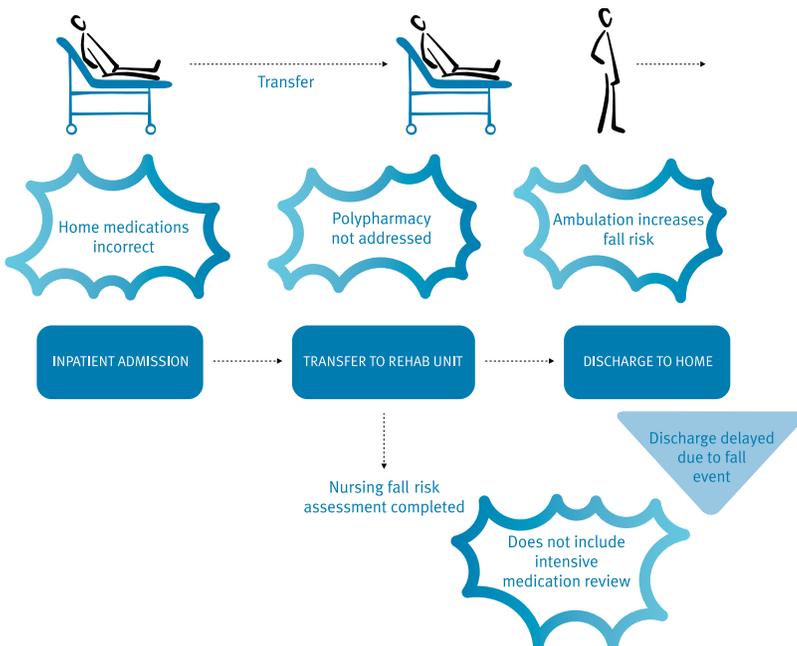
Accrediting and regulatory agencies are examining more closely than ever the instances when hospitalized patients fall. Patient falls can lead to significant injury, prolonged hospitalization, and even death. Besides the physical toll, the emotional toll for patients, their families and caregivers is also high.

Pharmacist Eric Yarnell was acutely aware of the Joint Commission’s National Patient Safety Goal 9, calling on hospitals to “reduce the risk of patient harm resulting from falls.” Yarnell saw a link between that goal and Goal 8, “Accurately and completely reconcile medications across the continuum of care.” He wondered whether his hospital was fully examining the role of medications in patient falls, considering that patients who take numerous medications are at an increased risk for falling.<sup>1</sup>

## Examining the current condition

Between August 2007 and July 2008, 272 patient falls occurred in the hospital. Of those, 31 falls, 11% of the total, occurred in the Acute Rehabilitation Unit. Yarnell’s group focused their efforts on that unit. They wanted to know where breakdowns in communications or nonspecified work could leave patients vulnerable to falling.

The current condition drawing shows several areas of vulnerability. Patients arrive at the hospital without a complete list of medications, or may be taking their medications incorrectly. Once in the hospital, their entire slate of medications is sometimes not fully examined for interactions. Perhaps most significant, although the nursing fall risk assessment is completed, the form does not take into account how many medications the patients are taking. So when these patients become ambulatory, they are at an increased risk for falls.



The current condition drawing clearly shows where the trouble spots are. The team begins to work on problems over which it has control – fall risk based on medication review.

<sup>1</sup> Susan J. Blalock, Carri Casteel, Karen B. Demby, Stefanie Ferreri, and Mary T. Roth., “Methodology of an ongoing, randomized controlled trial to prevent falls through enhanced pharmaceutical care,” *The American Journal of Geriatric Pharmacotherapy* 6.2 (2008): 61-81.



Other conditions raise the fall risk flag, such as patients taking higher-than-usual dosages, or taking medications known to raise the risk of falls. The new form creates a way to modulate and intensify the fall risk as necessary. The result is a far more accurate picture of the patient's likelihood of falling.

If a pharmacist notices the prescription of a high-risk medication for which there is a low-risk substitute, he or she sends a standardized pharmacy communication sheet to the physician, as part of standard communication. Here is one example:

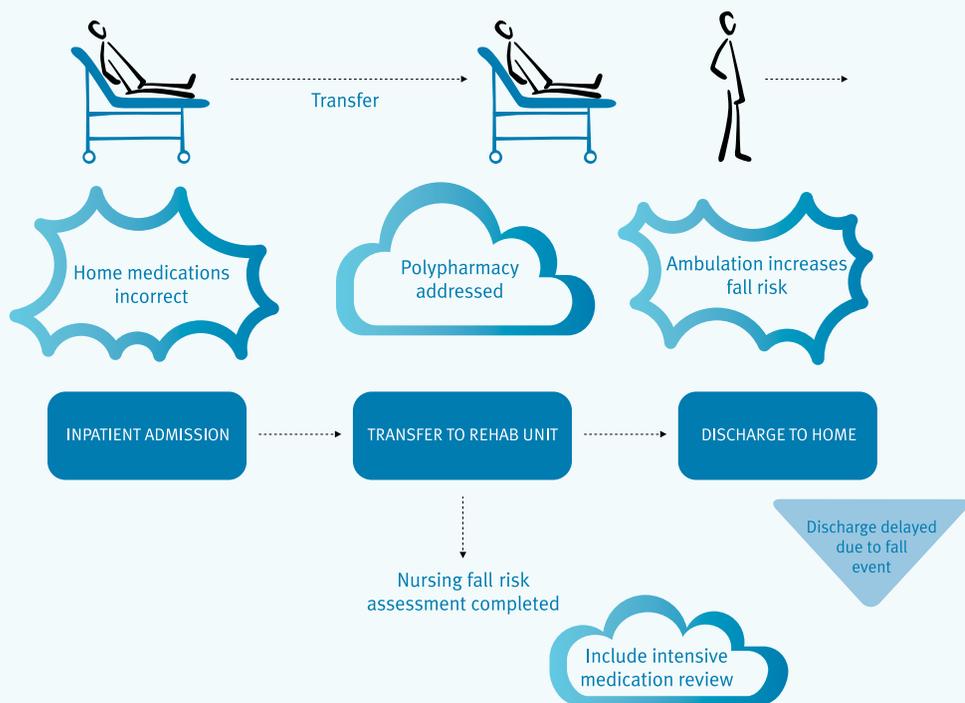
Dear Doctor,

RESTORIL 30mg has a potential to contribute to an increased risk of patient falls. Please consider ordering a lower dose of RESTORIL or changing to a shorter acting sedative such as AMBIEN.

Thank you.

Medication Fall Risk					
Indications in each category and see scale below to measure fall risk due to medications.					
<b>Medications</b>					
Antidepressants:	Bupropion Citalopram	Doxepin Effexor®	Fluoxetine Fluvoxamine	Lexapro® Paroxetine	Sertraline Venlafaxine
Sedatives:	Midazolam (Versed®)	Triazolam			
Antipsychotics:	Aricept®	Galantamine	Rivastigmine		
Antihypertensives:	Amiloride Amlodipine Atacand® Atenolol Avapro® Benazepril Benicar®	Bisoprolol Captopril Carvedilol Clonidine Cozaar® Diltiazem Diovan®	Enalapril Felodipine Furosemide HCTZ Labetalol Lisinopril Metoprolol	Micardis® Monopril Propranolol Quinapril Ramipril Sotalol Spironolactone	Triamterene Verapamil
Antipsychotics:	Clozapine	Seroquel®	Zyprexa®		
Antidiabetics:	Chlorpropamide Glimiperide	Glipizide Glyburide	Insulin Prandin®	Starlix®	
Anticholinergics:	Belladonna	Dicyclomine	Hyoscamine	Librax®	Propantheline
<b>High Risk Medications</b>					
Antidepressants:	Amitriptyline Clomipramine	Desipramine Imipramine	Mirtazapine Nortriptyline	Trazodone	
Sedating Antidepressants:	Alprazolam	Lorazepam	Oxazepam	Temazepam	
Antipsychotics:	Chlorpromazine Haloperidol	Hydroxyzine Lithium	Perphenazine Pachloperazine	Risperidone Thioridazine	Trifluoperazine
Antihistamines/Anesthetics:	Chlorpheniramine Cyproheptadine	Diphenhydramine Hydroxyzine	Meclizine Pachloperazine	Promethazine Scopolamine	
Anticonvulsants:	Amantadine	Bromocriptine	Comtan®	Levodopa	
Antidepressants:	Carbamazepine Depakote® Gabapentin Nifedipine	Keppra® Lamotrigine Lyrica®	Mirapex® Pergolide Phenobarbital	Phenytoin Selegiline Topamax	Valproate
Antipsychotics:	Beverages	Cough Syrup	Elixirs		
<b>Low Risk Medications</b>					
	Codeine Darvocet®	Fentanyl Hydromorphone	Meperidine Morphine	Oxycodone Percocet®	Vicodin®
Sedatives:	Chlordiazepoxide	Clonazepam	Diazepam	Flurazepam	
Antidepressants:	Carisoprodol	Chlorzoxazone	Cyclizapine	Metaxalone	Met. h. carb. b. amol
Antihypertensives:	Doxazosin	Hydralazine	Isosorbide	Nitroglycerin	Terazosin
# of Low Risk Meds X 1 =					
# of Mod. Risk Meds X 2 =					
# of High Risk Meds X 3 =					
Total Score:					
			<b>Fall Risk</b>		
			Score:	Risk Level	Risk Score
			0-3	Low	5 pts
			4-7	Moderate	10 pts
			>7	High	15 pts

The team also added a tool to document outcomes. Clinical interventions are already entered electronically in a quarterly report. Yarnell's group added a feature to the software so that information about falls is now automatically included.



New current condition: The issues of looking carefully at patients taking many drugs, and accurately assessing their risk of falling, have now been addressed. Other issues remain for further problem-solving.

## Results

Yarnell’s group discovered, in retrospect, that the revised Medication Fall Risk Assessment form could have predicted risk in some documented falls. Of seven patients who fell in the six months before the study began, five would have been called out as “high risk” on the new form; the other two would have been placed at “moderate risk.” Regular nursing assessments may also have identified these patients as “at risk,” but considering the pharmaceutical implications could have made those assessments more accurate, triggering a higher level of protection.

“Certain medications have a greater impact on risk than others,” said Yarnell. “The fall risk assessment now reflects that, and gives pharmacists the opportunity to intervene more directly. And although we recognize that physicians won’t follow every recommendation, we feel our voices are heard more now.”

## Progress ahead

Since the conclusion of the Pharmacy Agents for Change Fellowship, the Medication Fall Risk Assessment form and its interventions have become standard in all units at the hospital. In the future, Yarnell hopes to link or merge the Medication Fall Risk Assessment form and Nursing Fall Risk Assessment form.

“That is a loftier goal,” said Yarnell. “But doing this project was lofty, too, and was a real eye-opener for us.”

# MEDICATION RECONCILIATION AND PATIENT EMPOWERMENT AT THE COMPREHENSIVE LUNG CENTER

**Karen Steinmetz Pater, PharmD, BCPS, CDE**  
**UPMC Comprehensive Lung Center**

Pharmacist Karen Pater was concerned. She knew that adverse drug events (ADEs) among ambulatory patients were surprisingly common.<sup>1</sup> She also knew that the 250 ambulatory patients seen each week at the UPMC Comprehensive Lung Center (CLC) frequently used at least two types of drugs – antibiotics and corticosteroids – that were subject to errors in prescribing and monitoring. Furthermore, the average patient took a total of nine or more medications, putting them into the “polypharmacy” category that required special attention.

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<sup>1</sup> *Annals of Pharmacotherapy* 41 (2007): 1411–26.

## THE GOAL OF THE CLC PROJECT WAS TWOFOLD:

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- Goal #1:** Improve the accuracy of medication lists by enhancing the current medication review process.
- Goal #2:** Actively engage patients to partner with healthcare providers to meet their medication-related needs.

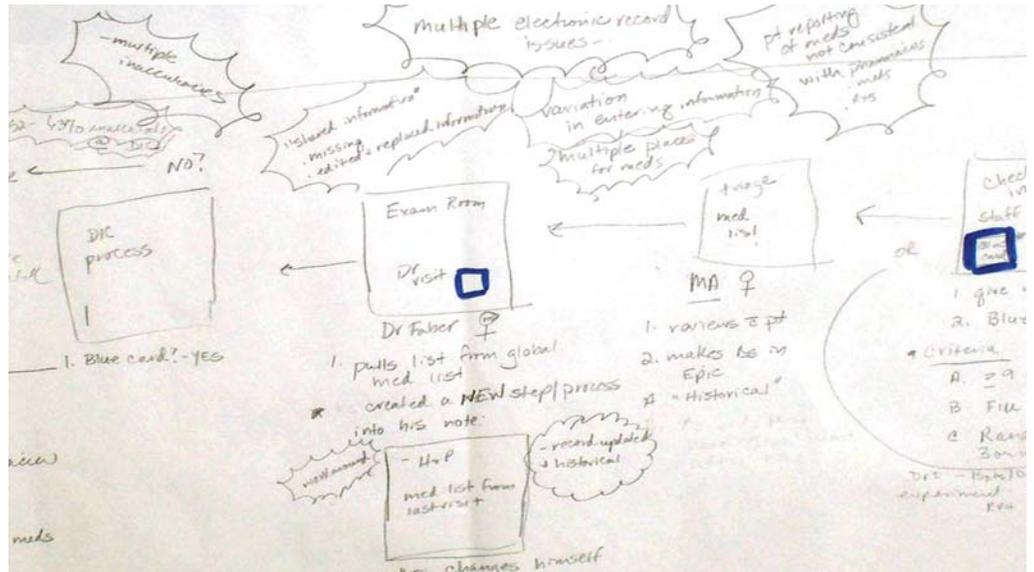


## Goal 1: Enhance the medication review process

### Current condition

“Learning to look at the problem another way, this was a unique thing we learned in the Pharmacy [Agents for Change] program,” said Pater. “Observation is enlightening, and although it takes some time, it’s worth the effort. You learn a lot about the way work actually happens.”

Pater’s team created a current condition drawing (to the right), showing graphically the steps of the process and the “storm clouds” or problem areas along the way. Narrowing the problem down to a manageable scope allowed the team to look at what they could fix in the medication review.



“The drawing is simple and succinct,” said Pater. “We’re dealing with a lot of different disciplines and people with differing education levels, and a simple drawing like this speaks to everyone.”

The team discovered that medication review, while it occurs at each visit, is done to different standards. The definition of “medication review” can vary from professional to professional. For example, a medical assistant who asks the patient, “Is your medication list accurate?” may believe he has completed a medication review. A pharmacist would differ with that assessment.

The medication review process, as examined through the lens of an A3, revealed at least three definitions of “medication review.” Medical assistants averaged approximately 48 seconds discussing medications with patients; a conscientious physician, 2.5 minutes; a pharmacist, 15 to 20 minutes.

“Obviously, a pharmacist is going to be more thorough, asking probing questions designed to uncover drug interactions and other hidden problems,” said Pater.

*“It is difficult to believe that we can transplant multiple organs into a single recipient, but we can’t make a simple medication list accurate. If we can’t improve on this simple task, then nothing else that we [might] do in health care will make much difference.”*

— Dr. Christopher Faber,  
Medical Director, Comprehensive Lung Center

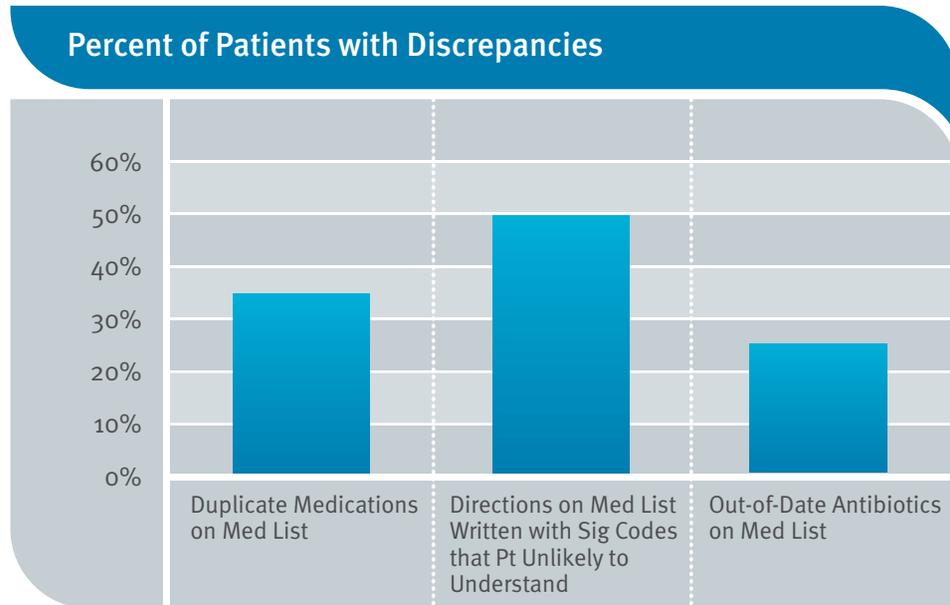
### Countermeasures

Looking at work this way led the team to its first countermeasure: Initiation of clinical pharmacy service to provide comprehensive medication reviews with “easy to read and understand” directions for use. The team created the following form, free of medical jargon and easy to follow.

Personal Medication Record								
PATIENT NAME: Mr. XXXXXXXX		ALLERGIES: Penicillins, Caffeine						
DATE OF BIRTH: 7/1/1937		PHARMACY: Giant Eagle or the VA						
PATIENT REPORTED MEDICATION LIST AS OF: 7/11/2008								
Key: M = Morning		L = Lunch		D = Dinner		B = Bedtime		
Medication	Directions	Dosage Schedule				Disease State(s)	Goal of Therapy	Notes
		M	L	D	B			
<b>PRESCRIPTION MEDICATIONS</b>								
Xopenex 1.25mg/3ml Nebulizer Solution	Use twice daily via nebulizer	X		X		Lung Disorder		Use with Ipratropium 0.02% solution
Ipratropium bromide 0.02% Solution	Use twice daily via nebulizer	X		X		Lung Disorder		Use with Xopenex solution
INTAL 800 mcg inhaler	Inhale 2 puffs 4 times a day	X	X	X	X	Lung Disorder		Should be spaced every 6 hours
ASMANEX 220 mcg inhaler	Inhale 1 puff daily	X				Lung Disorder		

## Results

Pharmacists began to complete comprehensive medication reviews at the CLC, patient by patient. Each session included a patient survey of medication use (what the patient reported taking) and an in-depth pharmacist interview, using the review form.



By the end of the program, 20 patients had been screened, and 18 of them (90%) were found to have medication discrepancies, (problems such as duplications, discontinuations, unclear writing and the like). One patient had 11 discrepancies; however, the average was 3.45 per patient.

Of the patients with medication discrepancies, part of the misunderstanding on their part stemmed from the fact that the physician wrote the directions on the list in “Sig Codes,” the Latin abbreviations meant for pharmacists, which patients are unlikely to understand. Duplicate medications occurred about 35% of the time, and out-of-date antibiotics appeared about 25% of the time.

Pharmacists documented a total of 69 medication discrepancies for these patients and updated them all in the system.

Today, Pater says, “Our rates of duplicates and out-of-date antibiotics are now under 10% and falling. It’s not perfect yet, but it’s much better than before.”

## Goal 2: Engage patients in helping providers meet their medication needs

### Current condition

Once these comprehensive medication reviews were complete, attention turned to ways of moving upstream in the system to prevent medication discrepancies from occurring in the first place. Patients themselves would have a larger role to play.

Patients often arrived at the CLC with an incomplete understanding of (a) the drugs they were supposed to be taking, and (b) the drugs they were actually taking. The comprehensive medication review revealed a gap between what the patient thought and what was actually happening (see chart).

While discussion sometimes centers around “patient empowerment,” something else was needed here. Patients not only need permission to take charge of their medications, but encouragement and a degree of expectation as well.

Pater’s team devised a Medication Passport, an attractive, quad-folded form about half the size of an actual passport but with a similar graphic on the front. Inside, patients were to track the medications prescribed to them, as well as any other medications, herbal remedies and vitamins they were taking. The Medication Passports were mailed to every CLC patient, with clear and inviting instructions.

Patients’ responses were immediate and positive. Of the first 33 people to arrive in clinic for appointments following the mailing, 18 (54.5%) brought a completed Medication Passport to review with their clinical team.

“The feedback on the Medication Passports was great,” said Pater. “Patients felt like a real member of their own healthcare team, which is the way it should be.”

### Still learning

Pater acknowledges the importance, and the difficulty, of involving every staff member in the process of change. And for a major change program like this one, strong communication and interpersonal relationships help move the work along.

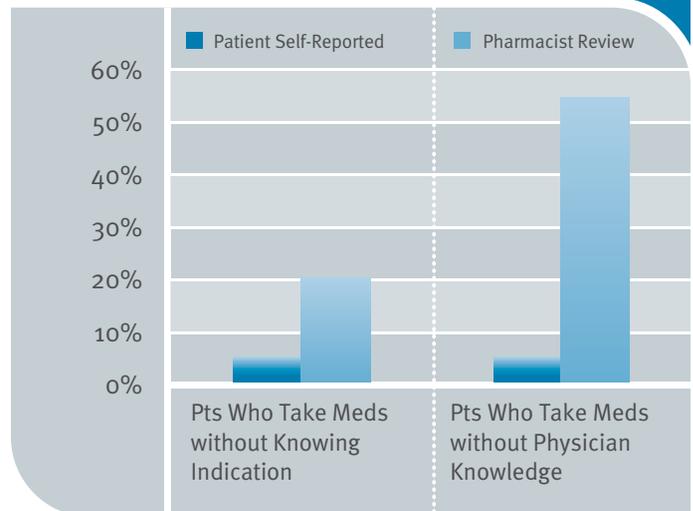
“Still sometimes, our significant learnings don’t trickle all the way through the organization,” she said.

“Little by little, everyone is getting on board though.”

Another difficulty is providing improvement data that are compelling enough for an academic medical organization. Still, Pater notes, there is strong anecdotal evidence of improvement. One patient had been admitted to the hospital for medication-related problems six times in the prior year. Following her comprehensive medication review and issuance of her Medication Passport, she concluded the following year with zero hospitalizations, and only one trip to the ER.

“That’s an N of 1,” she sighed. “But we have a number of these kinds of anecdotal examples. We know we are making a difference.”

### Patient Perception vs. Reality



Pharmacists noted a gap between what patients reported about their medications, and what was actually occurring. This gap spurred the idea of a Medication Passport.



Medication Passport

# CONCLUSION

Complexity in the hospital pharmacy will only increase. As more complicated medication regimens and “polypharmacy” become standard fare in health care, managing medications will be an ever-increasing challenge. Consistent medication reconciliation as patients transition from one care setting to another is an important element for improving care and preventing patient injuries. But only systematically integrating medication management across all care settings will produce optimum results for patients, as well as for healthcare professionals and payors. Learning how to meet this challenge is at the heart of the Pharmacy Agents for Change Fellowship.

The stories in this edition of *ROPS* demonstrate the ease with which the current system allows errors to slip through. The national statistics on patient harm and death provide the most dramatic examples of a system in crisis. Beyond that, however, is the subtler story of how acutely medications can affect whole areas of patient care, like falls, disorientation, co-morbid conditions, and drug resistance or, on the positive side, the simple joy of a morning cup of coffee. In the end, these are stories about highly educated, altruistic, dedicated pharmacists struggling to work within and change a system that is imperfectly designed to get the best results.

## Systems thinking

The layered and complex web of issues facing a modern hospital pharmacy makes it difficult to accomplish even fundamental tasks, like reconciling which medications a patient is taking when they are admitted to and discharged from the hospital. So overwhelming was this basic task that the Joint Commission, which had enshrined it as National Patient Safety Goal (NPSG) 8, partially rescinded it--not because it had become less important, but because no hospital had designed a consistent, reliable way to make it happen every time.

Typical of published goals and guidelines, NPSG Goal 8 described what should be done, but not how to do it. It failed to take into account the system’s nature of medication reconciliation, and that change requires collaboration across “silos” of departments, professions and “turf” that is difficult to achieve in the typical American hospital. Building a collaborative environment takes time, effort, leadership and a new way of looking at problem-solving.

## No electronic panacea

Those in search of a one-size-fits-all “magic bullet” for fixing the problems endemic to the modern hospital pharmacy will be disappointed. Computerized physician order entry and electronic health records will help – indeed, they are essential – but they

will not be the complete answer. In fact, when electronic interventions are introduced into a flawed, fragmented delivery system, the result is often a larger crisis accelerated with electronic speed.

When pharmacies and hospitals first start to untangle their underlying delivery system piece by piece, as demonstrated by the pharmacists here, they create the platform for the successful introduction of electronic systems. Perfecting Patient Care<sup>SM</sup> provides a framework for fixing long-entrenched problems, paving the way for the successful launch of electronic systems.

## Team building

Pharmacists' expertise benefits bedside care, as shown when pharmacists round with physician teams. Their detailed understanding of how drugs work is a primary resource for those who actually administer them to patients. And there is no substitute for a pharmacist at the bedside asking astute questions of patients and revealing issues that can be resolved or avoided.

Making clinical pharmacists full members of every healthcare team is essential to improving patient care. Doing so will involve breaking down the pharmacy "silo" and viewing the pharmacy not as a location in the hospital, but as a team of cross-functional experts who are integral to the delivery of patient care.

## Payment system

Payment structures may at last begin to reflect the integral nature of pharmacists' work. In 2010, expanded CMS guidelines will broaden the pharmacy consultation benefit to include a mandatory quarterly review to identify eligible members. Pharmacists will be paid to review a beneficiary's medications and make recommendations to the physician. They will receive additional payments if they recommend a less costly therapeutic equivalent to the patient. Health plans will be required to provide access to the benefit, regardless of the number of chronic health conditions and medications a patient may have.

The courageous pharmacists whose work appears in this edition have highlighted the reality on the ground. Sweeping change begins when the people who do the work solve one specific problem, then another. Perfecting Patient Care<sup>SM</sup> offers a way to look at problem-solving in a new and hopeful way, and to make measurable progress quickly.

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Centre City Tower, Suite 2400  
650 Smithfield Street, Pittsburgh, PA 15222  
Phone: 412.594.2550  
Fax: 412.232.6240  
Email: [info@jhf.org](mailto:info@jhf.org)  
[www.jhf.org](http://www.jhf.org)

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