The Patient Safety and Clinical Pharmacy Services Collaborative National Performance Report
PSPC 3: October 2010 - September 2011

Communities Organizing Integrated Delivery Systems With Clinical Pharmacy Services

For Patients With Chronic Conditions Whose Health Status and Safety Are Persistently Not Under Control

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Value Proposition: The nation’s communities have high medication risk patient populations that are in crisis. Community partners offer their high risk patients an innovation in service delivery design that can bring health status and safety under control. They offer a business case innovation where health plans can manage a reduction in health care costs by shifting patients from high cost uncoordinated care to lower cost coordinated care.

I. The Patient Safety Clinical Pharmacy Collaborative, in its third year (PSPC 3), is spreading an innovative delivery system able to save and improve the lives of chronically ill patients with high medication risk. These patients are in crisis every day.  

II. At least 15% of the nation’s population, 46 million of 310 million people (2010), is estimated to be high medication risk patients needing special coordinated care delivery systems with Clinical Pharmacy Services (CPS).  

III. Installing PSPC delivery systems nationwide will create a strategic opportunity for health plans to bend the cost curve by avoiding services costing on the order of $300B - $500B (10% - 15% of total spending.)  

IV. PSPC community partnerships, heavily involved in the safety net, estimate that 30% of their patients have an urgent need for coordinated Clinical Pharmacy Services.  

V. With volunteer participation in PSPC by communities, 66% of enrolled teams indicate that they are able to go operational within a 6 month period by focusing on small patient populations of focus.  

VI. Teams guided by a Change Package of best practices, deliver a coordinated set of outpatient primary care and clinical pharmacy services to a high risk patient population whose care and progress is managed using a simple patient registry.  

VII. Once operational, PSPC teams report that they are able to produce rapid improvement in health status over 6 to 12 months. Teams used markers for a number of conditions to see what percent of a population, not at standard (out of control) on the marker could be brought to the standard. For diabetes (A1C) it was 35%, for hypertension (Blood Pressure) it was 43%, for dyslipidemia (LDL) it was 37% and for anti-coagulation (INR) it was 51%.  

VIII. PSPC Team experience demonstrates that high medication risk patients require medication safety systems. When error screening is added, teams report an average of 1.5 potential errors per patient encounter (pADE) at startup. Of the 41 reporting teams, tracking 52 Populations of Focus (with 4 or more months tracking CPS), 32 indicated they were able to drive pADEs down, reducing average pADEs from 1.5 to .8 per patient encounter. These teams reported that harmful events (Adverse Drug Events or ADEs) decreased from .7 to .5 per patient.  

IX. PSPC advanced teams are ready to launch a second collaborative to bring their PSPC delivery systems to full scale. This will require the development of payment reform collaborative in many states.  

X. PSPC is engaging a number of national partners to accelerate the spread of the PSPC model across communities, with a goal of reaching 3,000 communities by 2015.
PSPC 3 VALUE PROPOSITION

**Value Proposition:** The nation’s communities have high medication risk patient populations that are in crisis. PSPC community partners offer their high risk patients an innovation in service delivery design that can bring health status and safety under control. They offer a business case innovation where health plans can manage a reduction in health care costs by shifting patients from high cost uncoordinated care to lower cost coordinated care.

Community partnerships can install PSPC delivery systems that bring the health and safety of their high medication risk patient populations under control. In the traditional delivery system these populations have one or more chronic conditions persistently out of control, face serious medication safety risks, and incur high cost uncoordinated care.

Regardless of their insurance coverage, these patients do receive care, and when they do, it turns out to be very costly and ineffective. They get expensive uncoordinated care, often for acute episodes that occur because they did not get coordinated care earlier.

PSPC community teams are demonstrating that delivery systems can be organized to address the special needs of these populations. These delivery systems employ:

- Quality improvement using a patient registry
- Integrated clinical pharmacy services with outpatient primary care
- Clinical team management of the population of focus
- Patient-centered method

Putting these elements in place requires executive and clinical leadership.

Installing a PSPC delivery system is carried out in manageable stages beginning with small patient populations of focus. Staging enables the PSPC partnerships to establish the necessary culture and operations, and to secure the funding arrangements that take the model to scale.

Once the integrated care is available PSPC teams have achieved dramatic improvement with the Populations of Focus (PoF):

- Of the populations not at standard on health status markers, from 11%-50% were brought to standard over a 12 month period.
- Screening uncovers mistakes, potential ADEs, of 1.5 per patient encounter. Quality improvement is able to cut that mistake rate by 46% in twelve months.
- Harmful events, ADEs, are systematically reduced by 28%, from 0.7/patient encounter to 0.5/patient encounter.

Community partnerships can offer health plans value purchasing arrangements that enable health plans to manage aggressively for population-based cost reduction. Payment policies in most states are not set up to finance these breakthrough delivery systems. Therefore, PSPC will create state forums where community PSPC teams can develop partnerships with health plans in the state to systematically manage the cost reductions for these high risk, high cost populations.
I. The Patient Safety Clinical Pharmacy Collaborative, in its third year (PSPC 3) is spreading an innovative delivery system able to save and improve the lives of chronically ill patients with high medication risk. These patients are in crisis every day.

People are the heart of the PSPC campaign. It brings together people for whom the current system does not work with people who want to change the system to meet the needs of high risk patients.

**University of Mississippi, MS**

“One patient has an A1C of 9%. She currently is taking glipizide/metformin 5/500- 2 tabs in the am and 1 tab in the pm. She reports having diarrhea after dose changes with metformin. It is necessary to intensify her glucose lowering therapy, but at this time she is not willing to initiate insulin. Therefore, I chose to recommend Actos, as increasing her metformin will likely lead to increased incidence of diarrhea and could result in non-compliance. Also, the patient has triglycerides of 256, and her insurance will not allow her to fill Welchol. I recommended OTC fish oil as well as generic fenofibrate. These affordable options allow the patient to have access to drugs that will help reduce her triglycerides and improve her overall lipid panel. This intervention improved her compliance, gave her access to affordable medications, and possibly eliminated her risk for an ADR from an increased metformin dose.”

**Patients Centered Care is Personal**

**White River Kensett, AR**

“One of our patients was experiencing dangerously high blood pressure measurements (baseline 200/100). When discussing his medications during an office visit, it was discovered that the patient was taking two clonidine tablets every morning, instead of one tablet twice daily as directed. The patient was also taking a beta-blocker and an angiotensin converting enzyme inhibitor for hypertension, but in suboptimal dosages. After consultation with the provider, his ACEI dose was optimized, and the clonidine tapered and discontinued. The patient is now at blood pressure goal and no longer experiencing rebound hypertension.”

**Clinicas del Camino Real, CA**

“Our patient is a 33 year old Hispanic Male with type 2 Diabetes that who was started on Leveemir, Lisinopril/HCTZ 20/25mg, and Simvastatin 40mg the preceding week. The patient presented to the clinic for a CPS visit with an initial BP of 80/42, rechecked 102/57. The patient complained of frequent dizziness since starting all new medications. Upon review of the patient’s chart, pt was consistently normotensive at all clinic visits. The pharmacist decreased the patients Lisinopril HCTZ dose by half and consulted with the patient’s PCP. After discussing the patient’s blood pressure, the provider and pharmacist agreed that the Lisinopril dose could be decreased and the HCTZ could be discontinued in the future.”

**Medication Therapy Requires Coordination**
Safety Requires Changing Practice.

El Rio, AZ

“We were documenting misuse of colchicine in our patients. This medication is supposed to be used for acute episodes of gout instead of on a chronic basis. Based on our review, we were able to run a report from our pharmacy database and send a report out to providers so that they could address this with the patient. We discussed this both at P&T and at the provider meetings at which time we identified multiple ways to avoid this in the future like by educating the prescribers and pharmacy department on not prescribing or dispensing colchicine unless it is for an acute flare-up.”

“We have eliminated medications from our formulary when we receive an FDA alert or guideline changes. Example: glyburide and Avandia were recently removed from ADA guidelines for treatment of diabetes due to profound hypoglycemia and cardiac risk. As such, we removed both from our formulary and actively contacted providers whose patients are on those medications so that they could replace those products in the patient’s regimen.”

Siouxland, IA

T.D. is a 42 year old white female with a history of type 2 DM for 7 years, hyperlipidemia, hypertension, depression/anxiety, endometrial cancer in 2009, and renal insufficiency. She was on a total of 14 medications. After receiving treatment for her endometrial cancer her blood glucose levels have been difficult to control. On 2/15/10 her A1C was greater than 15%. At this time her provider asked that our nurse case manager contact her on a weekly basis to provide diabetes education and management. The nurse case manager discussed the patient with the Pharmacists for recommendations on her medications, especially her diabetes medications. Weekly adjustments are made to her insulin regimen by the Pharmacists and the nurse case manager. Her most recent A1C was 7.0% on 08/09/2010. T.D.’s life has been saved by getting her A1C almost to goal. The risk of retinopathy, neuropathy, and nephropathy have been reduced significantly as well as risk for cardiovascular disease, the number 1 killer for patients with diabetes, by getting her A1C lower.

This outcome was accomplished by a dedicated nurse case manager, a provider willing to work within the framework of an integrated care team, and a clinical pharmacist who is an expert in diabetes and patient safety.

An Integrated Care Team Makes it Work
II. At least 15% of the nation’s population, 46 million of 310 million people (2010), are estimated to be high medication risk patients and may need special coordinated care delivery systems with clinical pharmacy services.

A significant part of the population is well served by the existing health care system. There is, however, a part of the population that is not well served.

There are high medication risk populations experiencing several of the following situations and conditions:

- Multiple chronic conditions
- Multiple medications
- Multiple providers
- Dangerous medications
- Access to care barriers.
- Poor medication adherence
- High utilization of the most expensive care.

For many their conditions and situations are correctable. There are evidence-based treatments and service delivery systems that can bring their health status under control.

**THE NATIONAL MEDICATION CHALLENGE**

**Figure 1**

**Figure 2**

*Based on a number of studies, PSPC teams estimate that at least 46 million people (15% of the population) fall into the high risk category.*
The population is in crisis. Its health status is persistently out of control. Over time it receives expensive services (emergency room, in patient care) and its health status does not improve.

Figure 3

Call for disruptive Innovation… uncoordinated care

USA Population

Healthy or Under Control

Does not work

Harmful, Waste $ 

Health Plans

Traditional

Specialist

Primary

Hospital

Transactional

A new delivery system must be created to care for the 15% of the population who do not have their health and safety under control.

In 2008, a feasibility study was carried out to see if there were best practices that were able to effectively serve the high medication risk population. A review of 34 high performing health care organizations concluded that service delivery systems could be tailored to meet the needs of the population. These systems have clinical pharmacy services integrated with outpatient primary care.

Figure 4

Review of Best Practice: CPS Integrated With Primary Care Produces Rapid Improvement In Health Status & Safety

Change Package. 7/08, RTI International:
Based on review of 34 high performing health care organizations

Optimum Health Outcomes

No Avoidable Adverse Events

High Medication Risk Patient Population

Integrated Patient Care

Clinical Team

Clinical Pharmacy Services
III. Installing PSPC delivery systems nationwide will create a strategic opportunity for health plans to bend the cost curve by avoiding services costing on the order of $300B - $500B (10 - 15% of total spending)

The 46M high risk patients cut across all age groups and all pay sources. Research is uncovering how this population affects costs and is creating opportunities to gain control of significant costs.

Research has shown the opportunities for cost avoidance are significant.

There is a two step strategic opportunity for the nation’s health care system:

1. Moving high medication risk patients from uncoordinated care to coordinated care will improve the health status of a significant part of the population.
2. Improving the Health Status of a high cost population can shift their utilization from high cost to low cost services.
PSPC creates an opportunity for health plans in partnership with providers to bend the health system cost curve down.

**Figure 7**

<table>
<thead>
<tr>
<th>A matched comparison</th>
<th>Cost per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,081 uncoordinated care patients</td>
<td>$17,061</td>
</tr>
<tr>
<td>37,873 coordinated care patients</td>
<td>$9,721</td>
</tr>
<tr>
<td>Savings opportunity</td>
<td>$7,340</td>
</tr>
</tbody>
</table>

“The Health Care Imperative, Institute of Medicine, 2011
Cost of Uncoordinated Care, Mary Kay Owens, SEC, Inc

If all health plans were able to shift 46 million high risk patients from uncoordinated care to coordinated care, there would be a $300B - $500B reduction in care costs ($7,000 - $10,000 saving opportunity per patient).
PARTNERSHIPS THAT WORK FOR HIGH RISK PATIENT POPULATIONS

IV. PSPC community partnerships, heavily involved in the safety net, estimates that 30% of their patients have an urgent need for coordinated Clinical Pharmacy Services.

Under PSPC, community partnerships assume accountability for the high risk patient population. Usually a primary provider has stewardship for a patient population where the current service arrangements are not sufficient to deliver health improvement and safety. By forming a partnership an integrated service delivery system can be constructed to provide the extra level of care.

By July of 2011, PSPC had enrolled 126 Teams from 43 States. The partnerships establishing those teams involved 330 organizations.

The partnerships are anchored in many of the nation’s safety net programs (Community Health Centers, Critical Access Hospitals, HIV/AIDS Clinics, Rural Health Centers). These organizations are likely to be serving patients with more chronic conditions and more severe conditions.

Each partnership has an average of 3 partners. 17 Schools of Pharmacy have participated in PSPC teams across the country (appearing on approximately 28% of the teams). Hospitals appearing on over 9% of the PSPC Teams.

Each partnership is responsible for a patient population under care. The size of those populations ranged from small (less than 500 patients) for specialty practices (e.g., HIV/AIDS) to large (up to 20,000 patients) for general population practices (FQHC’s). The partnerships estimated how many of their total patient population required CPS. Specialty providers had lower total populations but higher percent needing CPS. For providers with large primary care populations about 25% of the total population required CPS, or almost double our estimates for the total national population.
In general, the size of the team high medication risk populations was determined to be beyond the reach of the resources and capabilities at hand. A full scale delivery system would require major changes in information systems, securing CPS staff, adjusting clinical protocols, establishing new payment arrangements. Therefore, it was concluded that the teams would grow the new delivery system in small, rapid stages. The high risk population would be broken down into small populations of focus that are manageable with resources at hand. A delivery system would be built and tested for a population of focus and success would be scaled up and spread.

The urgency of the crisis called for immediate and sustained action. The urgency follows from the high risk faced by the patients. When teams were surveyed about the risk they identified three situations faced by the patients: the large number of medications taken, multiple numbers of conditions, and multiple providers involved.

**The High Risk Nature of the Population**

- 8 drugs per patient (Fig 11)
- 4 Chronic Conditions per Patient (Fig 13)
- 3 Providers per Patient (Fig 12)

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* General population service delivery systems
With volunteer participation in PSPC communities, 66% of enrolled teams indicate that they are able to go operational within a 6 month period by focusing on small patient populations of focus.

Community partnerships volunteer to participate in PSPC. The number of teams and organizations ready to take on this challenge indicates that interest is high. The rate at which teams go operational in a short period of time indicates that partnerships have a high degree of readiness to implement a PSPC service delivery system with resources at hand. By pacing the scale up with small patient panels, teams can go operational quickly.

Teams are considered operational when they are able to see patients, manage their care and share their performance information. In September 2010, 126 teams enrolled in PSPC 3. Over the next 12 months the teams attempted to go through a 12 month change process. Over the 12 month period, 85 of 126 teams became operational (67%). With increased administrative and technical support, the rate at which teams become operational has the potential to increase to 80 – 90%.
PSPC teams build the new delivery system by managing one or more carefully defined “Populations of Focus” or “PoF.” The Population of Focus is a panel of patients whose care a team has sufficient capability to deliver, track and manage. It is a purposeful sample designed to make it easy to manage and track improvements.

PSPC is about immediately serving patients to save their lives and bring them out of crisis. Populations of Focus enable teams to be in action immediately regardless of the state of the existing infrastructure. Teams are encouraged to start with small, manageable patient panels. Growth is managed by adding new PoFs.

Teams are asked to construct patient panels that meet four conditions:

1. **Common Health Status Marker**: Select a patient group where all patients have a common lead chronic condition (diabetes) or dangerous medication (anticoagulation). Use that condition to select a marker for “under control.” A marker is a measure (like A1C) and an accepted standard for health (A1C ≤ 7). That one marker is tracked as an improvement signal to PSPC.

2. **Baseline at 0%**: All patients in the Population of Focus have the lead condition persistently “not under control”. The 0% baseline makes it easier to see performance. Teams use patient records and consult with MDs to select patients.

3. **Size is Small and Manageable**: Pick a number of patients that can be served immediately with existing clinical resources and information system resources.

4. **Useful registry at hand**: To manage the population, have a practical way to track over time the patients’ service, health status and safety.
An expert panel selected health status markers for 7 common conditions or situations. Five of seven represent outcome measures: Anticoagulation, Depression, Diabetes, Dyslipidemia, and Hypertension. Two are process measures: Asthma and HIV/AIDS.

Figure 17

<table>
<thead>
<tr>
<th>Health Status Condition</th>
<th>Marker For Improvement</th>
<th>Time To See Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticoagulation</td>
<td>INR in Range</td>
<td>1-2 wk</td>
</tr>
<tr>
<td>Diabetes</td>
<td>A1c &lt; 7%; A1c &lt; 9%</td>
<td>3 mo.</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>LDL at goal</td>
<td>3 mo.</td>
</tr>
<tr>
<td>Hypertension</td>
<td>BP &lt; 140/90 mm Hg DM: BP &lt;130/80 mm Hg</td>
<td>3 mo.</td>
</tr>
<tr>
<td>Depression</td>
<td>Status (accepted scale)</td>
<td>6 mo.</td>
</tr>
</tbody>
</table>

Clinical Process Signal

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>On Controller Therapy</td>
<td>1-2 wks</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>On HAART</td>
<td>1-2 wks</td>
</tr>
</tbody>
</table>

Figure 18

<table>
<thead>
<tr>
<th># of Populations of Focus</th>
<th>Number of Teams</th>
<th>Distribution</th>
<th>Avg # of Patients per PoF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>56.0%</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>24.0%</td>
<td>41</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>14.0%</td>
<td>61</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>6.0%</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100.0%</td>
<td>71</td>
</tr>
</tbody>
</table>

Number of Populations of Focus by Team

50 Teams reported data on 85 PoFs with 44% of them tracking multiple PoF’s. The average number of Patients in the PoF’s was 71.
VI. Teams guided by a Change Package of best practices, deliver a coordinated set of primary care and Clinical Pharmacy Services to a high risk patient population whose care and progress is managed by a simple patient registry.

Becoming operational requires a team to develop a new service delivery system integrating primary care with Clinical Pharmacy Services and possibly other navigation and social services. The PSPC delivery system is captured in the “PSPC Change Package” document, a summary of best practice approaches identified in over 30 successful programs studied by RTI in 2008. This document is then updated annually to reflect the latest lessons learned.

The Change Package specifies a set of practices that can be adapted to the local situation. The PSPC delivery system has five defining components, referred to as strategies. When they are all in place, the team can expect to produce the intended results—safety and improved health for patients in a population of focus.

The strategy has 3 change concepts that make it operational. Each change concept shows up as a practice, protocol or process. Versions of the change concepts can be observed in high performing sites.
The “Change Package” is structured for implementation using a proven rapid change process called the “Model for Improvement” (Institute for Healthcare Improvement). Teams follow the well known “Plan-Do-Study-Act or PDSA” approach associated with quality improvement. Rapid testing of change concepts on small scales enables the team to systematically build the new practice. In the Change Package, each “change concept” has a number of suggested “action items that can be pursued using PDSA’s.

The faculty is experienced in the change package as the content was captured from their programs. The faculty coaches the teams in application and gain further insights about what works and how to make it better.

### Faculty Insights from the Model For Improvement in 2011

**Leadership Commitment:**
- Absolutely critical for teams. Clinical and executive leadership is challenging the teams to produce positive results.

**Measurable Improvement:**
- Teams experiencing breakthrough in “how do we get the data” and “how do we use it” 
- First two years teams focused on tracking health status. Now teams are focusing on how to identify and control pADEs and ADEs

**Patient Centered Care:**
- Have demonstrated the need to address health literacy
- Teams are actively building patient centered care elements into their programs

**Safety Medication Use Systems:**
- Most teams have a routine way of providing a systematic clinical pharmacy service. It is incorporated into their systems.

**Integrated Care**
- Clinical services are not distinct. Primary care and CPS are overlapping elements that flow into each other.
The PSPC model pays special attention to management of medications. With high medication risk patients, clinical pharmacy services have a dramatic payoff. CPS includes at least 10 kinds of activity that can add value to the care process.

The change package results in a new patient experience. Mini-Case Studies show the urgency and the kind of services that get provided:

- **Mini-Case Study 1** - Eastern Virginia Medical School Clinics, VA – *Dangerous Medications Call for a System Approach*
- **Mini-Case Study 2** - Holyoke Health Center, MA – *Complex Patient Situations Call for Care Coordination*
Mini-Case Study 1

Dangerous Medications Call for A System Approach

Eastern Virginia Medical School Clinics, VA

Caroline, a 65+ year old Caucasian woman, arrived for her routine 3-month visit at our rural HIV ID clinic. Her viral load was undetectable with a robust CD Count greater than 1000 (CD4 at 36%). Her medical history included HIV, diabetes, hypertension, hypothyroidism, obesity, peripheral neuropathy and depression.

Her medication regimen included tenofovir/emtricitabine, atazanavir, ritonavir, lisinopril, diltiazem, levothyroxine, pravastatin, aspirin, metformin, lantus insulin, paroxetine, and multivitamins. The dosages of all medications had been stable for the previous 3 months. Her current labs alerted us she was potentially in renal failure.

She was evaluated in the office. Prescription for tenofovir/emtricitabine, changed to abacavir and lamivudine. Appropriately dosed for reduced renal function. A phone consult with her primary care physician resulted in stat kidney studies and a same day appointment at their office. The primary care physician stopped metformin and reduced the lisinopril dose.

Caroline’s renal function returned to baseline values with preserved kidney function after therapy adjustment. Her viral load remained undetectable and CD4 count rose above 1400 (CD4 at 45%). The PSPC instituted initiative of standard lab sets for drug monitoring allowed for early detection and mitigation of adverse drug events for both ART and co-morbid therapy.

Patient Viewpoint – Caroline

“I cannot believe that this happened to me-I am so excited. I know this story is about me but I’m just nobody. But I’m getting the best possible medical care and these pharmacists’ services and doctors seem to have saved my life or kidneys. I am honored and humbled and so much in debt to my care team. At the time I really didn’t understand what possible problems I was facing. I live alone and must be as healthy as possible. My care team works with me to stay healthy. At 65 I’m feeling better than I did at 55 and the quality of my life keeps improving.” -- Caroline
Mini-Case Study 2

Complex Patient Situations Call for Care Coordination
Holyoke Health Center, MA

Marie is an 82 year old Spanish speaking patient with high cholesterol (LDL 73mg/dl), type 2 diabetes (A1C 10.1%), arthritis and a CVA in 2009. She is on 20 medications with duplication of therapy of 2 different statins being filled due to using mail order and our pharmacy. Marie had expired medications due to not taking them as directed; inconsistent refill dates due to multiple medication regimen and confusion of caretaker. Marie was only taking her medications in the morning when her caretaker checked in on her.

Marie was hospitalized recently for hypoglycemia due to caregiver lack of understanding of insulin. When her BG was 47mg/dl she gave insulin instead of glucose.

Marie was started on med boxes. All her medications were packaged by time of day depicted with pictures and English and Spanish directions. Her bolus insulin was discontinued since she could not understand how to use a sliding scale and was afraid of needles. Her bolus insulin was titrated and only once a day so her caregiver could give it. All mail order medications were stopped and she only fills medications here now.

Medication and insulin indications, use and technique were reviewed to improve adherence and decrease confusion. DM Education and proper hypoglycemia treatment. Marie’s A1C improved to 8.1 after 5 visits in 8 months. One BP med was discontinued after increased adherence. BP decreased from 142/80 to 130/65 and 110/70 in subsequent visits.

Physician Viewpoint – Dr. Billings

“Since the initiation of clinical pharmacy services, I no longer accept health-care disparities and a complicated medical delivery system as an excuse for not knowing what medications my patients are taking. I see the importance of a patient-centered team approach in preventing medical mistakes and adverse drug events. I truly believe that the way clinical pharmacy services are delivered at the Holyoke Health Center is the future model for health-care delivery systems in implementing safe and high-quality medicine. – Stephanie Billings, MD

HIGH MEDICATION RISK
• Multiple Disease States
• Poly-Pharmacy
• Multiple Medications
• Dangerous Medications
• Duplication
• Weak Adherence
• Expired Medications

ADVERSE EVENTS
• Medications Error Leads To Expensive Hospitalization

CLINICAL PHARMACY SERVICES
• Patient/Caregiver Counseling And Education
• Medication Reconciliation
• Retrospective Drug Utilization Review
• Provider Education
• Disease State Management

OUTCOMES
• Diabetes Improved
• No Hypoglycemic Attacks
• Blood Pressure Improved
VII. Once operational, PSPC teams report that they are able to produce rapid improvement in health status over 6 to 12 months. Teams used markers for a number of conditions to see what percent of a population, not at standard (out of control) on the marker could be brought to the standard. For diabetes (A1C) it was 34%, for hypertension (Blood Pressure) it was 40%, for dyslipidemia (LDL) it was 39% and for anti-coagulation (INR) it was 50%.

55 Teams tracked 92 Populations of Focus over the last 12 months. 50 of those teams, representing 78 PoF’s, tracked Clinical Pharmacy Services markers between 6 and 12 months. The PoF were purposefully formed with patients whose conditions were persistently out of control. A marker of health status was selected to track. Initially all the patients in the PoF were not meeting the standard conveyed by the marker. Teams reported the percent of the population that reached the standard for the marker. The percent represents an improvement in health status.

Figure 25

<table>
<thead>
<tr>
<th>Population of Focus</th>
<th>Number of Teams Tracking PoF</th>
<th>Avg Percent of Population Improving to the Marker</th>
<th>Variance in Team Improvement in Marker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticoagulation</td>
<td>11</td>
<td>51%</td>
<td>10%</td>
</tr>
<tr>
<td>Asthma</td>
<td>3</td>
<td>32%</td>
<td>2%</td>
</tr>
<tr>
<td>Depression</td>
<td>3</td>
<td>11%</td>
<td>2%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>39</td>
<td>35%</td>
<td>6%</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>9</td>
<td>37%</td>
<td>9%</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>2</td>
<td>45%</td>
<td>40%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>11</td>
<td>43%</td>
<td>7%</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

50 Teams Tracking 78 Populations of Focus

Teams reported data with some variation in the start month. 50 of 55 teams had been tracking CPS Services between 6 and 12 months.

Figure 26

The 39 Teams tracking improvement for the Diabetes PoF reported an average improvement in the health status marker of 35% with a variance of 6%
The 9 Teams tracking improvement for the Dyslipidemia PoF reported an average improvement in the health status marker of 37% with a variance of 9%.

The 12 Teams tracking improvement for the Hypertension PoF reported an average improvement in the health status marker of 40% with a variance of 7%.
SAFE USE SYSTEMS ARE NECESSARY

VIII. PSPC Team experience demonstrates that high medication risk patients require medication safety systems. When error screening is added, teams report an average of more than 1 potential error per patient encounter (pADE) at startup. Of the 41 reporting teams, tracking 52 Populations of Focus (with 4 or more months tracking CPS), 32 indicated they were able to drive pADEs down, reducing average pADEs from 1.5 to .8 per patient encounter. These teams reported that harmful events (Adverse Drug Events or ADEs) decreased from .7 to .5 per patient.

PSPC teams are introducing medication safety into the delivery systems for patients that have high medication needs and risk. The integration of Clinical Pharmacy Services enables the development of a safe medication use system.

Teams craft a care pathway with a two stage “Safe Use” medication system:

1. Identify and correct potential errors (pADE).
2. Identify and correct harmful events (ADE)

Often teams go through 3 stages of development for safe medication use. Initially potential errors increase as the team becomes proficient at indentifying them (Type 1). Soon errors being generated become known and predictable (Type 2). Quality improvement efforts finally remove the source of the mistakes and errors drop (Type 3).

The expectation is that, by catching, correcting and ultimately eliminating errors with medication, the avoidable harmful events will over time decrease to zero. Teams move to a state where every encounter is error free and harm free for the patient.
When teams installed a process to identify potential ADEs, they found that the traditional delivery systems in place were systematically generating medication practice errors. The 52 PoF’s managed by the 41 reporting teams in PSPC3 encountered a significant safety threat. During the early months, teams reported that the safety risk was:

- Average pADE per Patient Encounter = 1.50
- Average ADE per Patient Encounter = .68

After putting safety measurements in place, the 52 PoFs appear to be distributed among the three improvement stages shown in Figure 33:

**Figure 32**

**Pre-Post Profile of 41 Teams tracking 52 PoF with 4 or More Months Tracking CPS; Average pADEs per Patient dropped from 1.50 to .84**

- Total # of Teams Reporting = 46
- Total # of Teams with ≥ 4 Mo. Tracking CPS = 41
- Total # of PoF = 58
- Total # of PoF with ≥ 4 Months Tracking CPS = 52
- Beg pADE: Avg = 1.50; Variance = 1.87
- End pADE: Avg = .84; Variance = .48

**Figure 33**

**Distribution of PoF’s by Improvement Type in pADE’s for PoF’s with ≥ 4 Months of CPS**

<table>
<thead>
<tr>
<th>Improve Type</th>
<th>Change in pADE’s</th>
<th>Number of PoFs</th>
<th>Beg Avg pADE</th>
<th>End Avg pADE</th>
<th>Change in Avg pADE</th>
<th>% Change in Avg pADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Up</td>
<td>11</td>
<td>0.57</td>
<td>1.21</td>
<td>0.64</td>
<td>111%</td>
</tr>
<tr>
<td>Type 2</td>
<td>Unchanged</td>
<td>9</td>
<td>0.89</td>
<td>0.89</td>
<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Type 3</td>
<td>Down</td>
<td>32</td>
<td>1.98</td>
<td>0.71</td>
<td>-1.28</td>
<td>-64%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>52</strong></td>
<td><strong>1.50</strong></td>
<td><strong>0.84</strong></td>
<td><strong>-0.66</strong></td>
<td><strong>-44%</strong></td>
</tr>
</tbody>
</table>

Of the teams tracking 52 Population of Focus, 32 PoF indicated lower pADE rates.
The ADEs for the 39 teams declined as expected over time, indicating that safe use was being installed.

The 39 teams tracked 49 Population of Focus with 4 or more months of CPS shared the following results:

- Average ADE per Patient Encounter at the start = .68
- Average ADE per Patient Encounter after 4 or more months of CPS = .52

Figure 34

Pre-Post Profile of 39 Teams tracking 49 PoF with 4 or More Months Tracking CPS; Average ADEs per Patient dropped from .68 to .52

![Graph showing the decline in ADEs over time](image)

Figure 35

Distribution of PoF’s by Improvement Type in ADE’s for PoF’s with ≥ 4 Months of CPS

<table>
<thead>
<tr>
<th>Improve Type</th>
<th>Change in ADE’s</th>
<th>Number of PoFs</th>
<th>Beg Avg ADE</th>
<th>End Avg ADE</th>
<th>Change in Avg ADE</th>
<th>% Change in Avg ADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Up</td>
<td>11</td>
<td>0.06</td>
<td>0.73</td>
<td>0.67</td>
<td>1133%</td>
</tr>
<tr>
<td>Type 2</td>
<td>Unchanged</td>
<td>7</td>
<td>0.88</td>
<td>0.88</td>
<td>0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Type 3</td>
<td>Down</td>
<td>31</td>
<td>0.86</td>
<td>0.36</td>
<td>-0.50</td>
<td>-59%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>49</td>
<td>0.68</td>
<td>0.52</td>
<td>-0.17</td>
<td>-24%</td>
</tr>
</tbody>
</table>

Total PoF’s Reporting = 55

Of the 39 Teams tracking 49 PoF’s, 31 indicated they were able to reduce the average ADE per patient encounter.
IX. **PSPC advanced teams are ready to launch a second collaborative to bring their PSPC delivery systems to full scale. This will require the development of payment reform collaborative in many states.**

A set of advanced team are ready to scale up and spread where they move in a series of increments from a small PoF to the total high risk population under care. For many of the primary care–based partnerships, that will involve a significant scale up to 30% of the total population under care.

*Figure 36*

**Expanding operations to meet the full need is orchestrated in four stages:**

1. **Maintain** the health and safety of the *population of focus* under control.
2. **Scale up** to serve all high risk patients with the marker defining the population of focus
3. **Spread** to serve all high risk conditions
4. **Spread** by enrolling other partners in the community serving other high risk patient populations

Scale up and spread requires expansion of operations for all five systems in the change package. The team works with clinical and executive leadership to develop a strategic plan for scale up and spread. The executive leadership will need to work with its funders to produce the financial arrangements to make the PSPC model sustainable.

Most teams in PSPC 3 (86%) financed the clinical pharmacy services as a line item budget expense, grant or pro bono contribution. There was no payment source. Several teams (9%) had a payment source for the service.

*Figure 37*

**Funding Streams Have to Be Developed for Most PSPC Sites**

<table>
<thead>
<tr>
<th>Survey of Operational Teams (N = 63)</th>
<th>% of Total Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of Financial Support for CPS Services</td>
<td></td>
</tr>
<tr>
<td>Internal Budgeted Expense</td>
<td>53%</td>
</tr>
<tr>
<td>Outside Payment</td>
<td>9%</td>
</tr>
<tr>
<td>Outside Grant</td>
<td>19%</td>
</tr>
<tr>
<td>Pro Bono Contribution</td>
<td>14%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale Up Financing Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have an established, self sustaining source of funding</td>
</tr>
<tr>
<td>Have a plan to secure funding for CPS at full scale</td>
</tr>
<tr>
<td>No source of funding and no plan to secure it</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Moving to scale up, 1/3 of those reporting had established a payment source, almost 60% had not. For scale up and spread, a collaborative effort will be required in most States to secure payment for integrated clinical pharmacy efforts. The collaborative effort will bring together major payers and PSPC partnerships from across the state.
Advanced PSPC teams will be developing the financial model for the full scale PSPC delivery system. The Holyoke team shows what this will look like.

Figure 38

Holyoke has about 15,000 medical patients a year generating about 60,000 encounters or visits. The PSPC team estimates that at least 20% of this population requires CPS and 50% of that group requires intense Clinical Pharmacy Services.

Over the next year advanced team like Holyoke will be strategically designing the full scale integrated delivery system. This will support budgeting efforts and system development efforts. Holyoke’s team, for example, envisions a delivery system with three levels of service, anchored in clinical provider teams.

Figure 39

<table>
<thead>
<tr>
<th>Holyoke Vision: Three levels of service</th>
<th>Personnel Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provider Teams, Basic Care</strong></td>
<td>$290 per patient, $4.3 M/yr</td>
</tr>
<tr>
<td>- MDs</td>
<td></td>
</tr>
<tr>
<td>- Medical Assistants</td>
<td></td>
</tr>
<tr>
<td>- Nurses</td>
<td></td>
</tr>
<tr>
<td><strong>Basic Clinical Pharmacy Services</strong></td>
<td>$190 per patient, $0.6 M/yr</td>
</tr>
<tr>
<td>- Nurse Care Manager</td>
<td></td>
</tr>
<tr>
<td>- Medical Assistant/Community Health Worker</td>
<td></td>
</tr>
<tr>
<td><strong>Intense Clinical Pharmacy Service</strong></td>
<td>$280 per patient, $0.4 M/yr</td>
</tr>
<tr>
<td>- Clinical Pharmacist</td>
<td></td>
</tr>
<tr>
<td>- Medical Assistant/Community Health Worker</td>
<td></td>
</tr>
</tbody>
</table>

The value proposition for scale up and spread will show the improvement in health status and safety that will be produced by the new service delivery system. Health plans can track that improvement and correlate it with changes in utilization and reductions in high cost services.
PSPC – A NATIONAL SPREAD CAMPAIGN

X. PSPC is engaging a number of national partnerships to accelerate the spread of the PSPC model across communities, with a goal of reaching 3,000 communities by 2015.

PSPC is a national leadership campaign spreading a service delivery innovation that is intended to improve the health and safety of a population in crisis.

The current health care system is transactional, specialized and uncoordinated. Care is organized around access points: primary care, hospital, emergency department. These entities do not have the range of services required by high-risk patient population. They do not have a business model that leaves them accountable for the health of the population.

Figure 40

PSPC is a service delivery system innovation. The business literature calls this a “disruptive innovation.” Clayton Christensen of the Harvard Business School describes this as a process by which “complicated, expensive products and services are transformed into simple affordable ones. It is difficult for the leading companies and institutions in an industry to succeed at disruption.”

In this case the disruption is a simple service delivery system and business model innovation. It begins on one end with accountability for a population whose health status and safety are out of control. At the other that population has its health status and safety measured and increasingly under control. In the middle is an integrated delivery system that includes Clinical Pharmacy Services. These innovative delivery systems, tailored to high risk groups, are operated by partnerships.

The PSPC delivery systems have elements that are not covered in the traditional fee-for-service model. In every state the partnerships have to convene major health plans so they can consider how to pay for these delivery systems and do it in a way that tracks improvement in health and bends the cost curve down. The business model innovation can be viewed as “purchase value, not volume.”

The goal of the PSPC community is to rapidly spread a “best practice” service delivery model to every community. The campaign goal is to have PSPC models in place in 3,000 communities across the nation by 2015. (There are about 3,100 county and county-like geographical jurisdictions in the US).

PSPC will leverage a number of partnerships to reach at least 600 communities with PSPC 4.0.
**Figure 42**

<table>
<thead>
<tr>
<th>PARTNERSHIPS DEVELOPED DURING PSPC 3.0 TO INCREASE PACE IN PSPC 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATIONAL PARTNERSHIP</td>
</tr>
<tr>
<td>Centers for Medicare and Medicaid (CMS)</td>
</tr>
<tr>
<td>PSPC Alliance, Inc.</td>
</tr>
<tr>
<td>FDA Office of Women’s Health</td>
</tr>
<tr>
<td>AHRQ</td>
</tr>
<tr>
<td>University of Southern California</td>
</tr>
<tr>
<td>Administration on Aging</td>
</tr>
<tr>
<td>APhA Foundation, IMPACT</td>
</tr>
<tr>
<td>Clayton Christensen, Harvard Business School</td>
</tr>
<tr>
<td>Southeastern Consultants, Inc.</td>
</tr>
<tr>
<td>American Association of Colleges of Pharmacy (AACP)</td>
</tr>
<tr>
<td>American Pharmacists Association (APhA)</td>
</tr>
<tr>
<td>The Heinz Foundation</td>
</tr>
<tr>
<td>Institute for Healthcare Improvement (IHI)</td>
</tr>
<tr>
<td>Communities Joined in Action</td>
</tr>
</tbody>
</table>