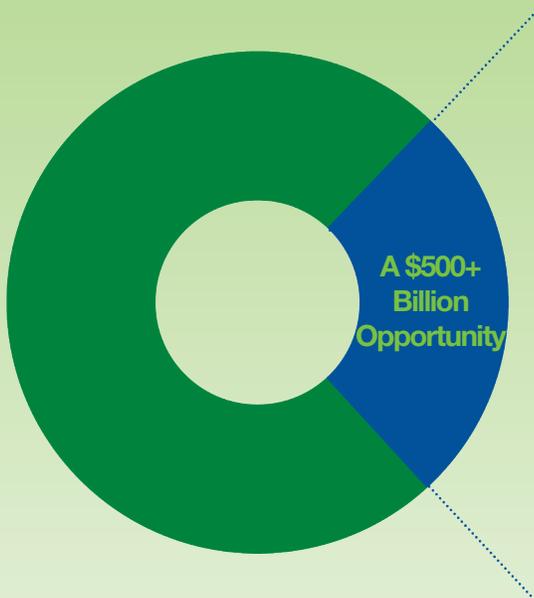


# BEND THE CURVE

## A Health Care Leader's Guide to High Value Health Care



- Reducing Emergency Department Overuse
- Reducing Antibiotic Overuse
- Improving Patient Medication Adherence
- Reducing Vaccine Underuse
- Preventing Hospital Readmissions
- Decreasing Hospital Admissions for Ambulatory Care Sensitive Conditions
- Preventing Medication Errors



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The views expressed herein are solely those of NEHI and are not intended to represent the individual viewpoints of our sponsors, members or advisors.

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## About NEHI

NEHI is a national health policy institute focused on enabling innovation to improve health care quality and lower health care costs. In partnership with members from all across the health care system, NEHI conducts evidence-based research and stimulates policy change to improve the quality and the value of health care. Together with this unparalleled network of committed health care leaders, NEHI brings an objective, collaborative and fresh voice to health policy. For more information, visit [www.nehi.net](http://www.nehi.net).

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## About the WellPoint Foundation

The WellPoint Foundation is the philanthropic arm of WellPoint, Inc. and through charitable contributions and programs, the Foundation promotes the inherent commitment of WellPoint, Inc. to enhance the health and well-being of individuals and families in communities that WellPoint, Inc. and its affiliated health plans serve.

The Foundation focuses its funding on strategic initiatives that address and provide innovative solutions to health care challenges, as well as promoting the Healthy Generations Program, a multi-generational initiative that targets specific disease states and medical conditions. These disease states and medical conditions include: prenatal care in the first trimester, low birth weight babies, cardiac morbidity rates, long term activities that decrease obesity and increase physical activity, diabetes prevalence in adult populations, adult pneumococcal and influenza vaccinations and smoking cessation.

The Foundation also coordinates the company's annual associate giving campaign and provides a 50 percent match of associates' campaign pledges. To learn more about the WellPoint Foundation, please visit [www.wellpointfoundation.org](http://www.wellpointfoundation.org).

# About this Guide

Dear Health Care Leader,

Our health care system stands at a crossroads: down one road lies increasingly higher costs that will continue to strain public and private spending; down the other, a leaner, more efficient future of high value health care and improved health for all Americans. Although we aspire to the latter path, the divide between the health care system's aspirations and reality is far too pronounced, as too much of the care we provide today is inefficient, ineffective and ultimately wasted.

The enclosed Bend the Curve guide is one attempt to bridge this divide. It is intended to support health care leaders' efforts to lower health care costs by identifying seven specific areas of waste and inefficiency that together drain \$521 billion from the system each year and steps that could be taken to curb this unnecessary spending without adversely impacting quality of care. Each of the seven topics includes a policy brief that provides details on the scope and causes of waste, describes "proven practices" that have already been implemented to curb waste, and recommends "policy actions" to remove the waste from the system. In addition, each topic includes a "Case Interview" about a successful intervention told in the words of the implementers themselves.

This guide is intended to provide you with data to make the case for solutions you can implement and promote, and also provides real-world experiences from health care leaders. More information and tools are available on the Bend the Curve Campaign's website, [www.nehi.net/bendthecurve](http://www.nehi.net/bendthecurve). Please use these tools to work in your own organizations and communities to identify, educate and implement successful solutions to the very real problem of health care waste.

Change will not happen overnight, but now is the time to begin our shared work to create high value health care.



Wendy Everett, ScD  
*President, NEHI*

# BEND THE CURVE

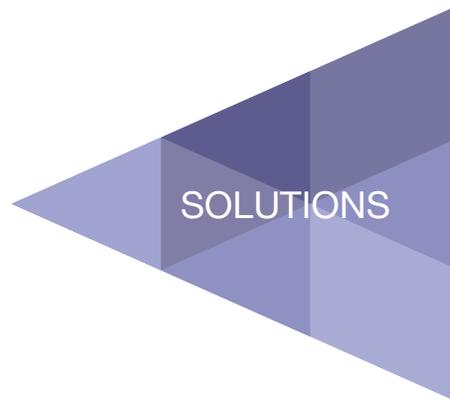
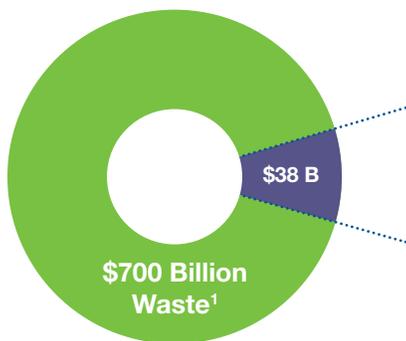
Every year, millions of Americans arrive at an Emergency Department (ED) to seek care for a non-urgent condition. They arrive with asthma flare-ups, diabetic complications, the common cold, the flu and even cases of the sniffles. Some are uninsured, but many are not. Some lack a primary care provider, but many have a regular source of health care. For thousands each day, the ED is their first source of health care, not their refuge in an emergency. The consequences of this overuse are well established: overcrowded emergency rooms, uncoordinated care and billions of dollars in unnecessary health care spending.

Data suggest that more than half of the 130 million annual ED visits are avoidable, for conditions that can be treated in urgent care clinics, primary care offices and by thoughtful prevention. Change is possible, but will only be achieved through coordinated action on many fronts.

Primary care must be elevated to priority status in the health care system and given the financial and technical resources necessary to provide appropriate care to more patients. Primary care practices themselves must work in new ways, leveraging the power of teams, extending access to care by making care convenient for patients with busy work and family lives. New sources of care must be made available, including retail clinics and “virtual” visits enabled by tele-health, and all providers need to better coordinate care across settings. Patients must also be part of the solution, embracing healthy behaviors and making thoughtful choices about where they seek care.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$38 billion currently wasted on unnecessary visits to the ED, money which can be reinvested to bring us closer to the goal of high value health care.

# Reducing Emergency Department Overuse: A \$38 Billion Opportunity



- Improve Access to Primary Care Services
- Promote Alternative Approaches to Primary Care
- Provide Specialized Services for Vulnerable Populations
- Implement Effective Chronic Disease Management
- Reform Payment for Providers
- Develop Financial Incentives for Patients
- Share Data on ED Utilization

Targeting the \$38 billion spent annually on emergency department overuse requires building on proven practices and implementing policy actions that target the root causes of the problem.<sup>2</sup>

The use of hospital emergency departments (ED) for non-urgent care and for conditions that could have been treated in a primary care setting is a significant source of wasteful health care spending. The causes of ED overuse are complex and systemic, resulting from the crisis in primary care and the appeal of the emergency department.

Reducing ED overuse requires building on a coordinated set of proven practices in the field coupled with policy actions in both the public and private sectors.

## THE PROBLEM

### Scope of Emergency Department Overuse

- Nationally, 56 percent, or roughly 67 million ED visits, are potentially avoidable.<sup>3</sup>

### Costs of Emergency Department Overuse

- The average cost of an ED visit is \$580 more than the cost of a comparable office visit.<sup>4</sup>

### Users of the ED for Non-Urgent Care

- All types of patients use the ED for non-urgent care, including all age groups, insurance types and even insured patients with a usual source of primary care.
- One-third of ED visits are made during regular business hours when primary care offices are open.

### Drivers of ED Use

- Patients can receive ED care anytime, regardless of the severity of their condition.
- The ED provides patients with immediate feedback and a sense of reassurance about their condition.
- A wide range of health care services are readily available in the ED.

### Primary Care in Crisis

- A lack of timely appointments and available after-hours care drive patients to the ED.
- Chronically ill patients without access to primary care, or those with poorly coordinated care, often end up in the ED.
- Many primary care practices instruct patients to seek care in the ED outside of business hours.

## SOLUTIONS

### Improve Access to Primary Care Services

- **Proven Practice:** Increasing access to primary care services can reduce ED overuse by up to 56 percent.<sup>5</sup>
- **Proven Practice:** Pilots of the patient-centered medical home model have recorded a 37 percent reduction in ED use.<sup>6</sup>
- **Proven Practice:** Patients receiving care from a primary care practice offering weekend hours use the ED 20 percent less than patients from practices that do not.<sup>7</sup>
- **Proven Practice:** Access to a physician-staffed 24-hour telephone consultation service reduced avoidable ED use from 41 percent to 8 percent of visits.<sup>8</sup>
- **Proven Practice:** Nurse-operated telephone triage programs, which provide patients with prompt

*Continued on back*

A number of tested measures already exist for reducing ED overuse, including offering alternative approaches to primary care, specialized services for vulnerable populations and effective chronic disease management.

Reducing the overuse of emergency department services requires policy actions that involve providers, payers and patients.

medical advice, reduced ED utilization by 4.3 percent and produced annual net savings of nearly \$400,000.<sup>9</sup>

#### Promote Alternative Approaches to Primary Care

- **Proven Practice:** Free-standing hospital-based urgent care clinics have the potential to reduce ED use by nearly 48 percent.<sup>10</sup>
- **Proven Practice:** Patients who had tele-health “virtual visits” with clinicians to diagnose and treat routine childhood symptoms used the ED 22 percent less than patients who did not use these services.<sup>11</sup>
- **Proven Practice:** Retail clinics, which provide services for simple acute medical conditions without an appointment, cost one-fifth as much as an ED visit and up to 10 percent of ED patient visits could be cared for adequately by retail clinic staff.<sup>12</sup>

#### Provide Specialized Services for Vulnerable Populations

- **Proven Practice:** Services for homeless adults, including housing and case management support, reduced ED use by 24 percent.<sup>13</sup>

#### Implement Effective Chronic Disease Management

- **Proven Practice:** Chronically ill adults who participated in group visits with other patients who had similar diseases used the ED 17 percent less than patients not participating in the program.<sup>14</sup>

#### Reform Payment for Providers

- **Policy Action:** Adopt payment approaches that enable providers to invest in primary care improvements, such as extended hours, increased contact with patients via telephone and e-mail, HIT, and additional staff for care teams.
- **Policy Action:** Implement performance-based payment systems that use patient ED utilization or appointment wait times as quality metrics to reward health care professionals who reduce ED overuse.

#### Develop Financial Incentives for Patients

- **Policy Action:** Reduce co-payments for patients who use urgent care clinics.
- **Policy Action:** Increase patient co-payments for non-urgent ED visits.

#### Share Data on ED Utilization

- **Proven Practice:** Providing hospital utilization data on avoidable ED visits to patients’ primary care providers.
- **Proven Practice:** Providing health plan claims data to health care professionals on the ED utilization of their patient populations.

► Learn more about ways to Bend the Curve in health care costs at: [www.nehi.net/bendthecurve](http://www.nehi.net/bendthecurve)

#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. NEHI. 2008.
3. Weinick, R., Billings, J., Thorpe, J. (2003). Ambulatory care sensitive emergency department visits: a national perspective. *Abstr AcademyHealth Meet*, 20(abstr No. 8), 525-526.
4. Machlin, S.R. (2006). Medical Expenditure Panel Survey. Statistical Brief 111: Expenses for a Hospital Emergency Room Visit, 2003. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from [http://www.meps.ahrq.gov/mepsweb/data\\_files/publications/st111/stat111.pdf](http://www.meps.ahrq.gov/mepsweb/data_files/publications/st111/stat111.pdf). Last accessed October 2011.

#### SOLUTIONS

5. Weinick and Billings. 2003.
6. Grumbach, K., Bodenheimer, T., Grundy, P. (2009). The outcomes of implementing patient-centered medical home

interventions: A review of the evidence on quality, access and costs from recent prospective evaluation studies. Washington, DC. Patient-Centered Primary Care Collaborative. Retrieved from [http://www.pcpcc.net/files/pcmh\\_evidence\\_outcomes\\_2009.pdf](http://www.pcpcc.net/files/pcmh_evidence_outcomes_2009.pdf). Last accessed October 2011.

7. Lowe, R.A., Localio, A.R., Schwarz, D.F., et al. (2005). Association between primary care practice characteristics and emergency department use in a Medicaid managed care organization. *Med Care*, 43(8), 792-800.
8. Franco, S.M., Mitchell, C.K., Buzon, R.M. (1997). Primary care physician access and gatekeeping: a key to reducing emergency department use. *Clin Pediatr*, 36(2), 63-68.
9. O’Connell, J.M., Johnson, D.A., Stallmayer, J., et al. (2001). A satisfaction and return-on-investment of a nurse triage service. *Am J Manage Care*, 7(2), 159-169.
10. Merritt, B., Naamon, E., Morris, S.A. (2000). The influence of an urgent care center on the frequency of ED visits in an urban hospital setting. *Am J Emerg Med*, 18(2), 123-125.
11. McConnochie, K.M., Wood, N.E., Herendeen, N.E., et al. (2009). Acute illness care patterns change with use of telemedicine. *Pediatrics*, 123(6), e989-e995.

12. Adamson, D.R. (2010). Health Care on Aisle 7: The Growing Phenomenon of Retail Clinics. Santa Monica, CA. RAND Corporation, 2010. Retrieved from [http://www.rand.org/pubs/research\\_briefs/RB9491/index1.html](http://www.rand.org/pubs/research_briefs/RB9491/index1.html). Last accessed October 2011.

13. Sadowski, L.S., Kee, R.A., VanderWeele, T.J., et al. (2009). Effect of a housing and case management program on emergency department visits and hospitalizations among chronically ill homeless adults. *JAMA*, 301(17), 1771-1778.
14. Coleman, E.A., Eilertsen, T.B., Kramer, A.M., et al. (2001). Reducing emergency visits in older adults with chronic illness: A randomized, controlled trial of group visits. *Eff Clin Pract*, 4(2), 49-57.

BEND THE  
CURVE

## Case Interview

*Jed Weissberg, MD, Kaiser Permanente and Mark Littlewood, The Permanente Federation on Facilitating Appropriate ED Use*

**What issue within reducing unnecessary emergency department visits were you trying to address?**

Facilitating appropriate ED use.

**What was the solution you decided upon to address the issue and why?**

There was not just one solution to addressing inappropriate ED use; rather, there were a number of solutions, as it was a multi-pronged approach:

- Increasing communication and access with primary care providers, through same day clinic appointments, secure email messaging, and nurse and physician presence in call centers. Having physicians work within the call center setting might arguably have had the greatest impact on reducing ED referrals in the Kaiser Permanente network.
- Establishing urgent care centers, which have 23-hour holding beds that allow for patients to be observed and treated without directly admitting patients to the hospital. This internal capability reduces referrals to contract or outside-of-network hospital EDs.
- Analyzing frequent fliers and discovering that a large number of them were going for mental health reasons. In turn, an outreach program was created in which social workers/mental health professionals contacted these patients to learn about their needs and provide appropriate resources and referrals to behavioral health services as an alternative to the ED.
- Improving decision support for doctors through EMRs, which help doctors to better diagnose and treat patients on 10 of the highest risk patient complaints. This also reduces return visits for the same symptoms or discharge when abnormal vital signs are still present.
- Improving transition support for patients following discharge through discharge bundles, as the most common cause for patients returning to the ED is not taking their medications correctly. This support is facilitated by a pharmacist and/or at the point of discharge and/or through a phone call or email follow-up within 24 hours of leaving the hospital.

**What were the barriers you faced in the implementation of your solution?**

Resource barriers are an issue, as there are often not enough resources to continue targeted programs, such

as outreach to frequent utilizers or improved work on transitions of care for those with high acuity conditions. In addition, there is an inherent tension between the desire of easy accessibility to physicians and the reality of physicians not being able to be seen 24/7, 365. Lastly, primary care panel management is an issue, as excessive panel size encumbers a clinic's availability of same day appointments.

**How did you overcome these barriers?**

Accessibility to physicians has been remedied through same day clinic appointments, secure email messaging, and call centers staffed by nurses and physicians. The results with these approaches are quite positive, as these call center physicians are able to offer assistance to about half of the patients they speak with, eliminating the need for an ED visit. Additionally, we have addressed the issue of primary care panel management by adding primary care physicians to reduce panel size and having some unscheduled appointment slots for use by call centers, which has helped when we are unable to match a patient with their PCP.

**What were the critical success factors in the implementation of your solution?**

An increased sense of ownership among physicians and ambulatory care staff to keep patients out of the hospital when they do not need to be there, specifically out of the ED, has been crucial. Physicians and ambulatory care staff feel a responsibility for keeping patients healthy, and do not want patients in the ED unless they have to be.

**What specific clinical and financial results have you experienced?**

Reduced costs and improved quality have been a real positive result of these solutions. In addition, a sense of ownership among physicians regarding the problem has also resulted. Lastly, saving patients' time in the ED has also occurred as a result of these solutions.

**What is one piece of advice you would offer to another organization trying to reduce unnecessary emergency department visits?**

Improve engagement with primary care physicians and the overall health care team.

# BEND THE CURVE

When overused, antibiotics can be harmful and costly. Antibiotics have cured millions of deadly and debilitating conditions and improved lives around the world. Yet these life-saving treatments are all too often used without good reason and restraint. The inappropriate use of antibiotics risks more than just excess spending; overuse increases the risks of antibiotic resistance, which helps to cancel out the curative power of these therapies and leads to the rise of “superbugs,” deadly new infections that can reek havoc on at-risk patients.

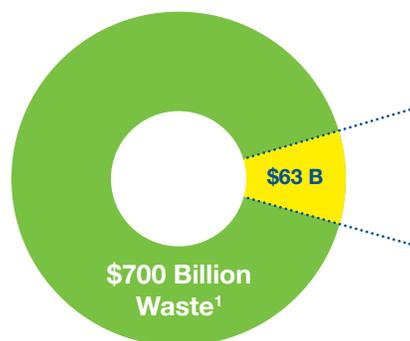
At the core of the problem is overtreatment: using antibiotics in circumstances where they will not be effective, such as viral conditions or where the natural healing process would be equally successful. Patients are partially to blame for this overtreatment; many believe that a visit to the doctor that does not end with a prescription is unsatisfactory, regardless of the actual clinical benefits.

Perhaps most surprising, however, is the fact that the vast majority of antibiotics used in the U.S. are not given to humans. The extensive non-therapeutic use of antibiotics in animals in the food supply, like all overuse of antibiotics, increases the risk of antibiotic resistance in humans.

A coordinated set of solutions promoting targeted use and discretion is necessary to curb the overuse of antibiotics. Stronger guidelines covering the appropriate use of antibiotics from the clinic to the ICU, coupled with financial incentives for physicians, can encourage more targeted use. In addition, robust regulatory oversight of the use of antibiotics in the food supply can reduce this significant source of antibiotic overuse.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$63 billion currently wasted on the overuse of antibiotics, money which can be reinvested to bring us closer to the goal of high value health care.

# Reducing Antibiotic Overuse: A \$63 Billion Opportunity



- Increase Use of Appropriate Vaccinations
- Expand Use of Hospital Guidelines
- Reduce Antibiotic Use in Critical Patients
- Improve Patient Education and Medical Leadership
- Reform Payment for Providers
- Implement Regulatory Reform

Targeting the \$63 billion spent annually because of antibiotic overuse requires building on proven practices and implementing policy actions that target the root causes of the problem.<sup>2</sup>

Antibiotic overuse represents a significant source of wasteful health care spending. The causes of antibiotic overuse are complex and systemic, resulting from overprescribing, patient preferences and the non-therapeutic antibiotic treatment of animals.

Reducing antibiotic overuse requires building on a coordinated set of proven practices in the field coupled with policy actions in both the public and private sectors.

## THE PROBLEM

### Scope of Antibiotic Overuse

- The overuse of antibiotics contributes to the emergence of antibiotic-resistant infections (ARIs) that are costly and difficult to treat.<sup>3,4</sup>
- Drug-resistant “superbug” infections, such as MRSA and C-difficile, are a significant cause of mortality. In 2005, more than 95,000 people in the U.S. developed severe MRSA infections, which led to 9,000 deaths.<sup>5,6</sup>

### Costs of Antibiotic Overuse

- In the U.S., ARIs are responsible for \$20 billion in excess health care costs, \$35 billion in societal costs and \$8 million in additional hospital days.<sup>7</sup>
- Reducing ARIs by just 20 percent would save \$3.2 to \$5.2 billion in health care costs each year and eliminate up to \$11.3 million in additional in-hospital days for patients with ARIs.

### Reasons for Antibiotic Overuse

- Overtreatment: Determining if an infection is viral or bacterial is expensive and time-consuming and concerns over malpractice lead many physicians to over-prescribe antibiotics.<sup>8,9</sup>
- Patients’ Preferences: Patients may pressure providers to prescribe antibiotics for conditions for which they are inappropriate, such as the common cold or sore throat, or inappropriately save antibiotics for later use, both of which can lead to increased antibiotic resistance.<sup>10,11</sup>
- Non-therapeutic Antibiotic Treatment of Animals: Approximately 70 percent of antibiotics used in the U.S. are used in the non-therapeutic treatment of cattle, swine, and poultry, and although the FDA issued voluntary guidelines in 2010 urging farmers not to use antibiotics for livestock growth, the guidelines are not yet mandatory.<sup>12,13</sup>
- Lack of Evidence-Based Research: Evidence-based research on appropriate and inappropriate antibiotic use is often lacking.<sup>14</sup>

## SOLUTIONS

### Increase Use of Appropriate Vaccinations

- **Proven Practice:** Researchers have found that greater use of flu shots was accompanied by a reduction in prescriptions for antibiotics.<sup>15</sup>

### Expand Use of Hospital Guidelines

- **Proven Practice:** Researchers in Canada found guidelines focused on curbing the overuse of antibiotics can lower the number of prescriptions written for them.<sup>16</sup>

*Continued on back*

Implementing regulatory reform, promoting the use of outcomes-based reimbursements and reducing antibiotic use in critical patients can all help to decrease antibiotic overuse.

These interventions require a renewed emphasis on the education of patients and providers and increased medical leadership on the issue.

#### Reduce Antibiotic Use in Critical Patients

- **Proven Practice:** Measuring levels of the chemical procalcitonin (PCT) is an effective way to monitor the presence of an infection and guide the duration of antibiotic treatment.<sup>17</sup>

#### Improve Patient Education and Medical Leadership

- **Proven Practice:** The CDC's *Get Smart, Know When Antibiotics Work* program, a comprehensive public health effort directed at health care practitioners, parents and the public, has led to a 20 percent decrease in prescribing for upper respiratory infections and a 13 percent decrease in prescribing overall for all office visits among children and adults.<sup>18</sup>
- **Policy Action:** Garner the support of hospital executives and physician champions to lead and educate staff and patients about the appropriate and inappropriate use of antibiotics, and encourage the establishment of formulary restrictions on certain broad spectrum antibiotics.

#### Reform Payment for Providers

- **Policy Action:** Encourage evidence-based practices by linking payment reimbursements to adherence to evidence-based guidelines to reduce the use of antibiotic classes that promote MRSA colonization.

#### Implement Regulatory Reform

- **Policy Action:** Ask the FDA to issue mandatory regulations regarding the non-therapeutic use of antibiotics to encourage livestock growth, similar to regulations established in Europe.<sup>19</sup>
- **Policy Action:** Encourage the FDA to re-review approvals for animal feed uses of antibiotics important to human medicine.<sup>20</sup>

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#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [http://www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. NEHI. 2008.
3. Lewis, R. (1995). The Rise of Antibiotic-Resistant Infections. FDA Consumer Magazine.
4. Whitney, C.G., Farley, M.M., Hadler, J., et al. (2000). Increasing prevalence of multidrug-resistant streptococcus pneumoniae in the United States. *N Engl J Med*, 343(26), 1917-24.
5. Kelland, K. (2011). Scientists find new MRSA superbug in cows, humans. Reuters. June 2, 2011. Retrieved from <http://www.reuters.com/article/2011/06/02/us-bacteria-mrsa-idUSTRE7517NH20110602>. Last accessed August 9, 2011.
6. Melnick, M. (2011). MRSA is on the rise among children: Could antibiotics be to blame? Time. August 15, 2011. Retrieved from <http://healthland.time.com/2011/08/15/mrsa-is-on-the-rise-among-children-could-antibiotics-be-to-blame> Last accessed August 17, 2011.
7. CDC. (2010). Get Smart: Know When Antibiotics Work. November 15, 2010. Retrieved from <http://www.cdc.gov/Features/GetSmart/>. Last accessed on August 16, 2011.
8. U.S. Congress, Office of Technology Assessment. (1995). Impact of Antibiotic-Resistant Bacteria 72 A-H-629 (Washington, D.C., U.S. G.P.O.). Supra note 16, at 127-29, 134; see infra § IV.C.3.

9. Watson, R.L., Dowell, S.F., Jayaraman, M., et al. (1999). Antimicrobial use for pediatric upper respiratory infections: Reported practice, actual practice, and parent beliefs. *Pediatrics*, 104(6), 1251-7.
10. Linder, J.A., Bates, D.W., Lee, G.M., et al. (2005). Antibiotic treatment of children with sore throat. *JAMA*, 294(18), 2315-22.
11. Richman, P.B., Garra, G., Eskin, B., et al. (2001). Oral antibiotic use without consulting a physician: A survey of ED patients. *Ain J Emerg Med*, 19(1), 57-60.
12. Union of Concerned Scientists. (2011). Slaughter Bill Would Protect Public from Dangerous Antibiotics Overuse in Livestock Production. March 9, 2011. Retrieved from [http://www.ucsusa.org/news/press\\_release/slaughter-bill-protect-public-from-antibiotics-overuse-0511.html](http://www.ucsusa.org/news/press_release/slaughter-bill-protect-public-from-antibiotics-overuse-0511.html). Last accessed July 29, 2011.
13. Los Angeles Times. 'Superbugs' in our food. August 6, 2011. Retrieved from <http://articles.latimes.com/2011/aug/06/opinion/la-ed-antibiotics-20110806>. Last accessed on August 9, 2011.
14. Sintchenko, V., Iredell, J.R., Gilbert, G.L., et al. (2001). What do physicians think about evidence-based antibiotic use in critical care? A survey of Australian intensivists and infectious disease practitioners. *Intern Med J*, 31(8), 462-9.

#### SOLUTIONS

15. Melcher, J. (2009). Flu Vaccine Inoculates Against Antibiotic Overuse. September 8, 2009. Retrieved from <http://www.miller-mccune.com/health/flu-vaccine-inoculates-against-antibiotic-overuse-3484/>. Last accessed on August 9, 2011.
16. Fiore, K. (2011). Boosting awareness can curb overuse of antibiotics. MedPage Today. July 27, 2011. Retrieved from <http://www.medpagetoday.com/InfectiousDisease/Infection-Control/27753>. August 20, 2011.
17. Heyland, D.K., Johnson, A.P., Reynolds, S.C., et al. (2011). Procalcitonin for reduced antibiotic exposure in the critical care setting: A systematic review and an economic evaluation. *Crit Care Med*, 39(7), 1792-9.
18. National Center for Health Statistics. (2009). Unpublished data from the National Ambulatory Medical Care Survey. Retrieved from <http://www.cdc.gov/nchs/ahcd.htm>. Last accessed August 27, 2011.
19. Los Angeles Times. 'Superbugs' in our food. 2011.
20. Union of Concerned Scientists. (2011). Preservation of Antibiotics for Medical Treatment Act: H.R. 965/S. 1211. Last Revised: June 24, 2011. Retrieved from [http://www.ucsusa.org/food\\_and\\_agriculture/solutions/wise\\_antibiotics/pamta.html#](http://www.ucsusa.org/food_and_agriculture/solutions/wise_antibiotics/pamta.html#). Last accessed August 15, 2011.



## Case Interview

*David Dosa, MD, Brown University School of Medicine  
on Appropriate Antibiotic Use in Nursing Homes*

### What issue within reducing antibiotic overuse were you trying to address?

There were two main problems within antibiotic overuse we were trying to address, both in the nursing home setting: the prescription of unnecessary antibiotics and medication errors.

### What was the solution you decided upon to address the issue and why?

Knowledge goes a long way. Educating both patients and providers about antibiotic overuse or inappropriate prescription of medications is crucial. The most important thing to remember, which I think people forget for the most part, is that not everyone has to be treated. In our study, we found that not only were doctors treating people with antibiotics when they did not need them, but doctors were also using the wrong drugs. Of 172 residents with urinary tract infections (UTIs) in two high-quality Rhode Island nursing homes, 40 percent of patients received antibiotics when the guidelines suggested no treatment was necessary. Furthermore, 56 percent of patients who received antibiotics received inappropriate medications, almost half were taking the wrong doses, and two-thirds were taking the antibiotics for too long. In turn, it is clear that improved education and awareness among providers and patients about antibiotic overuse is crucial.

### What were the barriers you faced in the implementation of your solution?

There were two main barriers to reducing antibiotic overuse in the two nursing homes. The first was financial, as there are perverse incentives at play in nursing homes: the nursing home receives more money for sending patients to the hospital than they do to keep them and help get them better. The second barrier was defensive medicine, as some of the emphasis on overtreatment comes from families – the fear of what will happen if we do not treat and the fear of recriminations if a mistake is made. There's definitely pressure and fear that comes with that.

### How did you overcome these barriers?

If nothing else, the study clearly showed that sometimes waiting and deciding not to treat is the right way to proceed, as this led to reduced antibiotic overuse.

### What were the critical success factors in the implementation of your solution?

Education and awareness among providers and patients is essential to addressing this problem now and in the future.

### What specific clinical and financial results have you experienced?

One of the most important findings and other studies show similar results, is that undertreatment did not hurt any of the patients. In our sample, no bad outcomes (e.g. kidney infection, hospitalization or death) were reported among those who did not get an antibiotic. In contrast, patients who were overtreated were far more likely to get antibiotic-resistant infections, like *Clostridium difficile* bacterium. By reducing antibiotic overuse in nursing homes, patients were less likely to get an antibiotic-resistant infection, which means that their visitors, caregivers and fellow patients were also less likely to get an antibiotic-resistant infection.

### What is one piece of advice you would offer to another organization trying to reduce antibiotic overuse?

Don't accept the status quo because it is not good enough, even at the best places. Opportunities always exist to improve provider practice related to the appropriate treatment of urinary tract infections in nursing homes.

*For more information, see: Rotjanapan, P., Dosa, D., Thomas, K.S. (2011). Potentially inappropriate treatment of urinary tract infections in two Rhode Island nursing homes. Arch Intern Med, 171(5), 438-43.*

# BEND THE CURVE

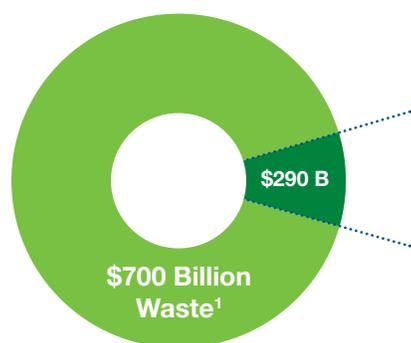
The rise of chronic disease is one of the nation's most pressing and expensive health care concerns. Tens of millions of Americans suffer from cardiovascular disease, diabetes, asthma and other chronic conditions, resulting in billions of dollars in health care spending and significant morbidity and mortality.

Despite the financial and human toll, many of these diseases can be effectively managed with the use of prescription medications. Unfortunately, many patients do not take their chronic disease medications as prescribed. Some decide to forgo filling a prescription for financial reasons, others stop taking their pills due to side effects and many more struggle with prescription regimens that can include multiple medications. Regardless of the reasons, a medication not taken is an opportunity missed.

Improving patient medication adherence for chronic disease has the potential to dramatically improve the health of chronic disease sufferers and to save hundreds of billions of dollars in unnecessary health care spending. No single solution will solve this problem; rather, a system-wide approach using technology, delivery system innovations, payment reforms and a renewed focus on the needs and abilities of patients is required.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$290 billion in preventable spending on chronic disease, money which can be reinvested to bring us closer to the goal of high value health care.

# Improving Patient Medication Adherence: A \$290 Billion Opportunity



- Improve Care Coordination
- Enhance Patient Engagement and Education
- Utilize Counseling and Medication Management
- Expand Screening and Assessment
- Invest in HIT Infrastructure
- Employ Quality Measurement
- Establish Financial Incentives

Reducing the \$290 billion spent annually because of poor medication adherence requires building on proven practices and implementing policy actions that target the root causes of the problem.<sup>2</sup>

Poor medication adherence represents a significant source of wasteful health care spending. The causes of non-adherence are complex and systemic, resulting from high out-of-pocket costs, poor care coordination and the failure to account for the patient's personal circumstances.

Improving medication adherence requires building on a coordinated set of proven practices in the field and policy actions in both the public and private sectors.

## THE PROBLEM

### Scope of Poor Medication Adherence

- Of the approximately 187 million Americans who take one or more prescription drugs, up to one-half do not take their medications as prescribed.<sup>3,4</sup>
- As many as 2 billion cases of poor medication adherence each year are avoidable.<sup>5,6</sup>

### Costs of Poor Medication Adherence

- Not taking medications as prescribed costs over \$100 billion a year in excess hospitalizations.<sup>7</sup>
- Total annual health care spending for a diabetes patient with low medication adherence (\$16,499) is almost twice the amount for a patient with high adherence (\$8,886).<sup>8</sup>
- Among hypertension patients, an estimated 89,000 premature deaths per year could be avoided with appropriate medication treatment.<sup>9</sup>
- Diabetes patients with poor medication adherence have a 30 percent yearly risk of hospitalization, as opposed to a 13 percent risk for those who accurately follow prescriber guidelines.<sup>10</sup>
- Non-adherent diabetes and heart disease patients have significantly higher mortality rates (12.1 percent) than similar patients who were adherent (6.7 percent).<sup>11</sup>

### Causes of Poor Medication Adherence<sup>12</sup>

- High out-of-pocket costs, especially for patients on multiple prescriptions for chronic conditions.
- Lack of care coordination, follow-up and shared decision-making.
- Complex or burdensome treatment regimens or multiple prescribed medications.
- Co-morbidities, such as severe and persistent mental illness.
- Side effects of prescribed medications, whether real or perceived.
- Personal factors, including lifestyle, culture and belief system.

## SOLUTIONS

### Improve Care Coordination

- **Proven Practice:** Care teams composed of physicians, pharmacists, nurses and other health care professionals can more effectively monitor adherence and counsel patients.<sup>13</sup>
- **Proven Practice:** Diabetes patients receiving case management, including bi-weekly automated calls and self-care training by nurses, are 21 percent more adherent to their medications than those who receive usual care.<sup>14</sup>

### Enhance Patient Engagement and Education

- **Proven Practice:** Elderly patients who receive pharmacist-led discharge counseling before

*Continued on back*

Using care coordination strategies, patient engagement and Medication Therapy Management can significantly improve medication adherence.

Improving medication adherence also requires investments in HIT and financial incentives for patients and providers.

hospital discharge improve their medication adherence by 43 percent.<sup>15</sup>

- **Proven Practice:** Patients who participate in motivational interviewing and discussions about their individual needs, constraints and preferences are 13 percent more likely to take their medications as prescribed compared to patients receiving usual care.<sup>16</sup>
- **Proven Practice:** Patients with depression who are provided educational materials and one-on-one follow-up are twice as likely to refill their prescriptions.<sup>17</sup>

#### Utilize Counseling and Medication Management

- **Proven Practice:** Fifty-six percent of HIV/AIDS patients enrolled in a Medication Therapy Management (MTM) program, a multi-disciplinary team approach to care, follow their medication directions, as compared to 38 percent of patients who did not receive MTM.<sup>18</sup>
- **Proven Practice:** Patients with high blood pressure taking once-daily therapies are 11 percent more adherent than those taking twice-daily therapies.<sup>19</sup>

#### Expand Screening and Assessment

- **Proven Practice:** Expanding the use of proven screening and assessment tools to target patients at greatest risk for non-adherence, such as those with depression.<sup>20</sup>
- **Proven Practice:** Establishing tools for providers to promote medication review and reconciliation as well as patient engagement, such as the American Society of Health-System Pharmacists Medication Reconciliation Toolkit.<sup>21</sup>

#### Invest in HIT Infrastructure<sup>22</sup>

- **Policy Action:** Invest in electronic health records, e-Prescribing, clinical decision support systems and sharing of data related to the proper use of medications.
- **Policy Action:** Encourage sharing of near real-time prescription fill and refill data among providers, between patients and providers, and between providers and pharmacists to implement instantaneous point-of-care medication review and regimen reconciliation.

#### Employ Quality Measurement

- **Policy Action:** Adopt consensus-based standards, such as those from the National Quality Forum and Pharmacy Quality Alliance, to measure the quality of adherence strategies.<sup>23,24,25</sup>
- **Policy Action:** Develop specific measures for adherence to medications for chronic disease.

#### Establish Financial Incentives<sup>26</sup>

- **Policy Action:** Provide incentives for Medication Therapy Management and patient counseling.
- **Policy Action:** Eliminate co-payments for generic drugs and reduce brand-name co-payments.<sup>27</sup>
- **Policy Action:** Expand adoption of value-based insurance design to reduce co-payments for medications for chronic conditions.
- **Policy Action:** Enable prescribers to simplify dosing by considering adherence and simplification of medication regimens in the development of formularies and cost-sharing requirements.

► Learn more about ways to Bend the Curve in health care costs at: [www.nehi.net/bendthecurve](http://www.nehi.net/bendthecurve)

#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [http://www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. NEHI. (2009). Thinking Outside the Pillbox: A System-wide Approach to Improving Patient Medication Adherence for Chronic Disease. Retrieved from [http://www.nehi.net/publications/44/thinking\\_outside\\_the\\_pillbox\\_a\\_systemwide\\_approach\\_to\\_improving\\_patient\\_medication\\_adherence\\_for\\_chronic\\_disease](http://www.nehi.net/publications/44/thinking_outside_the_pillbox_a_systemwide_approach_to_improving_patient_medication_adherence_for_chronic_disease). Last accessed October 2011.
3. Kaiser Family Foundation. Prescription Drug Trends, May 2010. Retrieved from <http://www.kff.org/rxdrugs/upload/3057-08.pdf>. Last accessed October 2011.
4. Osterberg, L., Blaschke, T. (2005). Adherence to medication. *N Engl J Med*, 353(5), 487-497.
5. Osterberg and Blaschke. 2005.
6. IMS Health. (2010). National Prescription Audit PLUS. Retrieved from [http://www.imshealth.com/deployedfiles/imshealth/Global/Content/StaticFile/Top\\_Line\\_Data/2010\\_Top\\_Therapeutic\\_Classes\\_by\\_RX.pdf](http://www.imshealth.com/deployedfiles/imshealth/Global/Content/StaticFile/Top_Line_Data/2010_Top_Therapeutic_Classes_by_RX.pdf). Last accessed October 2011.
7. Sokol, M.C., McGuigan, K.A., Verbrugge, R.R., et al. (2005). Impact of medication adherence on hospitalization risk and healthcare cost. *Med Care*, 43(6), 521-530.
8. Ho, P.M., Magid, D.J., Masoudi, F.A., et al. (2006). Adherence to cardioprotective medications and mortality among patients with diabetes and ischemic heart disease. *BMC Cardiovasc Disord*, 6, 48.

9. Cutler, D.M., Long, G., Berndt, E.R., et al. (2007). The value of antihypertensive drugs: A perspective on medical innovation. *Health Aff*, 26(1), 97-110.
10. Sokol, McGuigan, and Verbrugge. 2005.
11. Ho, Magid, Masoudi, et al. 2006.
12. Osterberg and Blaschke. 2005.

#### SOLUTIONS

13. NEHI. (2010). Thinking Outside the Pillbox, Medication Adherence and Care Teams: A Call for Demonstration Projects. Retrieved from [http://www.nehi.net/publications/48/medication\\_adherence\\_and\\_care\\_teams\\_a\\_call\\_for\\_demonstration\\_projects](http://www.nehi.net/publications/48/medication_adherence_and_care_teams_a_call_for_demonstration_projects). Last accessed October 2011.
14. Piette, J.D., Weinberger, M., McPhee, S.J., et al. (2000). Do automated calls with nurse follow-up improve self-care and glycemic control among vulnerable patients with diabetes? *Am J Med*, 108(1), 20-27.
15. Lipton, H.L., Bird, J.A. (1994). The impact of clinical pharmacists' consultations on geriatric patients' compliance and medical care use: A randomized controlled trial. *Gerontologist*, 34(3), 307-315.
16. Ogedegbe, G., Chaplin, W., Schoenthaler, A., et al. (2008). A practice-based trial of motivational interviewing and adherence in hypertensive African Americans. *Am J Hypertens*, 21(10), 1137-1143.
17. Katon, W., Rutter, C., Ludman, E.J., et al. (2001). A randomized trial of relapse prevention of depression in primary care. *Arch Gen Psychiatry*, 58(3), 241-247.
18. Hirsch, J.D., Rosenquist, A., Best, B.M., et al. (2009). Evaluation of the first year of a pilot program in community pharmacy: HIV/AIDS medication therapy management for

19. Mounier-Vehier, C., Bernaud, C., Carre, A., et al. (1998). Compliance and antihypertensive efficacy of amlodipine compared with nifedipine slow-release. *Am J Hypertens*, 11(4 Pt 1), 478-486.
20. American Association of Colleges of Pharmacy. (2009). Better Medication Adherence is Essential to Improve Health Care Quality, Outcomes and Value. Alexandria, VA. Retrieved from <http://www.aacp.org/issuesandadvocacy/advocacy/SignonLetters/Documents/Policy%20Recommendations%2010-14-09.pdf>. Last accessed October 2011.
21. American Society of Health-System Pharmacists. (2011). ASHP Medication Reconciliation Toolkit, Bethesda, MD. Retrieved from [http://www.ashp.org/Import/PRACTICEANDPOLICY/PracticeResourceCenters/PatientSafety/ASHP-MedicationReconciliationToolkit\\_1.aspx](http://www.ashp.org/Import/PRACTICEANDPOLICY/PracticeResourceCenters/PatientSafety/ASHP-MedicationReconciliationToolkit_1.aspx). Last accessed October 2011.
22. American Association of Colleges of Pharmacy. 2011.
23. American Association of Colleges of Pharmacy. 2011.
24. National Quality Forum. (2010). National Voluntary Consensus Standards for Medication Management. Washington, DC.
25. Pharmacy Quality Alliance. (2010). Pharmacy Quality Alliance Approved Measures, Washington, DC. Available at: <http://www.pqaalliance.org/files/PQA%20approved%20measures.pdf>. Last accessed October 2010.
26. American Association of Colleges of Pharmacy. 2011.
27. Maciejewski ML, Farley JF, Parker J, et al. Copayment reductions generate greater medication adherence in targeted patients. *Health Aff*, 2010;29(11):2002-2008.

BEND THE  
CURVE

## Case Interview

*Troy Trygstad, PharmD, Community Care of North Carolina  
on Pharmacy Home Project*

### What issue within improving patient medication adherence were you trying to address?

Community Care of North Carolina (CCNC) was established over a decade ago to improve coordinated care for Medicaid patients, particularly mothers and children. Early success with this population prompted North Carolina to promote enrollment of chronically ill adults in the network. The resulting influx of seriously ill or medically complex patients exposed many gaps in medication therapy, including widespread gaps in adherence. As a result, we realized that while standard process-based quality measures (e.g. HEDIS) would actively promote medication therapy management, intermediate outcomes, such as poor adherence, and desired outcomes, such as hospitalizations avoided, were receiving less prominence.

### What was the solution you decided upon to address the issue and why?

In 2007, CCNC created the Pharmacy Home Project ([www.pharmacyhomeproject.com](http://www.pharmacyhomeproject.com) to be launched by Feb. 2012), a project that has embedded clinical pharmacists and care managers within CCNC's 14 networks of physician practices, representing over 4,500 physicians statewide, which is more than 90 percent of primary care in North Carolina. The pharmacists' services are supported by CCNC's payment model, which is a hybrid Fee-for-service and Per Member Per Month Medical Home model.

We established four uniform principles for medication management in all our practices: pharmacy services are to be 1) well-coordinated, 2) goal-oriented (clinically goal-oriented), 3) continually reinforced, and should result in a 4) medication use plan for targeted patients. These general principles are designed to help "manage the patient between encounters" with the physician practice. CCNC specifically chose the Pharmacy Home Project model because it allows flexible implementation among the diverse regions and practice settings in North Carolina while also promoting clear standards of care coordination.

### What were the barriers you faced in the implementation of your solution?

Barriers to implementation included a pervasive lack of comprehensive patient data for use by clinicians, a lack of clinician expertise with the use of data systems, and an overall lack of organizational proficiency with the use of pharmacists in daily physician practice.

### How did you overcome these barriers?

CCNC has invested in building medication databases for its physician network, drawing upon centralized Medicaid data on patient use of medications. We have followed a decentralized approach to building organizational acumen and enthusiasm for the Pharmacy Home model. Physicians are supported to devise their own, site-appropriate solutions. As a result, we have observed an increased adoption of promising adherence interventions, such as motivational interviewing. In addition, CCNC's payment model has provided a direct means of support for retaining pharmacist services and adopting good medication management and adherence-related practices.

### What were the critical success factors in the implementation of your solution?

CCNC consulted with physicians from diverse regions and practice settings on ways to improve medication management. Our flexible approach allowed physicians throughout the state to "just go out and figure out how to do it." Physicians are made responsible for the outcomes of their patient panel and have resources provided to them to help improve those outcomes. While some critics have faulted this approach for its lack of tight central management, the Pharmacy Home model has proven adaptive and apolitical.

### What specific clinical and financial results have you experienced?

The Pharmacy Home model is an essential driver of CCNC's overall financial results. Analyses suggest that CCNC-sponsored care coordination has led to \$1.5 billion in avoided costs, including a 12 percent total budgetary cost avoidance in 2009. In addition, we have seen hospital admission rates decline by 2 percent, inpatient spending decline by 5.6 percent, preventable hospital admissions decline by 12.5 percent, and preventable readmissions decline by 9.3 percent. The best thing about this is that it's statewide, it's not a pilot, so the Pharmacy Home model laid on top of the CCNC system can move an entire state's outcomes.

### What is one piece of advice you would offer to another organization trying to improve patient medication adherence?

Focus on the patient upon leaving the hospital. If you are responsible for them after they leave, you better gather information and support those patients at home or leading up to the outpatient visit, or both.

# BEND THE CURVE

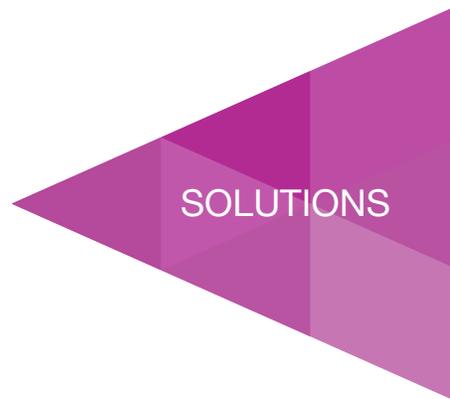
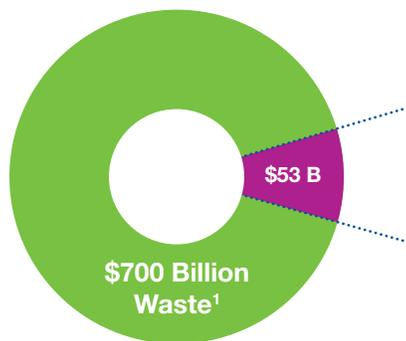
Since their initial use in the late 18th century, vaccines have spared millions from death and disability and eradicated some of history's most devastating diseases. From smallpox and polio to human papillomavirus (HPV) and the flu, vaccines prevent, cure and lessen the impact of many illnesses and, as a result, save billions of dollars for the health care system.

Given the clear benefits of vaccines it is surprising that so many vaccines are underused, with many Americans not receiving recommended vaccinations in a timely manner. Technical challenges and a difficult business model for vaccine manufacturers can lead to slow development of new vaccines and disrupt the supply of existing products. Patients without a usual source of primary care find it hard to access vaccines, while those without insurance struggle with the costs. The result is that millions of Americans are vulnerable to illnesses that can be prevented.

Vaccines represent a remarkably good value for the health care system, but significant effort is required to achieve that value. The development of new vaccines must be supported in regulation and reimbursement. The remaking of our primary care system into high-functioning teams and medical homes must be leveraged to expand vaccination rates. Payment systems must be rethought to invest in the long-term benefits of vaccines. Finally, all parties in the health care system must work in concert to dispel myths and educate the public about the value and safety of vaccines.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$53 billion in vaccine-preventable conditions, money which can be reinvested to bring us closer to the goal of high value health care.

# Reducing Vaccine Underuse: A \$53 Billion Opportunity



- Invest in Research and Development
- Promote Medical Home Models
- Increase Timely Immunizations of Children
- Enhance Medical Leadership
- Encourage Market Entry
- Revise Funding Models
- Promote Vaccine Registries and IT

Targeting the \$53 billion spent annually because of vaccine underuse requires building on proven practices and implementing policy actions that target the root causes of the problem.<sup>2</sup>

Vaccine underuse represents a significant source of wasteful health care spending. The causes of vaccine underuse are complex and systemic, resulting from shortages, exemptions from vaccination requirements, provider financing issues and health disparities.

Reducing vaccine underuse requires building on a coordinated set of proven practices in the field coupled with policy actions in both the public and private sectors.

## THE PROBLEM

### Scope of Vaccine Underuse

- One of every five children is not completely up to date on recommended immunizations.<sup>3</sup>
- More than one in 10 parents uses a vaccination schedule for their children other than the U.S. Recommended Immunization Schedule, including delaying some shots and refusing others.<sup>4</sup>
- Twenty-five percent of children lack full protection against vaccine-preventable communicable diseases.<sup>5</sup>
- Coverage levels for adolescents and adults are well below Healthy People 2010 targets.<sup>6</sup>
- Avoidable Deaths: For each birth cohort of children immunized, 14 million cases of vaccine-preventable diseases (VPD) are avoided and 33,000 VPD-related deaths are averted.<sup>7</sup>
- Influenza: 36,000 deaths annually in the elderly are due to the flu or its complications.<sup>8</sup>

### Costs of Vaccine Underuse

- Financial Cost: \$10 billion in annual direct health care costs.<sup>9</sup>
- Societal Cost: \$43 billion in annual indirect costs.<sup>10</sup>

### Causes of Vaccine Underuse

- Shortages: Interruptions in production and supply, higher-than-expected demand, and the time lag between the initial development and production contribute to vaccine shortages.<sup>11</sup>
- School Exemptions: Exemptions from school immunization requirements, often easily obtained, have risen over the last decade.<sup>12</sup>
- Provider Financial Barriers: The product-related costs of vaccine supply acquisition and maintenance and inadequate reimbursement for administering vaccines to children can be prohibitive.<sup>13</sup>
- New, Costly Vaccines: The number of new vaccines has increased in recent years, and newer vaccines are substantially more expensive than “traditional” vaccines.<sup>14</sup>
- Public Opinion: Increased concern regarding the supposed link between vaccines and autism, despite studies refuting the relationship, has led some to refuse vaccinations.<sup>15</sup>
- Income: Childhood poverty is a major risk factor for under-immunization.
- Race and Ethnicity: Immunization rates for Hispanics (47 percent) and Blacks (52 percent) are significantly lower than for Whites (65 percent).<sup>16</sup>
- Age: Adolescents and adults in general have lower vaccination rates than children.<sup>17</sup>

## SOLUTIONS

### Invest in Research and Development

- **Proven Practice:** Firms in the U.S. and abroad are experimenting with alternative production tech-

*Continued on back*

Innovations in vaccine development, the promotion of medical home models of care, increasing the immunizations of children and encouraging entry into untapped markets can significantly increase the appropriate use of vaccines.

These interventions increase access to the appropriate use of vaccines and help to lower the costs of vaccine administration and distribution.

nologies to reduce the lead time and dependence on egg-based production of vaccines, which could help to decrease vaccine shortages.<sup>18</sup>

#### Promote Medical Home Models

- **Proven Practice:** Children in states with a higher number of medical home practices received childhood vaccinations at a higher rate than others.<sup>19</sup>
- **Proven Practice:** Children achieve higher immunization rates when clinicians and providers focus on ensuring that every child receives all recommended vaccines.<sup>20</sup>
- **Policy Action:** Promote the immunization of children covered by Medicaid via medical home approaches.

#### Increase Timely Immunization of Children

- **Proven Practice:** Undertaking community interventions that include education and outreach and increase the adoption of effective practices by health care providers.<sup>21,22</sup>
- **Policy Action:** Adopt public policies to ensure adequate vaccine supply and financing and to improve tracking systems and participation in immunization registries.<sup>23,24</sup>

#### Enhance Medical Leadership

- **Policy Action:** Garner the support of hospital executives and physician leaders to educate hospital staff, patients and their communities about the appropriate use of vaccines.
- **Policy Action:** Medical organizations should work in partnership to educate policymakers on the appropriate use of exemptions from mandatory immunizations.<sup>25</sup>

#### Encourage Market Entry

- **Policy Action:** Provide financial incentives to accelerate the development and approval of new vaccines, such as those to prevent Dengue, RSV, AIDS, SARS and others.<sup>26</sup>

#### Revise Funding Models

- **Policy Action:** Encourage evidence-based practices that increase the number of vaccines appropriately given by linking payment reimbursements to multiple, simultaneous vaccine administrations as well as timely immunizations.

#### Promote Vaccine Registries and IT

- **Policy Action:** Registries and information technologies have shown demonstrable successes in identifying vaccine underuse; further promotion of these approaches should help to improve the appropriate administration of vaccines.

- ▶ Learn more about ways to Bend the Curve in health care costs at: [www.nehi.net/bendthecurve](http://www.nehi.net/bendthecurve)

#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [http://www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. NEHI. 2008.
3. The Commonwealth Fund. (2008). Immunization of Young Children. Retrieved from <http://www.commonwealthfund.org/Performance-Snapshots/Immunizations/Immunization-of-Young-Children.aspx>. Last accessed August 2011.
4. Dempsey, A.F., Schaffer, S., Singer, D., et al. (2011). Alternative vaccination schedule preferences among parents of young children. *Pediatrics*. 2011 Oct 3. [Epub ahead of print] PubMed PMID: 21969290.
5. The Commonwealth Fund Commission on a High Performance Health System. (2011). Why Not the Best? Results from the National Scorecard on U.S. Health System Performance.
6. Shen, A.K. (2009). The U.S. vaccine and immunization enterprise: Working to sustain and foster vaccine innovation. *Human Vaccines*, 5(10), 649-653.
7. American Academy of Pediatrics. (2007). Immunization Financing: Where is the Breaking Point? Task Force on Immunization. February 28, 2007. Retrieved from <http://www.aap.org/immunization/pediatricians/pdf/TaskForceWhitePaper.pdf>. Last accessed on August 23, 2011.
8. Centers for Disease Control and Prevention (CDC). (2007). Prevention and control of influenza: Recommendations of

the Advisory Committee on Immunization Practices (ACIP).

9. *MMWR Morb Mortal Wkly Rep*, 56(RR-6), 1-54.
10. American Academy of Pediatrics. 2007.
11. Zhou, F., Santoli, J., Messonnier, M.L., et al. (2005). Economic evaluation of the 7-vaccine routine childhood immunization schedule in the United States, 2001. *Archives of Pediatric and Adolescent Medicine*, 159(12), 1136-44.
12. Peter, G., des Vignes-Kendrick, M., Eickhoff, T.C., et al. (1999). Lessons learned from a review of the development of selected vaccines: National Vaccine Advisory Committee. *Pediatrics*, 104, 942-50.
13. The Council of State Governments' Healthy States Initiative. (2007). Exemptions from School Immunization Requirements. Retrieved from <http://www.healthystates.csg.org/NR/rdonlyres/7B29EF52-6408-4D67-904D-CFBE28AF35CA/0/ExemptionsLPB.pdf>. Last accessed on August 23, 2011.
14. American Academy of Pediatrics. 2007.
15. Hinman, A.R., Orenstein, W.A., Santoli, J.M., et al. (2006). Vaccine shortages: History, impact, and prospects for the future. *Annu Rev Public Health*, 27, 235-59.
16. CDC. (2010). Autism Spectrum Disorders, Research. Page last updated: December 29, 2010. Retrieved from <http://www.cdc.gov/ncbddd/autism/research.html>. Last accessed August 25, 2011.
17. Zimmerman, R.K., Nowalk, M.P., Raymund, M., et al. (2003). Tailored interventions to increase influenza vaccination in neighborhood health centers serving the disadvantaged. *Am J Public Health*, 93(10), 1699-705.
18. Zimmerman, Nowalk, Raymund, et al. 2003.

#### SOLUTIONS

18. Seiguer, E. (2005). Protecting the Nation's Health: Ensuring a Stable Supply of Influenza Vaccine. The Commonwealth Fund. July 2005.
19. Seipel, M.M. (2011). The impact of medical home on selected children's health outcome. *Soc Work Health Care*, 50(5), 347-59.
20. American Academy of Pediatrics. 2007.
21. Briss, P. A., Rodewald, L.E., Hinman, A.R., et al. (2000). Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. *American Journal of Preventive Medicine*, 18 (1 Suppl), 97.
22. CDC. (1996). Recommendations of the Advisory Committee on Immunization Practices: Programmatic strategies to increase vaccination rates--assessment and feedback of provider-based vaccination coverage information. *MMWR Morb Mortal Wkly Rep*, 45(10), 219-20.
23. Institute of Medicine. (2003). Financing Vaccines in the 21st century: Assuring Access and Availability. Washington, D.C.: National Academy Press.
24. Wood, D., Saarlans, K.N., Inkelas, M., et al. (1999). Immunization registries in the United States: Implications for the practice of public health in a changing health care system. *Annual Review of Public Health*, 20, 231.
25. Zacharyczuk, C. Multifaceted approach advocated for vaccine-hesitant parents. Infectious Diseases in Children. Retrieved from <http://www.pediatricsupersite.com/view.aspx?rid=84600>. Last accessed October 11, 2011.
26. Hinman, Orenstein, Santoli, et al. 2006.



## Case Interview

*Ginny Heller, WithinReach  
on Reducing Vaccine Hesitancy*

### What issue within reducing vaccine underuse were you trying to address?

The main issue we are trying to address is vaccine hesitancy. Washington state has the highest vaccine exemption rate in the country; about 6.2 percent of parents choose to opt out of kindergarten vaccination requirements for their children, a rate that has tripled since 1999. In contrast, the national rate is around 2 percent.

### What was the solution you decided upon to address the issue and why?

In 2008, Vax Northwest, a coalition of health care provider, nonprofit and public health groups, was launched. Vax Northwest is a partnership working to ensure all children and communities in Washington are protected from preventable, life-threatening diseases. The coalition, which includes Group Health, Seattle Children's Hospital, the Washington State Department of Health, WithinReach and the Community Pediatric Foundation of Washington, was formed to provide parents with the information they need when making decisions about vaccinating their children.

Through this partnership, we created a toolkit for health care providers to work with parents as they make vaccination decisions for their children. This toolkit has been piloted successfully in four clinics so far, and the coalition plans to further test and evaluate its approach in 50 clinics through a randomized controlled trial (RCT), which starts in early 2012. Furthermore, we have also developed community outreach resources, which parents can use to share information in their own communities.

### What were the barriers you faced in the implementation of your solution?

Time is always an issue for providers because they only have a limited amount during an office visit to properly empathize with and educate concerned parents. In addition, there is a lot of information available to the public that is based on fraudulent scientific data and surrounding media and celebrity hype, which continues to fuel vaccine hesitancy. Lastly, this intervention requires a significant cultural shift, as many providers will need to re-frame how they interact with patients.

### How did you overcome these barriers?

Some of those barriers have already been overcome in our four pilot clinics but all of them will require more comprehensive testing and evaluation moving forward through our RCT. The issue of time has already been improved by using the toolkit to more quickly and effectively answer questions from families. Furthermore, this toolkit has also been used to give families more accurate and understandable information about vaccines. Finally, the toolkit has begun to enable a cultural shift among some physicians in our pilot testing, as it makes them better equipped to work with families.

### What were the critical success factors in the implementation of your solution?

Education and awareness among providers is essential to the success of the toolkit. In addition, getting other communities and clinics on-board is crucial to spread the intervention.

### What specific clinical and financial results have you experienced?

Potential outcomes and goals for the intervention going forward include the following:

- Increased self-efficacy among providers in addressing vaccination concerns;
- Decreased vaccine hesitancy from families;
- Increased vaccine administration; and
- Improved quality of care.

### What is one piece of advice you would offer to another organization trying to prevent hospital readmissions?

First, you can't just beat parents over the head with the scientific data; it doesn't work. You have to use that information and combine it with a more empathetic approach, where you listen to their issues, validate their concerns, and then provide the appropriate data and information. Second, addressing vaccine underuse is not done through a one-pronged approach, where the Vax Northwest toolkit is the only solution. Rather, addressing vaccine underuse requires a multi-pronged approach, where the toolkit is used in conjunction with an emphasis on working with communities and leveraging social networks in appropriate ways.

# BEND THE CURVE

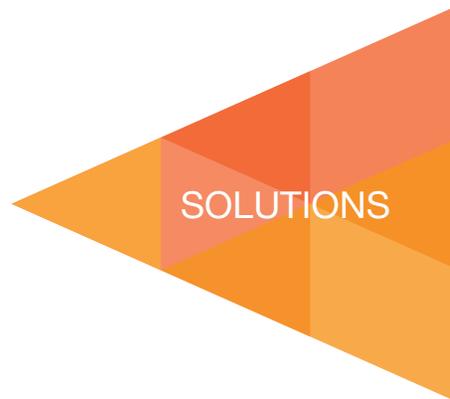
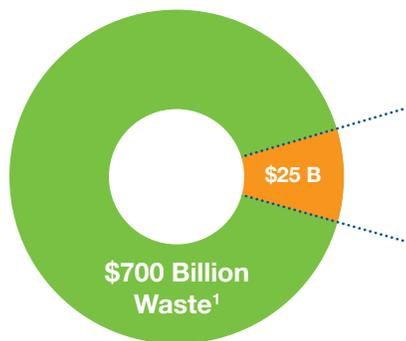
Every year millions of Americans are hospitalized, treated and released, healthier for the experience. Unfortunately, far too many of those released from the hospital return in just a few days or weeks, often for reasons that could have been prevented. With the costs of hospital stays ever increasing, the result is billions of dollars in preventable spending.

Many patients who are readmitted were originally discharged without a clear understanding of their follow-up care needs or without access to a provider to give that follow-up care. Others fall through the cracks during transitions in care, failed by a fragmented system, poor processes and ineffective technology.

Preventing hospital readmissions begins in the hospital; when a patient is discharged, especially if they suffer from chronic disease or complex comorbidities, a detailed follow-up care plan is needed. Such a plan must account for the patient's personal and financial circumstances, link them with appropriate sources of follow-up care and be communicated to the patient and their caregivers. In order to achieve this reality, providers need to invest in process and technology improvements and be financially rewarded for keeping patients healthy and out of the hospital.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$25 billion in preventable hospital readmission, money which can be reinvested to bring us closer to the goal of high value health care.

# Preventing Hospital Readmissions: A \$25 Billion Opportunity



- Change Admission Procedures
- Upgrade Discharge Processes
- Improve Follow-up Care
- Enhance Technology Interventions
- Reform Payment for Providers
- Expand Quality Measurement

Targeting the \$25 billion spent annually on preventable hospital readmissions requires building on proven practices and implementing policy actions that target the root causes of the problem.<sup>2</sup>

Preventable hospital readmissions represent a significant source of wasteful health care spending. The causes of hospital readmissions are complex and systemic, resulting from poor discharge procedures and inadequate follow-up care.

Reducing preventable hospital readmissions requires building on a coordinated set of proven practices in the field coupled with policy actions in the public and private sectors.

## THE PROBLEM

### Scope of Hospital Readmissions

- Nearly one in every five Medicare patients discharged from the hospital is readmitted within 30 days.<sup>3</sup>
- Across all insured patients, the preventable readmission rate is 11 percent; for Medicare patients the rate is 13.3 percent.<sup>4,5</sup>
- 836,000, or 12 percent, of the more than 7 million 30-day hospital readmissions that occur each year are preventable.<sup>6</sup>

### Costs of Hospital Readmissions

- Preventable hospital readmissions cost the U.S. health care system an estimated \$25 billion annually.<sup>7</sup>

### Reasons for Readmission

- Patients experience preventable medical errors and complications during the first hospital stay.
- Patients have limited or no access to effective post-hospital follow-up care (e.g. rehabilitation) in their communities.
- Patients and their families are inadequately informed about appropriate post-discharge care.
- Hospital records and discharge instructions are not effectively and efficiently disseminated to primary care clinicians and other post-discharge care providers to support the patient's recovery.

### Types of Patients Readmitted

- Preventable readmission rates are highest among patients with heart failure, COPD, psychoses, intestinal problems and/or those who have had various types of surgery (cardiac, joint replacement or bariatric procedures).<sup>8</sup>

## SOLUTIONS

### Change Admission Procedures

- **Proven Practice:** Requiring that hospital admission authorization includes both the identification of a health care professional to manage post-discharge care and a process for health care professionals to receive hospital records and discharge plans.

### Upgrade Discharge Processes

- **Proven Practice:** Requiring that discharge procedures include scheduling initial appointments

*Continued on back*

Hospital readmissions can be prevented by improving procedures for admitting and discharging patients, providing enhanced follow-up care and utilizing HIT.

A number of tested policy actions have track records in reducing readmissions, including changing payment systems and creating new readmission-based quality measures.

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for patients with health care professionals who will provide follow-up care.

- **Proven Practice:** Creating clear and detailed discharge plans tailored to patients as well as other key stakeholders: family members, clinicians, case managers and payers.
- **Proven Practice:** Conducting medication reconciliation to ensure that pre- and post-discharge medication lists are consistent and utilize clinical pharmacists for post-discharge phone calls to monitor medication use.<sup>9</sup>

#### Improve Follow-up Care

- **Proven Practice:** Providing patients with timely access to community-based care, such as health care professional visits.
- **Proven Practice:** Using nurse advocates to arrange timely post-discharge follow-up appointments with patients' primary care providers.<sup>10</sup>

#### Enhance Technology Interventions

- **Proven Practice:** Using profiling systems to identify patients at high risk for readmissions and connect them to additional discharge support.<sup>11</sup>
- **Proven Practice:** Monitoring patients in their homes using tele-health technologies to transmit clinical data to providers.
- **Proven Practice:** Empowering patients through tele-health systems to be better informed about their conditions and self-care measures they can take to prevent readmissions.

#### Reform Payment for Providers

- **Policy Action:** Reward providers with a share of net financial savings earned from reducing costly and preventable hospital readmissions.
- **Policy Action:** Create alternative payment models, such as bundled payments, to cover the entire episode of care and promote coordination and the delivery of high-value services.
- **Policy Action:** Encourage adequate payment for proven technologies that monitor and support compliance in patient groups at highest risk of readmission.
- **Policy Action:** Encourage private payers to follow Medicare's lead on reducing payments to hospitals for preventable hospital readmissions.

#### Expand Quality Measurement

- **Policy Action:** Measure whether patients received adequate continuity of care planning, including post-discharge instructions, information about help they will need at home, and symptoms they should watch for during their recovery.

#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. NEHI. 2008.
3. Jencks, S.F., Williams, M.V., Coleman, E.A. (2009). Rehospitalizations among patients in the Medicare fee-for-service program. *New Engl J Med*, 360(14),1418-1428.
4. Goldfield, N.I., McCullough, E.C., Hughes, J.S., et al. (2008). Identifying potentially preventable readmissions. *Health Care Financ Rev*, 30(1), 75-91.
5. Medicare Payment Advisory Commission. (2007). Report to the Congress: Promoting Greater Efficiency in Medicare. Washington, DC. Retrieved from [http://www.medpac.gov/documents/jun07\\_EntireReport.pdf](http://www.medpac.gov/documents/jun07_EntireReport.pdf). Last accessed October 2011.
6. NEHI. 2008.
7. PriceWaterhouse Coopers' Health Research Institute. (2008). The Price of Excess: Identifying Waste in Healthcare, 2008. Retrieved from <http://www.pwc.com/us/en/healthcare/publications/the-price-of-excess.jhtml>. Last accessed October 2011.
8. Jencks, Williams, and Coleman. 2009.

#### SOLUTIONS

9. Jack, B.W., Chetty, V.K., Anthony, D. (2009). A reengineered hospital discharge program to decrease rehospitalization: A randomized trial. *Ann Intern Med*, 150(3), 178-187.
10. Jack, Chetty, and Anthony. 2009.
11. Society of Hospital Medicine. Project BOOST: Care Transitions Implementation Guide. Philadelphia, PA. Retrieved from [http://www.hospitalmedicine.org/ResourceRoomRedesign/RR\\_CareTransitions/CT\\_Home.cfm](http://www.hospitalmedicine.org/ResourceRoomRedesign/RR_CareTransitions/CT_Home.cfm). Last accessed October 2011.

BEND THE  
CURVE

## Case Interview

*Liz Popwell, Cleveland Regional Medical Center  
on Community Care Management*

### What issue within preventing hospital readmissions were you trying to address?

The main problem was a very high readmission rate of patients with congestive heart failure (CHF). The hospital had a corporate goal to reduce 30-day readmissions of patients with CHF.

### What was the solution you decided upon to address the issue and why?

Care Solutions, a department of Cleveland Regional Medical Center, was formed to provide community care management. Our department is staffed with registered nurses and social workers who visit patients in their homes to provide education about their diagnoses. You can learn so much about an individual when you see their environment and patients are more difficult to educate in the hospital, as they do not feel good. This, in turn, allows our staff to help the patients develop a plan for changing lifestyle habits that affect their health.

### What were the barriers you faced in the implementation of your solution?

One of the barriers from the clinical perspective was the inconsistency of referrals from the hospital case managers. Another barrier was non-compliance from patients, due to a lack of transportation to grocery stores, insufficient funds to purchase medications or healthy foods, feelings of hopelessness with a diagnosis of CHF and lack of education about CHF as a condition.

### How did you overcome these barriers?

The problem of inconsistency of referrals from hospital case managers was remedied by initiating a process that would refer all CHF patients who were readmitted within 30 days to be followed by Care Solutions. As success with the patients was noted and readmissions declined, a cost savings analysis was completed. Additionally, the problem of non-compliant patients was alleviated by requiring one-on-one time and relationship building between staff and patients to get them to open up with some of their concerns and problems. Most interesting was that their problems were often related to social needs, not just a diagnosis.

### What were the critical success factors in the implementation of your solution?

As the program demonstrated success with identifying causative factors for the patients' readmissions, we realized that building a relationship with the patient is crucial. In turn, the assessment tool that we utilized gave a holistic view of the patient's needs, so they were viewed as a person, not just a diagnosis. One of our nurses was primarily focused on this program and would consult our social workers for suggestions on meeting unmet needs of the clients. Lastly, our cardiologists are aware of the success of the program and make direct referrals. Some of the patients have been identified as needing other services, and through the CHF program have been connected to beneficial programs.

### What specific clinical and financial results have you experienced?

Care Solutions has seen a number of clinical and financial improvements as a result of this program. Readmissions have been reduced by half, as has average length of stay. In addition, costs have been significantly reduced. Furthermore, Care Solutions sent out client satisfaction forms to patients in the CHF program. Their comments reflect that they felt that someone cared about their situation and that the education they received was beneficial, and their scores have consistently been 100 percent since the program began. With the program now in its eighth year, physicians have continued to make direct referrals for some of their patients who are at risk.

### What is one piece of advice you would offer to another organization trying to prevent hospital readmissions?

Don't give up and measure your process changes. This is such a big project to take on, and it has so many complex variables. As you implement new processes, be sure to measure the outcomes to determine if you are making the impact intended. If not, continue to seek new solutions and improvements.

# BEND THE CURVE

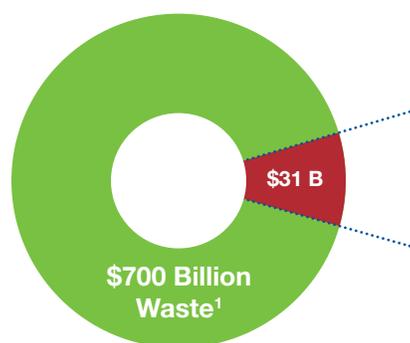
Thanks to advances in therapies, technologies and care practices, many health conditions can be effectively managed in the clinic and community settings. Cardiovascular conditions, diabetes, asthma, pulmonary disease and some infections, collectively called ambulatory care sensitive conditions (ACSCs), can all be treated in outpatient care settings. Yet millions of Americans suffering from these conditions are hospitalized each year, incurring billions in unnecessary costs.

The hospitalization of patients with ACSCs represents a systemic failure. Those at greatest risk of hospitalization for ACSCs are often the patients in greatest need: low-income individuals, Medicaid recipients, the uninsured and those without access to a usual source of ambulatory care. Common among these groups is a difficulty in accessing high quality, affordable primary care in their communities.

Core to solving the problem of ACSC hospitalizations is increasing the availability of primary care in at-risk communities. This can take the form of traditional physician's offices or community health centers, conveniently located in underserved communities, or through more innovative approaches, such as primary care delivered in retail clinics. In conjunction, the expansion of insurance and coverage models which promote access and encourage preventative care, such as the Medicaid Managed Care program, can improve disease management and prevent hospitalizations. Finally, all ambulatory care settings can work to improve their chronic disease management activities and partner with patients in their own health.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$31 billion in hospitalizations for ambulatory care sensitive conditions, money which can be reinvested to bring us closer to the goal of high value health care.

# Decreasing Hospital Admissions for Ambulatory Care Sensitive Conditions: A \$31 Billion Opportunity



- Increase Access to Community Health Centers
- Reduce Patient Travel Time
- Change Medicaid Re-enrollment Policies
- Expand Medicaid Managed Care
- Increase Availability of Primary Care Services
- Improve Chronic Disease Management

Targeting the \$31 billion spent annually on ambulatory care sensitive condition (ACSC) hospital admissions requires building on proven practices and implementing policy actions that target the root causes of the problem.<sup>2</sup>

Hospital admissions for ambulatory care sensitive conditions (ACSC) represent a significant source of wasteful health care spending. The causes of ACSC admissions are complex and systemic, resulting from disparities in income and race, inadequate access to care, and a lack of private insurance coverage.

Reducing ACSC admissions requires building on a coordinated set of proven practices in the field coupled with policy actions in both the public and private sectors.

## THE PROBLEM

### Defining Ambulatory Care Sensitive Conditions

- Ambulatory care sensitive conditions are those “for which good outpatient care can potentially prevent the need for hospitalization, or for which early intervention can prevent complications or more severe disease.”<sup>3</sup>

### Scope of ACSC Hospitalizations

- From 1994-2003, hospital admission rates increased for five of 16 ACSCs: hypertension (by 26 percent); short-term complications of diabetes (20 percent); chronic obstructive pulmonary disease (12 percent); bacterial pneumonia (8 percent); and urinary tract infections (7 percent).<sup>4</sup>
- Between 1999 and 2007, among adults with Medicaid, the ED visit rate for ACSCs per 1,000 enrollees increased from 66.4 to 83.9.<sup>5</sup>

### Costs of ACSC Hospitalizations

- In 2006, hospital costs for potentially preventable conditions totaled nearly \$30.8 billion, which is one of every \$10 of total hospital expenditures.<sup>6</sup>
- Congestive heart failure and bacterial pneumonia were the two most common reasons for potentially preventable hospitalizations in 2006, accounting for half of the total hospital costs (\$8.4 billion and \$7.2 billion, respectively) for all preventable hospitalizations.<sup>7</sup>

### Patients at Risk for ACSC Hospitalizations

- Medicaid recipients and the uninsured: Among working age adults, those receiving Medicaid and the uninsured had higher ACSC hospitalization rates than insured individuals.<sup>8</sup>
- Individuals with difficulty accessing care: Medicare beneficiaries in fair or poor health who resided in a primary care shortage area were 1.82 times more likely to experience a preventable hospitalization as compared to similar individuals in non-shortage areas.<sup>9</sup>
- Racial and ethnic minorities and persons of low socioeconomic status: Racial and ethnic minorities and individuals with low socioeconomic status are more likely than non-minorities and individuals of higher socioeconomic status to be hospitalized due to ACSCs.<sup>10,11,12,13</sup>

## SOLUTIONS

### Increase Access to Community Health Centers

- **Proven Practice:** Among low-income and elderly patients in medically underserved areas, those with access to federally qualified community health centers had 21 percent fewer preventable hospitalizations than those without access to such clinics.<sup>14</sup>

*Continued on back*

Increasing access to primary care and community health centers, reducing patient travel time, increasing Medicaid re-enrollment time and expanding the Medicaid Managed Care program can significantly decrease ACSC hospital admissions.

These interventions represent a renewed emphasis on primary and community care, especially improving chronic disease management, which helps to improve quality of care and reduce costs.

#### Reduce Patient Travel Time

- **Proven Practice:** Patients in the Veterans Administration who traveled less than 30 minutes to their nearest provider had fewer ACSC hospitalizations.<sup>15</sup>

#### Change Medicaid Re-enrollment Policies

- **Proven Practice:** California extended the eligibility re-determination period from three months to 12 months, resulting in 3,060 fewer ACSC hospitalizations in the first year among children and an estimated \$17 million reduction in hospitalization costs.<sup>16</sup>

#### Expand Medicaid Managed Care

- **Proven Practice:** Individuals covered by a mandatory Medicaid Managed Care program had a 33 percent lower rate of ACSC hospitalizations as compared to Medicaid fee-for-service recipients.<sup>17</sup>

#### Increase Availability of Primary Care Services

- **Proven Practice:** Increasing physician supply by 40.2 per 100,000 reduced the ACSC hospitalization rate by 14 percent for children, 7 percent for 18-39 year olds and 8 percent for 40-64 year olds.<sup>18,19</sup>
- **Policy Action:** Enhance access to primary care for the uninsured, underinsured, Medicaid-insured and medically underserved populations.<sup>20,21</sup>
- **Policy Action:** Expand affordable and comprehensive health care coverage to the uninsured.

#### Improve Chronic Disease Management

- **Policy Action:** Educate patients and parents of children about how to control a chronic condition, as educational interventions for patients with asthma have been shown to reduce their risk of hospitalization by 36 to 43 percent.<sup>22,23,24</sup>
- **Policy Action:** Increase the use of effective care coordination programs for those with chronic disease, as discharge planning plus post-discharge support for patients with heart failure has been shown to reduce hospital readmissions by 25 percent on average.<sup>25</sup>

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#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [http://www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. NEHI. 2008.
3. Agency for Healthcare Research and Quality (AHRQ). (2004). AHRQ Quality Indicators: Guide to Prevention Quality Indicators, Hospital Admission for Ambulatory Care Sensitive Conditions. Rockville, MD. U.S. Department of Health and Human Services.
4. The Commonwealth Fund. (2006). Hospitalizations for Ambulatory Care Sensitive Conditions. Retrieved from <http://www.commonwealthfund.org/Content/Performance-Snapshots/Overuse-of-Health-Care-Services/Hospitalizations-for-Ambulatory-Care--8211-Sensitive-Conditions.aspx>. Last accessed October 2011.
5. Tang, N., Stein, J., Hsia, R.Y., et al. (2010). Trends and characteristics of US emergency department visits, 1997-2007. *JAMA*, 204(6), 664-670.
6. Jiang, H.J., Russo, C.A., Barrett, M.L. (2009). Nationwide Frequency and Costs of Potentially Preventable Hospitalizations, 2006. HCUP Statistical Brief #72. April 2009. U.S. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb72.pdf>. Last accessed October 2011.
7. Jiang, Russo and Barrett. 2009.
8. Laditka, J.N., Laditka, S.B. (2004). Insurance status and access to primary health care: Disparate outcomes for potentially preventable hospitalization. *Journal of Health and Social* 12/11

#### SOLUTIONS

9. Parchman, M.L., Culler, S.D. (1999). Preventable hospitalizations in primary care shortage areas: An analysis of vulnerable Medicare beneficiaries. *Archives of Family Medicine*, 8(6), 487-91.
10. Billings, J., Zeitel, L., Lukomnik, J., et al. (1993). Impact of socioeconomic status on hospital use in New York City. *Health Aff*, 12, 162-173.
11. Cable, G. Income, race, and preventable hospitalizations: a small area analysis in New Jersey. *J Health Care Poor Under-served*, 13(1), 66-80.
12. Laditka, J.N., Laditka, S.B., Probst, J. (2005). More may be better: evidence of a negative relationship between physician supply and hospitalization for ambulatory care sensitive conditions. *Health Serv Res*, 40, 1148-1166.
13. Parker, J.D., Schoendorf, K.C. (2000). Variation in hospital discharges for ambulatory care sensitive conditions among children. *Pediatrics*, 106(4), 942-948.
14. Epstein, A.J. (2001). The role of public clinics in preventable hospitalizations among vulnerable populations. *Health Services Research*, 36(2), 405-20.
15. Finegan, M.S., Gao, J., Pasquale, D., et al. (2010). Trends and geographic variation of potentially avoidable hospitalizations in the veterans health-care system. *Health Serv Manage Res*, 23(2), 66-75.
16. Bindman, A.B., Chattopadhyay, A., Auerback, G.M. (2008). Medicaid re-enrollment policies and children's risk of hospitalizations for ambulatory care sensitive conditions. *Medical Care*, 46(10), 1049-54.

17. Bindman, A. B., Chattopadhyay, A., Osmond, D.H., et al. (2005). The impact of Medicaid managed care on hospitalizations for ambulatory care sensitive conditions. *Health Services Research*, 40(1), 19-38.
18. Parchman and Culler. 1999.
19. Laditka, Laditka and Probst. 2005.
20. Bindman, Chattopadhyay, Osmond, et al. 2005.
21. Laditka and Laditka. 2004.
22. Flores, G., Abreu, M., Chaisson, C.E., et al. (2003). Keeping children out of hospitals: Parents' and physicians' perspectives on how pediatric hospitalizations for ambulatory care sensitive conditions can be avoided. *Pediatrics*, 112(5), 1021-30.
23. Gibson, P. G., Powell, H., Coughlan, J., et al. (2003). Self-management education and regular practitioner review for adults with asthma. *Cochrane Database of Systematic Reviews*, (1), CD001117.
24. Smith, J. R., Mugford, M., Hollan, R., et al. (2005). A systematic review to examine the impact of psycho-educational interventions on health outcomes and costs in adults and children with difficult asthma. *Health Technology Assessment*, 9(23), 1-182.
25. Phillips, C. O., Wright, S.M., Kern, D.E., et al. (2004). Comprehensive discharge planning with post-discharge support for older patients with congestive heart failure: A meta-analysis. *JAMA*, 291(11), 1358-67.

BEND THE  
CURVE

## Case Interview

*Elizabeth Woods, MD, Children's Hospital Boston  
on Community Asthma Initiative*

### What issue within decreasing hospital admissions for ACSCs were you trying to address?

The Community Asthma Initiative (CAI), a program of Children's Hospital Boston (CHB), was developed with the aim of reducing the number of asthma-related hospitalizations, emergency department visits, and missed school and work days by helping children and their families from neighboring Boston communities manage their asthma.

### What was the solution you decided upon to address the issue and why?

Asthma is the leading cause of hospitalization at CHB. Moreover, the asthma hospitalization rate for Latino and Black children in Boston was five times higher than the rate for White children in 2003. As a result, the target population for our program is primarily Latino and Black children with asthma between the ages of 2 and 18 in Boston who have had prior hospitalizations and/or ED visits.

CAI uses a comprehensive, socio-ecological approach to address asthma health disparities, including enhanced patient care, access to services, quality improvement evaluation, training, community education and advocacy for policy change. The services provided include nurse case management for an individualized care plan, such as coordination with primary care and allergists; home visits, including environmental assessments, integrated pest management plans, smoking cessation programs and asthma education; and connection to community resources for patients from neighboring Boston communities identified through ED visits or inpatient admissions.

### What were the barriers you faced in the implementation of your solution?

The primary barrier has been financial, specifically, obtaining sustainable funding for the program. In 2007, CHB was awarded \$2 million dollars over five years from the CDC's REACH program to eliminate racial and ethnic health disparities among minority populations. We were one of 40 organizations selected from 22 states across the country to receive such funding. This funding has experienced recent cuts, which will clearly affect our ability to work effectively. Furthermore, the nature of the work makes it hard to get

reimbursed under the fee-for-service model. Much of the work we do is not traditionally done in the clinic or hospital; rather, it is done primarily through nurse and community health worker home visits and phone calls.

### How did you overcome these barriers?

We have tried to collaborate with Medicaid to find ways to reimburse CAI's activities but it has been difficult to identify a solution.

### What were the critical success factors in the implementation of your solution?

Success in the CAI program has largely been a result of strong cultural competency and awareness. Much of our staff, from nurse practitioners to community health workers, is bicultural and bilingual. Cultural sensitivity is a necessity given that over 90 percent of the population we serve is Latino and Black children.

### What specific clinical and financial results have you experienced?

Parental reports of children in the CAI program at 6 and 12 months as compared to baseline have shown the following: significant reductions in ED visits (64 percent), hospitalizations (79 percent), days of limited physical activity (32 percent), missed school days (41 percent), missed parent/caregiver work days (46 percent), and an increase in current asthma action plans (56 percent). The return-on-investment was 1.46 over two years and 1.73 including quality-of-life calculations. This information has been used to implement pilot bundled payments for non-reimbursable care. Overall, CAI has remarkably improved health outcomes and has been shown to be a cost-effective intervention.

### What is one piece of advice you would offer to another organization trying to decrease hospital admissions for ACSCs?

Nurse involvement with case management, care coordinators, home visits and supervision of the community health worker home visits has been critical to the success of the program and to addressing health disparities for children and families living with asthma.

# BEND THE CURVE

To err may be human, but medication errors in the health care system exact a considerable human and financial toll. While the introduction and availability of new medications has improved the health of countless Americans, those same medications, offered in error, cost billions of dollars in unnecessary spending and claim thousands of lives.

Preventable medication errors occur in all care settings, from hospitals to clinics, and at all steps of the care process. They may be the result of a mistake in dosing, a foreseeable allergic reaction by a patient or an interaction with another medication. Often they are caused by the fragmentation of care, especially for the complex chronically ill, and are exacerbated by the lack of information technology resources and data sharing.

Like many other areas of waste and inefficiency, reducing medication errors requires changes in the structure and financing of the health care system, paired with new ways of working. Care coordination and integrating the patient into the care team improves transitions and provides more checks throughout the care process. These new care delivery approaches must be supplemented with new technologies to catch errors and new payment models to incentivize and reward best practices and healthy outcomes.

Successful adoption of proven practices and implementation of policy actions together offer the potential to make millions healthier and save \$21 billion in preventable medication errors, money which can be reinvested to bring us closer to the goal of high value health care.

# Preventing Medication Errors: A \$21 Billion Opportunity



- Improve Care Coordination
- Facilitate Patient Engagement
- Require Pharmacist Follow-up
- Enhance Technology Interventions
- Increase Incentive Payments
- Update Accreditation/Certification

Targeting the \$21 billion spent annually on preventable medication errors requires building on proven practices and implementing policy actions that target the root causes of the problem.

Preventable medication errors represent a significant source of wasteful health care spending. The causes of medication errors are complex and systemic, resulting from the fragmented nature of the care delivery system and the failure to effectively share and use health care data.

Reducing preventable medication errors requires building on a coordinated set of proven practices in the field coupled with policy actions in the public and private sectors.

## THE PROBLEM

### Scope of Medication Errors

- Each year in the U.S., serious preventable medication errors occur in 3.8 million inpatient admissions and 3.3 million outpatient visits.<sup>2,3</sup>
- The Institute of Medicine, in its report *To Err Is Human*, estimated 7,000 deaths in the U.S. each year are due to preventable medication errors.<sup>4</sup>

### Costs of Medication Errors

- Inpatient preventable medication errors cost approximately \$16.4 billion annually.<sup>5</sup>
- Outpatient preventable medication errors cost approximately \$4.2 billion annually.<sup>6,7</sup>

### Prescription Errors

- Dosing errors make up 37 percent of all preventable medication errors.<sup>8</sup>
- Drug allergies or harmful drug interactions account for 11 percent of preventable medication errors.<sup>9</sup>
- Preventable medication reconciliation errors occur in all phases of care: 22 percent during admissions, 66 percent during transitions in care and 12 percent during discharge.<sup>10</sup>
- Approximately 100 undetected dispensing errors can occur each day as a result of the significant volume of medications dispensed.<sup>11</sup>

### Fragmentation of Care

- Only 13 percent of primary care physicians reported that they communicated with a pharmacist regarding new prescriptions.<sup>12</sup>

### Lack of Information Technology Infrastructure

- EMR systems that are described as fully functional and had a prescribing function were reported by only 4 percent of physicians.<sup>13</sup>
- Electronic prescribing is used by only 32 percent of physicians in ambulatory care settings.<sup>14</sup>

## SOLUTIONS

### Improve Care Coordination

- **Proven Practice:** Improved communication among physicians, pharmacists and nurses prevented 85 percent of serious medication errors.<sup>15</sup>
- **Proven Practice:** Including a pharmacist on routine medical rounds led to a 78 percent reduction in medication errors.<sup>16</sup> Adding a pharmacist to a physician rounds team in an intensive care unit led to annual savings of \$270,000.<sup>17</sup>

*Continued on back*

Using care coordination strategies, interdisciplinary teamwork and information technologies can significantly reduce preventable medication errors.

These interventions increase the availability of data, provide clinical decision support, engage the patient and improve the accuracy of prescriptions.

► Learn more about ways to Bend the Curve in health care costs at: [www.nehi.net/bendthecurve](http://www.nehi.net/bendthecurve)

#### Facilitate Patient Engagement

- **Proven Practice:** Medication errors can be reduced through active engagement of patients and family caregivers with the care team, the use of patient safety checklists, and increased awareness of publicly reported hospital safety records.
- **Policy Action:** Adopt Joint Commission recommendations for medication reconciliation, ensuring that medications are reconfirmed and reviewed with the patient at each transition in care.<sup>18,19</sup>
- **Policy Action:** Empower patients and family caregivers to manage their medications by keeping PHRs and personal medication lists and informing them about the purpose, effects, and side effects of their medications.<sup>20</sup>

#### Require Pharmacist Follow-up

- **Proven Practice:** Patients who received pharmacist follow-up calls were 88 percent less likely to have a preventable medication error resulting in an ED visit or hospitalization.<sup>21</sup>

#### Enhance Technology Interventions

- **Proven Practice:** e-Prescribing systems reduced medication errors by 85 percent and generated net cost savings of \$403,000 in ambulatory care settings.<sup>22,23</sup>
- **Proven Practice:** Verifying the correct drug dosage with Bar Code Electronic Medication Administration System (eMAR) technology led to a 51 percent reduction in medication errors and annual savings of \$2.2 million in a large academic hospital.<sup>24,25</sup>
- **Proven Practice:** Computerized Physician Order Entry (CPOE) with clinical support reduced serious medication errors by 81 percent.<sup>26</sup>

#### Increase Incentive Payments

- **Policy Action:** Assist health professionals and hospitals in adopting clinical IT tools (EHRs, e-prescribing, CPOE and eMAR), achieving “meaningful use” standards (drawn from HIT Policy Committee recommendations) and earning federal incentive payments.
- **Policy Action:** Provide private and state payer-based financial incentives to providers using evidence-based practices that reduce medication errors and using EHRs that generate key patient medication information (active medication lists, medication allergy lists).
- **Policy Action:** Encourage providers to participate in the CMS Electronic Prescribing (eRx) Incentive Program.

#### Update Accreditation/Certification

- **Proven Practice:** Certifying providers as trained and proficient in teamwork.
- **Policy Action:** Have specialty societies encourage providers to participate in the CMS Physician Quality Reporting Initiative (PQRI) for documenting current medications in the medical record.
- **Policy Action:** Set standards and require public reporting of medication errors as a condition for state licensure.

#### THE PROBLEM

1. NEHI. (2008). How Many More Studies Will It Take? A Collection of Evidence That Our Health Care System Can Do Better. Retrieved from [http://www.nehi.net/publications/30/how\\_many\\_more\\_studies\\_will\\_it\\_take](http://www.nehi.net/publications/30/how_many_more_studies_will_it_take). Last accessed October 2011.
2. Massachusetts Technology Collaborative and NEHI. (2008). Saving Lives, Saving Money: The Imperative for CPOE in Massachusetts. Retrieved from [www.nehi.net/publications/8/saving\\_lives\\_saving\\_money\\_the\\_imperative\\_for\\_computerized\\_physician\\_order\\_entry\\_in\\_machusetts\\_hospitals](http://www.nehi.net/publications/8/saving_lives_saving_money_the_imperative_for_computerized_physician_order_entry_in_machusetts_hospitals). Last accessed on October 2011.
3. Center of Information Technology Leadership. (2007). The Value of Computerized Provider Order Entry in Ambulatory Settings. Retrieved from [http://www.partners.org/cird/pdfs/CITL\\_ACPOE\\_Full.pdf](http://www.partners.org/cird/pdfs/CITL_ACPOE_Full.pdf). Last accessed October 2011.
4. Institute of Medicine. (1999). To Err Is Human: Building a Safer Health System. Washington, DC: National Academy Press.
5. Massachusetts Technology Collaborative and NEHI. 2008.
6. Center of Information Technology Leadership. 2007.
7. Burton, M.M., Hope, C., Murray, M.D., et al. (2007). The cost of adverse drug events in ambulatory care. *AMIA Annu Symp Proc*, 90-93.
8. Bobb, A., Gleason, K., Husch, M., et al. (2004). The epidemiology of prescribing errors. *Arch Intern Med*, 164(7), 785-792.
9. Bobb, Gleason, Husch, et al. 2004.
10. Santell, J.P. (2006). Reconciliation failures lead to medication errors. *Jt Comm J Qual Patient Saf*, 32(4), 225-229.
11. Cina, J.L., Gandhi, T.K., Churchill, W., et al. (2006). How

- many hospital pharmacy medication dispensing errors go undetected? *Jt Comm J Qual Patient Saf*, 32(2), 73-80.
12. Ranelli, P.L., Biss, J. (2000). Physicians' perception of communication with and responsibilities of pharmacists. *J Am Pharm Assoc*, 40(5), 625-630.
  13. Hsiao, C.J., Burt, C.W., Rechtsteiner, E., et al. (2008). Preliminary Estimates of Electronic Medical Records Use by Office-Based Physicians. Atlanta, GA: National Center for Health Statistics (NCHS). Retrieved from [www.cdc.gov/nchs/data/hestat/physicians08/physicians08.pdf](http://www.cdc.gov/nchs/data/hestat/physicians08/physicians08.pdf). Last accessed October 2011.
  14. Grossman, J.M. (2006). Even When Physicians Adopt E-Prescribing, Use of Advanced Feature Lags. Washington, DC: Center for Studying Health System Change. Issue Brief No. 133. Retrieved from [www.hschange.com/CONTENT/1133/1133.pdf](http://www.hschange.com/CONTENT/1133/1133.pdf). Last accessed October 2011.

#### SOLUTIONS

15. Fortescue, E.B., Kaushal, R., Landrigan, C.P., et al. (2003). Prioritizing strategies for preventing medication errors and adverse drug events in pediatric inpatients. *Pediatrics*, 111(4 Pt 1), 722-729.
16. Kucukarslan, S.N., Peters, M., Mlynarek, M., et al. (2003). Pharmacists on rounding teams reduce preventable adverse drug events in hospital general medicine units. *Arch Intern Med*, 163(17), 2014-2018.
17. Leape, L.L., Cullen, D.J., Clapp, M.D., et al. (1999). Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *JAMA*, 282(3), 267-270.
18. Joint Commission on Accreditation of Healthcare Organizations. (2006). Using medication reconciliation to prevent

- errors. *Sentinel Event Alert*, 35, 1-4.
19. National Priorities Partnership. (2008). National Priorities and Goals: Aligning Our Efforts to Transform America's Healthcare. Washington, DC: National Quality Forum.
  20. Sabogal, F., Coots-Miyazaki, M., Lett, J.E. (2007). Ten effective care transitions interventions: improving patient safety and healthcare quality. *CAHQ Journal*, 31(2), 15-19.
  21. Schnipper, J.L., Kirwin, J.L., Cotugno, M.C., et al. (2006). Role of pharmacist counseling in preventing adverse drug events after hospitalization. *Arch Intern Med*, 166(5), 565-571.
  22. Kaushal, R., Kern, L.M., Barrón, Y., et al. (2010). Electronic prescribing improves medication safety in community-based office practices. *J Gen Intern Med*, 25(6), 530-536.
  23. Weingart, S.N., Simchowitz, B., Padolsky, H., et al. (2009). An empirical model to estimate the potential impact of medication safety alerts on patient safety, health care utilization, and cost in ambulatory care. *Arch Intern Med*, 169(16), 1465-1473.
  24. Poon, E.G., Keohane, C.A., Yoon, C.S., et al. (2010). Effect of bar-code technology on the safety of medication administration. *N Engl J Med*, 362(18), 1698-1707.
  25. Maviglia, S.M., Yoo, J.Y., Franz, C., et al. (2007). Cost-benefit analysis of a hospital pharmacy bar code solution. *Arch Intern Med*, 167(8), 788-794.
  26. Bates, D.W., Teich, J.M., Lee, J., et al. (1999). The impact of computerized physician order entry on medication error prevention. *J Am Med Assoc*, 282(4), 313-321.



## Case Interview

*Saul Weingart, MD, PhD, Dana-Farber Cancer Institute  
on e-Prescribing and Medication Alerts*

### What issue within preventing medication errors were you trying to address?

We wanted to estimate the impact of medication safety alerts on patient safety, health care utilization and cost in ambulatory care. Specifically, we looked at the potential of reducing the number and severity of adverse drug events (ADE) in the ambulatory care setting.

### What was the solution you decided upon to address the issue and why?

Our study examined medication alerts generated by PocketScript, an electronic prescribing application that allows clinicians to transmit prescriptions electronically to a pharmacy via a computer or a handheld device. When a prescriber attempts to order a drug, the system checks whether the prescribed medication interacts with any medications on the patient's profile, drawing on a list of medication interactions. If an interaction is detected, a warning banner is displayed showing the severity of the interaction (high, medium or low), along with a description of the interaction.

Because ambulatory care clinicians override as many as 91 percent of drug interaction alerts, the potential benefit of e-prescribing with decision support is uncertain. Although overriding alerts may jeopardize the potential impact of these systems, it is possible that even a small number of accepted alerts may reduce patient harm, decrease unnecessary utilization of health care services and save money over time. As a result, our study hypothesized that e-prescribing alerts that clinicians accepted would, in aggregate, benefit patients, lower health care costs and help to validate the continued use of these systems.

### What were the barriers you faced in the implementation of your solution?

"Alert fatigue" from physicians is a concern with e-prescribing, as providers felt some alerts were distracting. In addition, the disproportionate relationship between the number of alerts and the patient safety and financial benefits of e-prescribing in this study can make one wonder whether the juice is, in fact, worth the squeeze. Lastly, generalizability of the study was restricted by the use of a single e-prescribing system and drug interaction alert database.

### How did you overcome these barriers?

Alert fatigue from physicians can be ameliorated to a degree through the use of "non-interruptible" alerts

in e-prescribing systems, which display some of the more distracting alerts to providers but do not require them to do anything about them. Additionally, our cost estimates did not take into consideration savings that might accrue from other areas, such as from improved formulary adherence and increased use of generic drugs, which could improve the argument for e-prescribing. Lastly, despite concerns of generalizability in our study, in 2008, the PocketScript system was used by 8 percent of Massachusetts prescribers and approximately 4,000 eligible prescribers in 18 states, and many of its features are common to many commercial and home-grown e-prescribing systems.

### What were the critical success factors in the implementation of your solution?

Meaningful Use criteria through the Affordable Care Act include incentives for safe prescribing, which continue to further the encouragement of HIT, EMRs and e-prescribing. In addition, some insurance companies have been creating incentives for e-prescribing. Lastly, despite an up-front time cost, providers have been interested in doing this, which is crucial to preventing medical errors.

### What specific clinical and financial results have you experienced?

Our study found electronic drug alerts likely prevented 402 ADEs, including 49 potentially serious, 125 significant and 228 minor ADEs. Accepted alerts may have also prevented a death in 3 cases, permanent disability in 14 and temporary disability in 31. Alerts also potentially resulted in 39 fewer hospitalizations, 34 fewer ED visits, and 267 fewer office visits, for a cost savings of \$402,619. Based on our estimates, 331 alerts were required to prevent 1 ADE, and a few alerts (10 percent) likely accounted for 60 percent of ADEs and 78 percent savings.

### What is one piece of advice you would offer to another organization trying to prevent hospital readmissions?

First, technology can create safer health care, but be wary of easy solutions. Second, consider opportunities to engage patients in preventing medication errors.

*For more information, see: Weingart, S.N., Simchowitz, B., Padolsky, H., et al. (2009). An empirical model to estimate the potential impact of medication safety alerts on patient safety, health care utilization, and cost in ambulatory care. Arch Intern Med, 169(16), 1465-1473.*

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