

RE-ENGINEERING THE PRIMARY CARE PRACTICE TO ELIMINATE ADULT IMMUNIZATION DISPARITIES

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Traditional “one-patient-at-a-time,” doctor-centered primary care practice models do not achieve optimal immunization rates for pneumonia and influenza, in part because of time pressures and competing demands from a burgeoning list of clinical guidelines. Some widely used quality improvement methods (physician education, provider feedback, academic detailing, etc.) have only a modest and short-lived impact on improving immunization rates. Evidence is mounting that practices can substantially improve immunization rates by changing practice systems and processes with standing orders and algorithms, expanded nurse decision-making, patient education and incentives, and partnerships with community-based pharmacies. Quality-focused, constantly-learning practices that cultivate a culture of excellence will be most effective in adopting such changes. (*Ethn Dis.* 2005;15[suppl 3]:S3-21–S3-26)

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ADULT IMMUNIZATIONS IN PRIMARY CARE

The archetypal primary care clinician, the family doctor who has a long-term personal relationship with patients in the context of their family and community, would be perfectly positioned to assure that each patient receives all the immunizations they need to stay healthy. However, 21st century realities intrude harshly on this ideal. The modern primary care practitioner faces an overwhelmingly complex set of clinical guidelines and evidence-based recommendations in caring for patients with multiple chronic diseases, each of whom may require myriad medicines or diagnostic technologies on every visit. Meanwhile, the continuity and intimacy of the doctor-patient relationship has been stretched to the breaking point by social and market forces. The model of doctors addressing acute needs while still remembering to order each element of chronic care guidelines and preventive services one-patient-at-a-time in the exam room is no longer realistic.

High Variance—Gap between Optimal Care and Usual Care

In settings ranging from private practice to HMOs to safety-net clinics, adult immunization rates are sub-optimal. Missed opportunities to vaccinate occur frequently. Perhaps the most important reason is that the primary care physician has too little time and too many prevention/intervention services to deliver. Recently, Yarnall found that if primary care physicians delivered every preventive service recommended by clinical guidelines, it would increase their workday by as much as seven ad-

ditional hours.¹ While this paper focuses on strategies to improve immunization rates for influenza and pneumococcal vaccines, the strategies may also be applicable in delivering other preventive services (eg, cancer screening, diet and obesity education, blood pressure and metabolic control). Coordinating immunization strategies with other preventive services will become even more relevant as additional adult vaccines (eg, human papilloma virus, herpes simplex virus, and acellular pertussis) come online.

High Disparity—Gap between Advantaged and Disadvantaged Populations

The quality gap is also linked to the disparity gap. Along various dimensions (rich vs poor, insured vs uninsured, White vs African-American or Latino, rural and inner city vs suburban) the disadvantaged have significantly lower immunization rates than the advantaged, even when cared for in the same practice settings.²⁻⁴ Recent authors have made the case that if we are to achieve consistency in the quality of health care delivered to all patients, then we must explicitly link the issues of quality and health disparities.⁵ According to the Institute of Medicine’s *Guidance for the National Health Care Disparities Report*, “disparities often represent an inequality in quality.”^{6,7}

Can Immunization Rates be Improved in Primary Care?

The good news is that immunization rates are potentially the low-hanging fruit of the quality gap in primary care. Increasing immunization rates will require little long-term behavioral

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change or self-discipline on the part of patients, and relatively simple re-design of processes within the primary care practice. In various settings, “best-practice models” have demonstrated that rates of influenza and pneumococcal vaccination can be substantially improved.^{8,9}

Can Immunization Rates be Improved in Practices that Serve High-Disparity Populations?

However, do these same models apply to safety net primary care practice settings that serve low-income, high-disparity patient populations? Dr. Zimmerman and his team offered a menu of evidence-based practice interventions in two community health centers, each of which served a low-income, high-disparity patient population. Intervention options included reminders, standing orders, and walk-in “flu shot clinics.” Chart audits from one center showed that influenza immunization rates increased from 24% to 30% ($P<.001$) for patients aged 50 to 64 years and from 45% to 53% for patients aged 65 years and older ($P<.001$). Although each health center chose a somewhat different mix of interventions, both increased the number of adults immunized against influenza compared to the previous pre-intervention year.¹⁰

How to Get Started—Measure Performance!

To improve immunization rates, the practice must know what baseline rates are. Most traditional practices do not measure immunization rates (unless they undergo audits from a third-party payor). Three alternative methods can measure immunization rates in a primary care practice:

1. Audit 30 charts of adults in the target age group. All those meeting risk factor indications go in the denominator, and the number immunized is the numerator.
2. Check accounts payable records (or

immunization logs) to see how many doses of vaccine were administered in the previous year; divide that by the estimated number of at-risk patients (age group plus younger patients with chronic disease indications) in the practice.

3. An electronic health record (EHR) can make the task dramatically easier and more accurate, if staff is trained in generating custom reports. Set criteria (age, chronic disease factors, steroid prescriptions) to define the denominator population who should have received immunizations, and then divide the number who actually received immunizations by that denominator.

The critical factor in measuring immunization rates is for all the practitioners to confront the results honestly, and then to have the courage and the creativity to try new strategies for improving these rates. Although some patients are vaccinated in the community at a health department or by another provider, assessment of a practice’s immunization rates will show what the practice itself is actually doing. If the results differ substantially from those based on vaccine orders, then the issue of record keeping in the practice must be addressed.

What Does Not Work?

Research has demonstrated that several approaches are ineffective for change in the primary care setting. Top-down, authoritarian, administrator-driven solutions produce poorly sustained results. However, individual, front-line action without the support or buy-in of key leadership is similarly ineffective.¹¹ In a study within Veteran’s Administration Health Systems, a “teamwork culture” was found to be positively associated with in-hospital patient satisfaction, while a “bureaucratic culture” had a negative effect.

Other interventions may be necessary but not sufficient. While guidelines, mail-outs, and lecture-based con-

tinuing medical education (CME) may be necessary to disseminate knowledge, the literature clearly shows that in isolation they have little or no impact on changing physician behavior.¹² Content-driven hand-outs or lecture-based physician education are so consistently ineffective that they are used as the placebo in most randomized controlled quality improvement interventional trials. Educational programs using more interactive methods small group discussion, and reminders or reinforcement are somewhat more effective.¹³

What Works Moderately?

In some systems, physician performance is rated against peers in their practice, clinic, or medical facility. Provider feedback generates some personal motivation to improve performance, although the effect is mild and requires repeated reinforcement to sustain.¹⁴ Another mildly effective intervention is academic detailing, which uses either influence-leaders from within the practice, or other trained personnel to deliver evidence-based guidelines and recommendations for practice change.^{15,16} Often these two methods are combined.^{17,18} The combination of feedback and academic detailing in a randomized controlled trial showed modest improvements in influenza vaccination rates, and large improvements in pneumococcal vaccination rates, but no significant advantage compared to the placebo intervention (physician education).¹⁹ The Guide to Community Preventive Services provides an extensive review of this literature and gives “strongly recommended” ratings to certain interventions based on the scientific strength of evidence from published studies (not necessarily the magnitude or sustainability of the effect, but the consistency of the finding across scientifically rigorous studies). Strongly recommended were the following interventions: reducing out-of-pocket costs; client reminder/recall; provider reminders; provider performance feedback; and standing orders.

Education programs and expanding access in healthcare sites only had sufficient evidence for a strong recommendation when done as part of multi-pronged interventions.^{20,21}

What Really Works for Long-Term Improvement?

To improve immunization rates substantially, and to sustain these improvements over the long term, it is necessary to re-engineer the primary care practice. Models that work include creating a culture of excellence; changing systems and micro-processes of care; chart-based flow sheets, patient logs and reminder tools; electronic health records redundancy; teamwork, and community partnerships.

CULTURE OF EXCELLENCE

Perhaps the most difficult and yet most important strategy for achieving excellence in quality of care is to create a culture of excellence within the organization. High-performing healthcare organizations have a different organizational culture than do lower-performing organizations.²² Characteristics of excellent organizations include having leaders who demand and model excellence first from themselves and then from all members of their team, mechanisms for measuring and rewarding excellence, embracing rather than resisting change, short cycle-times and feedback loops for implementing and measuring the effectiveness of new strategies, and cultivating a quality-focus in a continuous learning environment.^{23,24} In a Veteran's Administration study of compliance with clinical practice guidelines in outpatient settings, there were specific organizational factors (such as mission, capacity, and professionalism) associated with higher levels of compliance.²⁵

One essential element of creating the culture of excellence is clinician ownership or buy-in. For example, in a study of diabetes-related quality of care for Medicare enrollees, quality was related

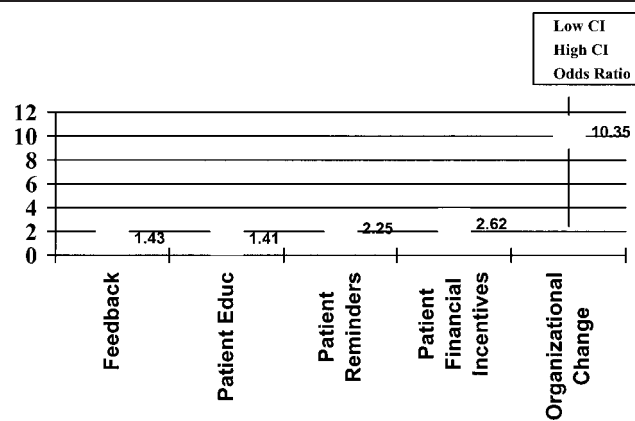


Fig 1. Meta-analysis results demonstrating effectiveness of interventions targeting preventive services

to a wide range of quality improvement activities, including computer-generated reminders, physician champions, practitioner quality-improvement work groups, clinical guidelines, academic detailing, self-management education, availability of laboratory results, and registry use. However, after adjusting for geographic and structural variables (such as non-profit status or patient mix), only **practitioner input** and use of clinical-guidelines software remained as independent predictors of quality.²⁶

SYSTEMS CHANGE (RE-ENGINEERED PROCESSES)

In the quality improvement models of Juran and Deming,²⁷ the results we obtain reflect either a process out of control (widely variable immunization rates) or a process that is statistically under control and consistently produces the results it is designed to produce. In either case, immunization rates can be inappropriately low. To improve immunization rates, we must change our systems and the processes of delivering care.

In a meta-analysis of interventions targeting preventive services, Stone et al found that interventions using systems-change or organizational change were 4–5 times more effective (odds ratio

[OR], 10.0) in increasing cancer screening and immunization rates than were other interventions such as patient education, reminders, or financial incentives (OR=1.5 to 2.6, see Figure 1). Provider education had no impact at all (OR=1.0).²⁸ Gyorkos et al conducted an analysis of vaccination strategies and found that system-oriented strategies (eg, standing orders for nurses) resulted in pooled vaccination rate increases of 39% and 45% for influenza and pneumococcal vaccines, respectively.²⁹

In most practices, the default setting is to do nothing unless the doctor orders it, a system that depends on the physician consistently remembering to order the immunization even as they deal with acute complaints, chronic disease management, and other preventive services such as cancer screening, all in the context of a 10–15 minute one-on-one encounter with each patient in the exam room, at the end of a long chain of interactions with the practice staff and nurses. Instead, we must re-set the default setting by re-designing the patient care process to do the right thing automatically unless the doctor says no. For example, standing orders may be put in place for influenza vaccine for elderly patients or patients with other indications, and nurses may actually administer the vaccine before the physician sees the patient (or even on a “flu-

Table 1. Redesigning processes of care of patients with diabetes

Old Process	New Process
Patient with diabetes gets finger-stick blood glucose; patient may have fasted Doctor sees patient, and may order Hgb A _{1c} and lipid profile	Place machine for testing Hgb A _{1c} and lipid profile in nursing station or each hallway Nurses follow standing order for fingerstick Hgb A _{1c} and lipid profile on every person with diabetes
Doctor may offer fluvax/pneumovax/eye referral If Hgb A _{1c} is high, doctor/nurse may call patient back for follow-up	Results on chart when doctor sees patient Doctor may intensify regimen
If patient comes back, doctor may intensify regimen	Standing orders for flu vaccine (and pneumovax if none previously) for every patient with diabetes Standing orders for mammograms, PSAs, etc

shot only” visit), even in emergency department settings (Table 1).³⁰

Low-tech tools are often sufficient to achieve rapid, significant improvements. Examples include chart pre-screening; risk assessment forms; post-it prompts; flow sheets; reminder cards (by mail, email, or phone); recall systems; clinical tracking logs; and patient education materials.^{30,31} Examples of a few of these low-tech tools and templates (such as a patient self-prescription form for preventive services and a combined problem list and preventive services flow sheet) appear in the appendix.

SYSTEMS CHANGE (ELECTRONIC HEALTH INFORMATION SYSTEMS)

Electronic health information systems are a powerful tool for increasing performance of preventive services, including immunizations, but they do not automatically fix missed opportunities. The practice must consciously decide to engage tools within the information system that can improve performance both in the context of individual patient visits, and in more global population-based strategies.

“In-the-moment” tools can improve performance at the time of each individual patient visit. For example, prompts or flags can be set to remind the provider that an influenza vaccina-

tion is indicated for individuals that meet certain age or other risk factor criteria.^{32,33} These prompts can also trigger standing orders for nurses to follow an immunization protocol. They can also generate secondary actions (for example, an order for a influenza vaccination might trigger a secondary order for a pneumococcal vaccination, if there is no previous record of vaccination). In the hospital setting, a computer-driven standing order algorithm increased pre-discharge influenza and pneumococcal vaccination rates significantly more than did simple computer-prompted reminders.³⁴

While information systems are effective in decreasing missed opportunities to immunize within day-to-day practice, the real power of information systems is in assessing and reaching out to the entire population at risk within the practice. For example, in most EHR systems, we can set criteria (age, chronic disease factors, steroid prescriptions, etc) to define the population that needs immunization. We can then print out mailing labels to send flu-shot reminder cards in September each year.³⁵ We can also use this list of at-risk patients to track immunization rates, and also to identify high-risk patients (elderly COPD patients on steroids, for example), who might be targeted for aggressive care management, including a phone reminder about influenza and

pneumococcal vaccination from a nurse.³⁶

Managed care organizations and VA health facilities have taken this a step further. Physicians may be emailed reminder prompts when preventive services are overdue on patients within their primary care panels, regardless of whether or not the patients have come in recently for visits. Immunization rates can be tracked by provider, by clinic site, and by demographic sub-groups (especially high-disparity patient populations), in order to create focused interventions designed to improve immunization rates. For example, a low rate of immunization among older African-American men might prompt the practice to develop immunization outreach activities with local barber shops that serve this population. In the future, perhaps patients will also receive automatic email reminders coupled with electronic prescriptions for vaccinations that can be received at their local pharmacy at their convenience.

PRIMARY CARE TEAMS

McCarthy et al found that teamwork and the use of clinical protocols by non-physicians resulted in a greater incidence of mammography among their study groups.³⁷ By empowering more clinical staff (eg, medical assistants, licensed practical nurses) to initiate preventive services, mammography screening was offered as a routine part of the clinical encounter. Before the system change, only 68% of patients received mammography screening; after the change, 77% of patients received the screening. Others have found similar results in improved rates of interventions when pharmacists become part of the healthcare team and provide self-management education to patients with diabetes.³⁸ In a study related to asthma quality of care, McLean et al also found that engaging pharmacists as part of the healthcare team resulted in 75% fewer

<p><u>What Doesn't Work</u> (<i>necessary but not sufficient</i>)</p> <ul style="list-style-type: none"> ○ Mailed guidelines ○ Lectures / CME programs ○ Top-down management <p><u>What Works Moderately</u></p> <ul style="list-style-type: none"> ○ Provider feedback ○ Academic detailing ○ Patient reminders <p><u>What Really Works</u></p> <ul style="list-style-type: none"> ○ Patient self-management ○ Systems change (re-engineered processes) ○ Team-based strategies ○ Community partnerships
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Fig 2. Improving immunization rates within primary care practice

emergency room visits and medical office visits, while increasing quality of life scores nearly 20%.³⁹ Use of protocols by standing orders has been credited as a factor in raising influenza vaccination rates in neighborhood health centers in the inner city.¹⁰ Implicit in the development of primary care teams is the concept of creating redundancy to assure that critical actions for each patient do not slip through the cracks. Staff at multiple levels from the front desk to the nursing station to the doctor's exam room to the cashier to the quality/nurse manager can be trained to ask patients if they received or would like to receive their influenza or pneumonia vaccine.

PATIENT EMPOWERMENT

Perhaps the most important team member in health care is the patient. With education and empowerment, the patient can "order" their own preventive services. (See example of age-gender checklist of the "Top 7 Prevention Services" patients may choose to receive, which can be given to the patient at the registration desk when they check in). Nursing staff or physicians can then as-

sure that all needed services are discussed with the patient and ordered/administered. Recent Cochrane database reviews have demonstrated the effectiveness of patient self-management in several chronic disease states such as asthma, diabetes, etc.⁴⁰ Further testing will be needed to evaluate "whole-person self-management" programs, as opposed to disease-specific models.⁴¹ In this approach, a patient would receive training from health educators on the full spectrum of self-manageable conditions and prevention activities, with a view toward improving global health outcomes and quality of life.

COMMUNITY PARTNERSHIPS

In addition to patients and health professionals, the team must go beyond the practice walls to partner with various resources in the community. These might include churches and other faith communities, pharmacies, businesses, etc. Adult immunizations are especially suited to these strategies (drive-through flu shots at a local pharmacy or bank, flu shots given at a shopping mall, gro-

cery store, or home improvement center, or outreach nurse visits to senior centers or retirement communities, etc).

The successful partnership/team comprises school clinics/school nurses, nursing staff, pharmacists, respiratory care specialists, primary care practitioners, and other specialists. In international settings, the use of community health workers, village health workers, nurse-auxiliaires, or *promotoras* have been highly effective in improving childhood immunization rates, sometimes surpassing rates achieved in industrialized nations with doctor-centered models. Here in the United States, we have made substantial improvements in health outcomes when public health and primary care join forces (hypertension detection and treatment, Pap smear screening for cervical cancer, childhood immunizations, etc). The essential element is teamwork both within and outside of the clinical practice. To quote the Italian poet Luciano de Crescenzo, "*We are all like angels with only one wing. We only fly when we embrace each other.*"

CONCLUSION

Multi-dimensional quality improvement interventions, using the full range of evidence-based interventions, changing systems and processes of care to make excellent care the automatic default setting, and involving the entire health care team (including the patient and community) with repetition, reinforcement, and redundancy built in, will have the greatest effect in improving clinical performance.

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