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Proven Health Interventions in which People without Medical Training Can Play a Key Role:

Options for Faith- and Community-Based Organizations

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Summary

Our scan of the health care and health economics literature uncovered several evidence-based interventions that (1) have a significant role for people without medical training; and (2) could be undertaken by members of faith-based organizations (FBOs) or community-based organizations (CBOs) to improve population health while slowing the growth of hospital costs. Our discussion is framed in terms of FBOs, but the analysis also applies to many other CBOs.

Highly Promising Interventions

Two interventions with proven results appear capable of being undertaken by congregations, with support from hospitals or others.

Tobacco, Exercise, and Diet Messages (TEXT ME)

Research findings. Patients discharged from the hospital with a diagnosis of coronary heart disease (CHD) received targeted text messages about smoking, exercise, diet, and general cardiovascular wellness. Messages varied based on patient characteristics such as smoking status and preferred diet. In six months, compared to a control group of CHD patients who left the hospital without receiving text messages, those in the TEXT ME program experienced significant improvements in health status, including

- a 44 percent higher likelihood of achieving healthy blood pressure;
- more than twice the likelihood of exercising at least 30 minutes a day at least five times a week; and
- a 33 percent greater likelihood of stopping smoking.

Altogether, TEXT ME participants were nearly three times as likely to achieve target wellness metrics for at least four out of five measures of cardiovascular health (cholesterol levels, blood pressure, regular exercise, smoking, and body weight).

How a participating congregation could help. Congregation members could customize the study's text messages to fit their community. Members who are hospitalized with a diagnosis of coronary heart disease would be given a chance to sign up for TEXT ME before they leave the hospital.

How the sponsoring hospital could contribute. At some point between admission and discharge, the hospital could

- identify congregational members who have been hospitalized with a diagnosis of CHD;
- give such members an opportunity to join TEXT ME; and
- for those who consent, transfer relevant information about the patient (e.g., smoking status, dietary preferences) into the TEXT ME system.

The hospital or another entity outside the congregation would need to establish, operate, and fund a system for transmitting text messages.

Project Re-Engineered Discharge (Project RED)

Research findings. The study population consisted of adult patients in a large Boston hospital who planned to return home after their hospital stay. The intervention had two components:

- Discharge educators (DEs) followed a detailed, step-by-step program for working with patients before their discharge. This program helped both patients and the patients' primary care providers understand the patients' conditions at discharge and what to do after the return home. In some cases, DEs with appropriate nursing backgrounds also checked prescriptions for errors.
- Pharmacists used a step-by-step protocol to contact patients after their return home. The goal of these calls was to make sure the patients were taking the right medicine. More than half the time, there was a conproblem with the prescription that the pharmacist needed to address.

Participants in Project RED had a 33 percent lower rate of emergency room (ER) visits and a 28 percent lower rate of readmission within 30 days of discharge, compared to the control group of patients receiving usual care. Within that 30-day period, total health care costs per patient were 33.9 percent lower for Project RED participants; that savings estimate reflects actual reductions in hospital spending and estimated increases in primary care costs.

How a participating congregation could help. Members (or other patients) who are hospitalized could be asked whether they want to be visited by a discharge educator from their congregation. Those who assent would be visited by fellow congregants who are serving as DEs. Congregant DEs would use replication guides and tools, developed by researchers to provide a step-by-step guide. The average time commitment for DEs would be less than 90 minutes per patient, according to the research.

How the sponsoring hospital could contribute. The hospital could fund DE training. In addition, the hospital would need to engage community pharmacists, perhaps by encouraging discharged patients to use pharmacists who participate in the intervention.

Potentially Promising Interventions

In this second category of interventions, research shows positive outcomes, but the effort required of congregations is greater than with the above approaches. Further work is needed to test the willingness of FBOs to take the steps outlined below. To address the time demands of these interventions, congregants could consider teaming up so more than one congregant helps each patient. It may also be worth considering whether hospitals could pay some congregation members who make a particularly significant time commitment to this work.

Community Asthma Intervention (CAI)

Research findings. The study population consisted of children ages 2 to 18 who had a recent, asthma-related ER visit or hospitalization and who lived in an underserved Boston community with high asthma rates. Nurse case managers (NCMs) worked with the children's primary care providers to develop care plans. Community health workers (CHWs) then made home visits to assess environmental conditions, identifying potential asthma triggers. Home visitors

- provided culturally sensitive asthma education materials and helped identify the home's barriers to asthma treatment adherence;
- furnished asthma-prevention items, such as mattress covers, pest management kits, and vacuum cleaners with special filters; and
- on a "case-by-case basis," referred the family to the city's inspectional services department, to a "green" pest-management company funded as part of the intervention, and/or to legal services attorneys trained to compel landlords to make improvements.

After 12 months, asthma-related hospitalizations declined 84.8 percent, the number of children with ER visits for asthma fell 68.0 percent, parents missed 49.7 percent fewer days of work, and children experienced 42.6 percent fewer days of limited physical activity and 41.0 percent fewer missed days of school. Similar results were reported after 6 months. One analysis of return on investment (ROI) found an ROI of 1.46 after two years— in other words, $1.46 in hospital costs were saved for every dollar invested in the CAI program. A second ROI analysis concluded that the project paid for itself in less than two years, because of lower hospital costs; after three years, the ROI was calculated as 1.33.

How a participating congregation could help. Members would receive training from the sponsoring hospital and then conduct home visits, under the supervision of a nurse. Based on the study, the average patient

would require 20 hours of home visiting time. Researchers have published a free replication manual, which congregations could use to guide implementation.

How the sponsoring hospital could contribute. Either the hospital or another organization outside the congregation would need to: (1) provide supervising NCMs; (2) train congregants; (3) pay for asthma-prevention items (mattress covers, etc.); (4) contract with a pest-management company; and (5) manage the overall program.

Project Sugar

Research findings. African-Americans who were diagnosed with type 2 diabetes and who lived in inner city Baltimore received either a "minimum" or an "intensive" intervention. With the minimum intervention, staff made telephone calls and mailed educational materials to patients and sent providers summaries of patients' care. In the intensive intervention, both nurses and CHWs made home visits and informed the patients' primary care physicians about what took place. Based on patient characteristics and clinical indicators, an algorithm directed the home visitors to take specific actions involving nutrition, physical activity, medication adherence, appointment adherence, foot care, and behavioral and psychosocial issues. Nurses made at least one home visit per year, and CHWs made at least three.

After 24 months, ER visits declined 23 percent more with the intensive intervention than with the minimum intervention. After 36 months, patients who received additional visits from a CHW experienced 47 percent fewer ER visits and 56 percent fewer hospitalizations.

How a participating congregation could help. Members, both nurses and lay people, could conduct at least one and three home visits per year, respectively. Participants would join coordination sessions with NCMs, perhaps held biweekly for lay people. Participants would need to commit to prior training, which, for lay people, involves an intensive, six-week course.

How the sponsoring hospital could contribute. The hospital would need to sponsor training, maintain the information technology (IT) application that implements the algorithm, and, with patient consent, populate the application with relevant clinical information.

Individualized Management for Patient-Centered Targets (IMPaCT)

Research findings. The intervention targeted uninsured and Medicaid-enrolled adults, ages 18 to 64, who lived in a high-poverty area of Philadelphia and expected to return home after leaving the hospital. CHWs

met with patients to develop individualized recovery plans and shared the plans with relevant hospital staff. The CHWs followed up after discharge to link patients to primary care providers and to provide other support. Twice weekly during their involvement with a patient, CHWs had their plans reviewed by clinical social workers.

Compared to similar patients in a control group, those receiving IMPaCT services had a 60 percent lower rate of multiple rehospitalizations within 30 days following discharge.[1] They were 52 percent more likely to obtain timely primary care within 14 days following discharge, experienced a nearly three-fold average level of improvement in self-reported mental health, and more than a three-fold increase in patient involvement with care, as measured by the researchers.

How a participating congregation could help. Members would receive an intensive, month-long training with slightly more than 90 hours of classroom instruction. They would then work with hospital patients before and after discharge. During their involvement with a particular patient, members would check in regularly with a supervising social worker. Members would work with a patient for 14 days after discharge or the initial primary care appointment, whichever comes last. On average, CHWs would spend 28 hours per patient, based on study results.

How the sponsoring hospital could contribute. Either the hospital or another organization outside the congregation would need to train and supervise the CHWs.

[1] Among patients who were rehospitalized once, IMPaCT participants had a 73 percent lower chance of experiencing additional readmissions. No statistically significant difference was observed with initial readmissions.

Technical Analysis

Introduction

Faith-based organizations (FBOs) and community-based organizations (CBOs) can play key roles in the health care system. Some roles draw on the expertise of affiliated nurses or other health professionals. Lay members can also serve as community health workers (CHWs). Across different environments and localities, these communities can make contributions to population health. Community members' education, advocacy, and social support efforts are often enhanced by commonalities of ethnicity, language, socioeconomic status, and life experience that are shared with vulnerable patients, opening the door to culturally and linguistically competent service provision.

Faith-based communities have much to offer the health care system. In many communities, faith is reflected in action to help people in need. An evidence-based partnership with hospitals can assure community members that their dedication is likely to make a significant difference in the lives of those suffering with illness. Many congregations count among their members nurses and other health professionals, who can be engaged in efforts to improve health and wellness. However, the approaches described in this paper also provide opportunities for members without medical training to contribute by acting as CHWs. Of course, many of these features also characterize other community organizations with a membership base that shares a mission of helping those in need.

The potential for the FBOs, CBOs and CHWs to contribute to the health of their communities is typically underappreciated (Bovbjerg, Eyster, Ormond, Anderson, & Richardson, 2013). However, new evidence shows that in some cases, or with some populations, health interventions drawing on CHWs and other human capital available to FBOs and CBOs can produce positive health outcomes and lower hospital spending, with relatively low intervention costs.

In this study, we conduct a literature review to find strategies that FBOs and CBOs in Maryland could consider implementing to reduce hospital costs and improve population health. Our goal was to identify interventions with a solid evidentiary basis showing positive outcomes.

How We Chose the Interventions

Data Sources and Searches

We searched the peer-reviewed published literature, as well the "grey" literature,[2] for studies that examined health interventions that have a significant role for FBO- or CBO-affiliated individuals. We sought interventions with significant roles for people without medical training or for nurses—categories of people likely to be found among a congregation's membership. We focused on interventions that achieved outcomes in one or more of the following categories:

- Improvement in modifiable risk factors that are independently associated with a higher risk of initial admission or readmission to the hospital, such as those related to chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD) and diabetes;
- Fewer initial hospital admissions for ambulatory-care-sensitive conditions (e.g. asthma); and
- Fewer hospital readmissions. Interventions in this category might improve the discharge process, postdischarge care, or postdischarge care coordination.

Keywords for our search included:

- A term for roles that could be served by members of FBOs or CBOs (e.g. people without medical training, often called "lay people;" CHWs; nurses; social workers; etc.); and
- Terms for the outcomes or risk factors we were targeting (e.g. hospital admissions, admissions for ambulatory-care-sensitive conditions, readmissions, COPD risk factors, CHD risk factors, diabetes risk factors, etc.).

We sought interventions that helped either a broad population (e.g., all adults) or populations with high users of hospital care. We included but did not limit ourselves to approaches that helped Medicare patients. We considered only interventions with protocols that were detailed enough for replication.

We searched PubMed, MedLine, Academic OneFile, and Google Scholar. We also examined study bibliographies for other potentially relevant research, and considered studies discovered through ad hoc

[2] For our purposes, the "grey" literature is composed of press coverage, web pages belonging to organizations and hospitals involved in the design and implementation of interventions, reports available on the internet, and similar sources of information on relevant interventions that fall outside the scope of peer-reviewed literature.

searches and consultation with outside experts. We drew on systematic reviews of interventions when available, e.g., (Viswanathan, et al., 2009).

Study Selection and Evidence Rating

Subject to the search criteria delineated above, we focused on studies that (1) empirically tested the relationship between an intervention and one or more specified outcomes and (2) were published between January 1, 2000 and October 1, 2015. One Urban Institute (Urban) researcher reviewed titles and abstracts identified in the initial search for studies that potentially met the inclusion criteria. Two Urban researchers subsequently reviewed the full text of the studies, including an examination of methods and study quality, to make final determinations about study selection. Reviewers used "Evidence Rating" criteria developed by the Agency for Healthcare Research and Quality (AHRQ, 2015), slightly modified as described below, as well as AHRQ assessment guidelines related to empirical findings of health care interventions (Berkman, et al., 2013). AHRQ developed these criteria to help evaluators consistently assess the quality and strength of published evidence.

We included studies only if the evidence of positive outcomes was determined to be "strong" or "moderate," using AHRQ's classification system (AHRQ, 2015):

- An intervention's evidence was determined to be "strong" if the findings satisfied the following criteria:
    - Findings came from "one or more evaluations using experimental designs based on random allocation of individuals or groups of individuals (e.g., medical practices or hospital units) to comparison groups." In addition to this criterion articulated by AHRQ, we required studies to have large enough samples to yield highly reliable outcomes (generally with a sample number, or N, of 500 or more subjects in the intervention group). We thus used a narrower definition of "strong" evidence than is applied by AHRQ.
    - Results showed "consistent direct evidence of the effectiveness of the innovation in improving the targeted health care outcomes."
    - At least two similar interventions used an experimental design to show consistent findings. This criterion was not a part of the AHRQ guidelines. We added it due to small sample sizes of many evaluations.
- We used the following criteria to identify evidence of "moderate" strength:

- Evaluation results show "consistent direct or indirect evidence of the effectiveness of the innovation in improving targeted health care outcomes" although the strength of the evidence is limited by sample size, study quality, or generalizability.
- The findings are based on at least one systematic evaluation with a quasi-experimental design. Examples of such approaches might include "the non-random assignment of individuals to comparison groups, before-and-after comparisons in one group, and/or comparisons with a historical baseline or control."
- Stronger evidence is not available in the form of randomized, controlled experiments, with one exception. We departed from AHRQ guidelines by classifying experimental designs as offering evidence of "moderate" strength when samples of intervention patients were small in size (generally with N<500). AHRQ's guidelines characterize such evidence as "strong."

Review of Selected Interventions

1. The Tobacco, Exercise and Diet Messages (TEXT ME) Intervention

OVERVIEW

The Tobacco, Exercise and Diet Messages (TEXT ME) intervention is a lifestyle-focused, semipersonalized support program delivered by mobile phone text messaging (Chow, et al., 2015). The text-message–based prevention program focuses on individuals with coronary heart disease (CHD) and promotes lifestyle changes that are associated with reduced cardiovascular risk. The text messages provide advice, motivation, and information with the goal of improving each participant's diet, increasing physical activity, and encouraging smoking cessation. The messages were developed in a collaborative, multi-stage process with input from many stakeholder groups, including clinicians and patients. The intervention demonstrated clinical benefit, is relatively easy to scale up, could be adapted to meet distinctive cultural and linguistic needs, and is relatively inexpensive.

ROLES FOR NURSES AND PEOPLE WITHOUT MEDICAL TRAINING

Congregations could initially shape the intervention by customizing health messages to fit the local community. Congregants hospitalized with CHD could then opt to participate in TEXT ME.

RESEARCH SUPPORT

Evidence Rating

Strong: Evidence supporting the TEXT ME program consists of a randomized clinical trial examining the effect of semipersonalized, lifestyle-focused messages delivered by mobile phone text messaging among 710 patients with CHD, out of 1,301 individuals assessed for eligibility. The study collected information about cardiovascular risk factors and self-reported measures of physical activity, diet, and medications at baseline and at six months. Peer-reviewed evaluation results demonstrated that the intervention influenced patient behaviors and improved risk profiles in the short-term.

Findings from the TEXT ME program are consistent with other evaluations of text messaging programs, evaluations that used randomized controlled trials to demonstrate short-term effects on weight loss (Patrick, et al., 2009). A separate systematic review of randomized or quasi-randomized trials involving text messaging interventions similarly found such interventions to have positive effects on smoking cessation (Whittaker, et al., 2012). Additional evidence from the TEXT ME program includes estimates of program costs, as well as post-implementation surveys of participants' satisfaction with the program.

Date First Implemented

The TEXT ME intervention began in September 2011 and ended November 2013.

What They Did

Patient Population

The intervention population was composed of individuals with diagnosed CHD at a large tertiary hospital in Sydney, Australia.

The Intervention

As described above, text messages related to health prevention goals were developed in a collaborative, multi-stage process with input from stakeholder groups (Chow, et al., 2012). The content of the messages fell into four areas: smoking, diet, physical activity, and general cardiovascular health. Each participant received four text messages per week for 24 weeks, with messages arriving during weekdays at random times during working hours. Messages were semipersonalized, based on baseline characteristics such as smoking status and vegetarian diet. Some messages used participant names. Following are examples of text messages in each category (Chow, et al., 2015):

Examples of text message content related to smoking:

- "[NAME], try identifying the triggers that make you want a cigarette & plan to avoid them."

- "[NAME], for many it may take several attempts to quit, so keep trying."

Examples of text message content related to diet:

- "Did you know 90% of people don't eat the recommended daily intake of vegetables (5 [servings] a day)?"
- "Try avoiding adding salt to your foods by using other spices or herbs."

Examples of text message content related to physical activity:

- "Hi [NAME], don't forget physical activity is good for you! It reduces your risk of diabetes, heart attack, stroke, and their complications."
- "Walking is cheap. It can be done almost anywhere. All you need is comfortable shoes & clothing."
- "Have you gone for your walk today [NAME]?"

Examples of text message content related to general cardiovascular wellness:

- "Have you got a chest pain Action Plan [NAME]? Find ideas at *http://www.heartfoundation.org.au/Pages/default.aspx*"
- "Studies show that stress, worry & loneliness can increase the risk of heart disease. Please talk to a health professional if you need help."

To evaluate the intervention, CHD patients were randomly assigned to receive (n = 352) or not receive (n = 358) the text messages. Participants were assessed at baseline and at six months with a clinic visit and questionnaire. A separate questionnaire after the program was completed investigated participants' views of the acceptability and usefulness of the program.

Clinical Outcomes

Program evaluation found significant improvements related to the intervention in low-density lipoprotein cholesterol level (LDL-C), systolic blood pressure, and body mass index (BMI) (Chow, et al., 2015). Intervention participants were also more likely to exercise regularly and to quit smoking.

At baseline, the intervention and control groups were similar across a range of sociodemographic characteristics and health factors. At six months, the evaluation showed statistically significant but modest clinical reductions in levels of LDL-C among participants in the intervention group, compared with those in the control group. It also showed gains in secondary health outcomes:

- Blood pressure control: The proportion with blood pressure at levels generally considered not to be high (<140/90 mm Hg)—was 79.2 percent among participants, compared to 54.9 percent in the control group.
- BMI: Participants in the intervention group had better absolute BMI, with a statistically significant mean difference of -1.3 between the intervention [avg. BMI = 29.0] and control [avg. BMI = 30.3] conditions), measured in weight (kg) / height (m^2). Thus, average participants in the intervention condition were able to slip below the World Health Organization's threshold for clinical obesity, which is set at a BMI "greater than or equal to 30" (World Health Organization, 2015).
- Physical activity: 53.8 percent of participants in the intervention group reported frequent regular exercise, compared to 22.5 percent in the control group, and
- Smoking: 74.6 percent of the intervention group achieved nonsmoking status, by study's end, compared to 55.9 percent in the control group. At baseline, slightly more than half of each group smoked (52.3 percent and 53.9 percent for the intervention and control groups, respectively).

Controlling for multiple factors, researchers found that TEXT ME participants were

- 44 percent more likely to have their blood pressure under control;
- More than twice as likely (relative radio, or RR, of 2.39) to exercise at least five times per week for at least 30 minutes per session; and
- 33 percent more likely to stop smoking.

In addition, intervention participants were more likely to experience improvement in multiple risk factors. Fully 28.9 percent of those in the intervention group achieved healthy levels with at least four out of five key risk factors, compared to just 10.3 percent of those in the control group. Controlling for multiple factors, those participating in TEXT ME were 2.8 times as likely to hit four or more targets for improved cardiovascular health.[3] Reducing multiple risk factors could increase health benefits over time. However, the extent to which program effects continued beyond the study's six-month tracking period is unknown.

The intervention was well-received by participants in the intervention group, with a large share reporting that the messages were useful and the level of contact was appropriate. In the intervention group, 87 percent responded to program feedback questionnaires. Among respondents, 91 percent reported that the program was useful, 97 percent said that messages were easy to understand, 81 percent reported that the

[3] Those targets involved cholesterol levels, blood pressure, regular exercise, smoking, and body weight.

program was motivating with respect to diet, and 73 percent said that it was motivating with respect to physical activity.

Resources Used and Additional Considerations

Staffing

Publications have not reported the level of staff resources that was required to accomplish the following goals: identifying a population of individuals who would be included in the intervention because of CHD and other targeted risk factors, coordinating the development of text message content, administering a message-management system that varied messages based on participants' personal characteristics, and sending the text messages.

Program Costs and/or Return on Investment

Program evaluation showed that the text messages cost approximately US $10 per participant for the 96 messages sent over the programs' six months.

Additional Considerations

The study noted that text messages may be well suited to low-income populations since one can receive text messages without a smartphone, stable landline, or particular apps.

2. Project RED (Re-Engineered Discharge)

OVERVIEW

Project Re-Engineered Discharge (Project RED) was developed by researchers at the Boston Medical Center (BMC) in order to improve the hospital discharge process for a population of adults who were hospitalized from home and then discharged back to the community. Project RED relies on a "discharge educator" (DE)—typically a registered nurse—to undertake a specific set of activities in advocating for patients prior to discharge. The DE collaborates with the patients' multidisciplinary medical teams, following a set of prescribed activities aimed at educating and preparing the patient and caregivers for success following discharge. In addition, clinical pharmacists make phone calls to patients soon after discharge. Project RED has been effective at reducing readmissions and post-discharge emergency room (ER) visits. The intervention has a highly developed set of replication guides and tools, including specialized materials for addressing the needs of diverse patient populations. The intervention was developed through a mixed-methods analysis of hospital discharge failures (Greenwald, Denham, & Jack, 2007).

ROLES FOR NURSES AND PEOPLE WITHOUT MEDICAL TRAINING

This intervention would rely on a trained nurse or lay person to play the role of the DE, performing specified communication and planning activities before discharge. Such activities follow a detailed and specific recipe. For the average patient, about 90 minutes of DE work is required.

RESEARCH SUPPORT

Moderate: The evidence consists of one randomized controlled trial of Project RED, with 370 adults in the treatment group and 368 in the control group. Outcomes were not risk-adjusted; instead evaluators relied on randomization to achieve comparability between groups. The trial was conducted at BMC, a large, urban, safety-net academic hospital in Boston, Massachusetts. Fifty-nine percent of the eligible participants were enrolled. An evaluation of a replication of the intervention on a similar population could not be found, although studies have been conducted on other populations.[4]

Date First Implemented

The intervention studied with a randomized controlled trial occurred in 2004.

What They Did

Patient Population

The intervention population was adults ages 18 and older who: (1) were hospitalized from home; (2) were English-speaking; (3) had a telephone; and (4) planned to be discharged to the community. Some patients were excluded, such as those discharged to skilled nursing facilities (Jack, et al., 2009). Whereas most discharge intervention programs target patients with specific diagnoses or specific population groups (typically elderly patients), this intervention is applicable to a "general medical population" (Jack, et al., 2009).

Description of the intervention

Project RED hired six part-time DEs, all registered nurses, to work with intervention participants. This level of staffing made a DE available in the hospital for 5 hours each day, 7 days a week during the intervention. (Authors' note: In the original evaluation of Project RED, the DE was called a "discharge advocate.") The DEs

[4] Similar findings were reported in a Project RED intervention designed for patients discharged from a Skilled Nursing Facility (Jack, et al., 2009). Researchers used a consecutive sample evaluation design, whereby randomly arranged index cards were placed in opaque envelopes labeled consecutively with study numbers, and participants were assigned a study group by revealing the index card. This is the strongest type of nonsampling evaluation design (Berkowitz & et al, 2013). In addition, another Project RED intervention involved Medicare fee-for-service patients at five hospitals in Texas, but only the most successful intervention results were published. Researchers used a pre-/post-evaluation design (Markley, et al., 2013). Since this evaluation has a weaker design, the findings are not presented.

completed a specific set of activities in advocating for patients prior to discharge. The DE collaborated with the patients' multidisciplinary medical teams, following a set of proscribed activities (Figure 1) aimed at educating and preparing the patient and caregivers for success following discharge.

Before the discharge, the DE met at least once with the patient and the patient's medical team to discuss the hospital stay and what needed to be done for a successful transition home. By entering information collected from medical records, providers, and patients, the DE produced an "after-hospital care plan" as a printed color booklet. The information included: medical provider contact information, appointment calendar, color-coded medication schedule, list of tests with pending results at discharge, description of the discharge diagnosis with illustrations, and information about what the patient should do if a problem occurs after discharge. The booklet template for the after-hospital care plan was designed to be accessible to individuals with limited health literacy. By using scripts provided in a training toolkit, the DE reviewed the contents of the plan with the participant patient, using a teach-back methodology in which the patient explained information back to the DE using the patient's own words. On the day of discharge, the plan and a discharge summary were faxed to the patient's primary care provider.

In about half of the cases, DEs licensed as registered nurses conducted medication reconciliation. Just over half (53 percent) of the intervention group had their medications reconciled and had an updated medication list included in the after-hospital care plan." For many patients, however, medication reconciliation was addressed only in a follow-up call from a pharmacist, two to four days after discharge. Across all patients with a follow-up call from a pharmacist (including some who already went through medication reconciliation with a nurse) more than half of patients had prescription errors. To fix these errors, pharmacists often had to call the patients' primary care providers.

In carrying out reconciliation, the pharmacist call followed a script, which included efforts to make sure patients were taking the right medication. The pharmacist had access to the discharge plan and the hospital discharge summary. The pharmacist made at least three attempts to reach the participant by phone. A proposed extension of the program would extend the follow-up period for pharmacists to 30 days, which researchers thought could potentially improve program effectiveness (Peikes D., 2013).

All Project RED scripts and materials are freely available on a federal government website maintained by the Agency for Healthcare Research and Quality (AHRQ, 2015). In the clinical trial of RED, DEs were registered nurses hired specifically to perform DE functions, and follow-up calls came from clinical pharmacists (Jack, et al., 2009).

Figure 1. Components of the RED that are performed by the "Discharge Educator," as described in toolkit materials (Jack, Paasche-Orlow, Mitchell, Forsythe, & Martin, 2013):

1. Ascertain need for and obtain language assistance.
2. Make appointments for follow-up care (e.g., medical appointments, post-discharge tests/labs).
3. Plan for the follow-up of results from tests or labs that are pending at discharge.
4. Organize post-discharge outpatient services and medical equipment.
5. Identify the correct medicines and a plan for the patient to obtain them.
6. Reconcile the discharge plan with national guidelines.
7. Teach a written discharge plan the patient can understand.
8. Educate the patient about his or her diagnosis and medicines.
9. Review with the patient what to do if a problem arises.
10. Assess the degree of the patient's understanding of the discharge plan.
11. Expedite transmission of the discharge summary to clinicians accepting care of the patient.
12. Provide telephone reinforcement of the discharge plan.

Baseline data collected during the intervention included sociodemographic characteristics (age, race/ethnicity, personal income, health insurance type, education level, employment status, homeless status), more medically-focused information (such as whether the patient had a primary care physician, previous hospital admissions, and ED use in the six months before the intervention admission), the Short Form-12 Health Survey, Version 2; the depression subscale from the Patient Health Questionnaire-9; and the Rapid Estimate of Adult Literacy in Medicine (Jack, et al., 2009). The latter three materials are measures of self-reported general health status across a number of domains, self-reported depression symptoms, and ability to read common medical words. This data demonstrated that the randomly chosen intervention and control groups were similar across these demographic and clinical characteristics.

Clinical Outcomes

Primary outcomes were ER visits, readmissions and overall hospital utilization (the sum of ER visits plus readmissions) within 30 days of discharge. Readmissions were defined to include any ER visit within 30 days of the initial that led to a hospitalization. Secondary outcomes included: self-reported preparedness for hospital discharge, self-reported understanding of how to take medications after discharge and diagnosis at

discharge, and follow-up with a primary care provider within 30 days of discharge. The research staff conducting follow-up assessments was blinded as to whether participants were in the intervention or control group.

Participants in the Project RED intervention group (N=370) had a 30 percent lower rate of overall hospital utilization within 30 days of discharge compared to those receiving usual care (N=368; 0.314 versus 0.451).[5] Put differently, one readmission or ER visit leading to hospitalization was prevented for every seven patients who participated in the intervention. Breaking apart the two primary outcomes, readmissions within 30 days of discharge were 28 percent lower for the intervention group compared to the control group (0.149 versus 0.207), and ER visits were 33 percent lower (0.165 versus 0.245). Adverse events were not assessed.

The participants in Project RED were reported to have an average total health care cost that was $412 less than average costs in the control group during the 30 days following hospital discharge. This represented a 33.9 percent net savings, taking into account actual reductions in hospital costs and estimated increases in primary care expenses.

Some caution is needed in using these cost-savings results, however. More than 96 percent of costs involved actual hospital care expenses, but researchers also estimated cost effects for primary care by making an assumption about reimbursement levels for primary care visits. Furthermore, it is unknown to what extent ER visits and readmissions could have occurred outside the scope of the cost data collection, which appears to have been limited to the hospital where the intervention took place.

Resources Used and Additional Considerations

Staffing

A nurse (as the DE) and a clinical pharmacist (for the follow-up call) were employed in the clinical trial, but a variety of other staff could perform the functions of the DE, including a social worker, a case manager, or a discharge planner (Jack, Paasche-Orlow, Mitchell, Forsythe, & Martin, 2013).

[5] The hospital utilization measure used in this paper combines ER visits and rehospitalizations. It examines the "person-months of follow-up" that occur within 30 days of discharge. For the intervention group, the denominator is 370 person-months of follow-up, and the numerator is 116 hospitalizations (across the 80 participants whose data includes this measure), resulting in a hospital utilization measure of 0.314 visits per person per month. The comparison group measure was computed similarly. The incidence rate ratio , which is the hospital utilization measure for the intervention group divided by the same measure for the control group—that is, 0.341 divided by 0.451—was 0.695 [95 percent CI, 0.515 to 0.937]; (P-value=0.009).

The total DE time in the evaluation was estimated to be 87.5 minutes per Project RED participant, including time with the patient, time reviewing files and talking with medical staff, and time preparing the discharge plan. Additional time was required for training. Total pharmacist time was estimated to be 26 minutes per participant, including preparation, missed calls, and the call time (Jack, et al., 2009).

Program Costs and/or Return on Investment

We did not find any analysis of program costs or return on investment.

Additional Adoption Considerations

"The most common source of resistance for a project such as the RED comes from [information technology] IT departments. IT's involvement is needed if your hospital decides to generate the After Hospital Care Plan (AHCP) using data already in your information systems. IT departments typically have a large workload, so establishing the priority of the RED usually needs to come from senior management. Another pocket of resistance may come from nursing and physician staff. Depending on who will fulfill the discharge educator (DE) role, the floor nurse job description may change. It is important to conduct a thorough analysis of established responsibilities and processes so that you are not just adding tasks and the job can be reorganized appropriately. Physician staff may now be required to change their policies and processes with regard to medication reconciliation, which may be difficult to implement." (Jack, Paasche-Orlow, Mitchell, Forsythe, & Martin, 2013). The latter factor involves communications from DEs or pharmacists noting medication errors that require physicians' attention.

3. Community Asthma Initiative (CAI)

OVERVIEW

The objective of the CAI intervention was to reduce asthma-related pediatric ER visits and hospitalizations through a culturally sensitive program combining CHW and NCM home visits (Woods, et al., 2012). The intervention sought to reduce household antigens to reduce asthma prevalence, thus lowering hospital costs while improving quality of life and increasing the number of children's symptom-free days. Focusing on children with a recent ED visit or hospitalization related to asthma, CAI included: (1) NCMs and coordination of care with primary care and referral services; (2) nurse home visits or nurse-supervised CHW home visits for asthma education, environmental assessment, remediation materials, and connection to community resources; and (3) referral to an exterminator, inspectional services, or legal services when indicated. To help other communities implement similar interventions, researchers have published a replication manual, available free-of-charge on the internet (Sommer, et al., 2013).

ROLES FOR NURSES AND PEOPLE WITHOUT MEDICAL TRAINING

The CAI intervention relied on NCMs and community health workers. NCMs were responsible for case management and for supervision of home visits. Such visits assessed environmental risk factors, provided items (like mattress covers) to lessen asthma risks, and referred families, as appropriate, to pest-control providers, city inspection departments, or legal services programs.

RESEARCH SUPPORT

Evidence Rating

Moderate: The evidence related to the CAI intervention is not based on a randomized clinical trial. It consists primarily of pre- and post-implementation comparisons of ER visits, hospitalizations, limitation of physical activity, patient-missed school, and parent-missed work (Woods, et al., 2012). A sample of 562 children was identified as eligible for the intervention. Among the children, 283 (50.4 percent) participated, and outcomes were evaluated for this sample. The analyses evaluated changes from baseline to 6 or 12 months. Appropriate statistical modeling was employed.[6] Tests of statistical significance were presented. In the intervention group, 12-month data show a significant decrease in the share with one or more asthma ER visits and hospitalizations.

Additional evidence demonstrated significant savings in hospital costs, compared with the hospital costs of a neighboring community with similar demographics that had not received the intervention. However the differences between the intervention group and control group may confound results. In particular, as the authors suggest, the apparent cost savings results could just represent "regression to the mean" in costs for the intervention group, rather than representing savings due to program effects. That is, hospital costs for the intervention group might have decreased over time even in the absence of the intervention. For example, if the ER visit occurred when illness was the most severe, the illness might have lessened going forward simply due to natural recovery from disease or other health-related factors, and not due to the effect of the intervention. In addition, the cost analysis drew on a smaller sample of intervention patients (N = 102), with a larger comparison group (N = 559), examining costs one year back and two years forward.

A separate study examined the cost analysis and return on investment (ROI) more closely, using multivariate regression analysis to control for gender, age, and race/ethnicity (Bhaumik, et al., 2013).

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[6] The technical explanation follows. Dichotomous outcomes across the three time points were compared using unadjusted and adjusted repeated-measures and random intercept logistic regression models. For the regression analyses of longitudinal repeated-measures data, the authors used Generalized Estimating Equation random intercept Poisson regression analyses to test differences across the three time points in the number of events/days for outcome variables.

However, researchers did not use a more appropriate control group (i.e., children with a recent hospital admission) or risk adjustment. Overall, further study is needed to fully evaluate the cost implications of the intervention.

Date First Implemented

The intervention began in 2005, with enrollment and follow-up through 2007.

What They Did

Patient Population

The intervention targeted children 2 to 18 years old living in four urban zip codes encompassing diverse, underserved patient communities that showed a high prevalence of asthma. These four zip codes also bordered a major, urban pediatric hospital. In particular, CAI services were offered to children who had a recent, asthma-related ER visit or hospitalization. Eligible children were enrolled in the CAI program for 12 months.

Description of the intervention

NCMs employed by Boston Children's Hospital assessed the medical history of children in the intervention program by examining asthma-related ER admissions and hospitalizations. The NCM then contacted patients to obtain permission for sharing information with providers and community health workers. After receiving patient consent, the NCM communicated with each child's primary care provider to develop a plan of care. Next, a home visit was conducted by either a bilingual NCM or a NCM-supervised bilingual community health worker (CHW). The home visit included the provision of limited asthma education and an environmental assessment of each child's home focused on identifying and reducing the ill-effects of asthma triggers. Participating families were provided such materials as mattress covers, vacuum cleaners with HEPA filters, and pest-management kits. When needed, families were referred to integrated pest management provided by a local "green" pest control company. Paying pest control costs was part of the intervention, rather than left to families; CAI also referred patients, as appropriate, to the city's inspectional services department or to legal services programs that could compel landlords to mitigate home conditions that trigger asthma attacks.

Clinical Outcomes

Twelve-month data showed significant decreases in hospitalizations (84.8 percent), asthma ER visits (68.0 percent), days of limited physical activity (42.6 percent), days of missed school (41.0 percent), and days of parents' missed work (49.7 percent ($P < .0001$). After six months, similar results were observed (declines of

79.7 percent in hospitalizations, 66.5 percent for ER visits, 50.4 percent in physical activity limitation days, 44.9 percent in missed school days, and 53.2 percent in parents' missed days of work) ($P < .0001$).

Resources Used and Additional Considerations

Staffing

Boston Children's Hospital provided NCM services and home visits and partnered with Boston Asthma Initiative (BAI) to give participating families access to linguistically and culturally competent CHWs who received special training in preventing and treating asthma-related illness. The evaluation reports that in fiscal year 2006 for 102 new families, the program included 1.0 full-time equivalent (FTE) nurse, 1.0 FTE CHW, 0.25 FTE program coordinator, 0.1 FTE program director, 0.1 FTE evaluator, household items that address asthma triggers (e.g., furniture covers, vacuum cleaners with special filters, etc.), and inspection and exterminator services (Woods, et al., 2012).

Program Costs and/or Return on Investment

One peer-reviewed study found that over a two-year period

- program costs (including staff, supply, and exterminator expenses) averaged $2,529 per child; and
- savings in reduced ER and hospitalization expenses averaged $3,879.

The result was a net ROI of 1.46 ($P < .0001$). In other words, for every dollar spent on the program, $1.46 in hospital costs were saved over two years (Woods, et al., 2012)

A second study analyzed ROI over a three-year, rather than a two-year period. Researchers heavily discounted savings to present value, using a 10 percent interest rate.[7] Even with such discounting, ROI was .67 after one year, 1.46 after two years, and 2.04 after three years. Researchers then used a multivariate analysis to control for demographic characteristics (age, gender, race/ethnicity). The resulting adjusted ROI was 0.56 after one year, 1.06 after two years, and 1.33 percent after three years. In other words, the program (1) paid for itself in less than two years and (2) after three years, saved $1.33 in hospital costs for every dollar invested in the program. Adding dollar estimates for the value of fewer missed school days and

[7] For example, a $110 savings one year from the present was discounted to a present value of $100, on the assumption that one could have invested $100 today, earned a 10 percent interest rate, and wound up with $110 after a year. Woods and colleagues suggest that they discounted to present value, but they do not specify the interest rate they used. Presumably, they used the same 10 percent rate, since they reported a 1.46 ROI after two years—the same rate found by Woods et al. (2012).

fewer missed parental work days resulted in a 1.85 total ROI; factoring in such effects is sometimes termed "societal return on investment," or SROI (Bhaumik, et al., 2013). [8]

Note that CHWs were paid for both ROI studies. The ROI would be even higher if CHWs were volunteers, as could be the case with FBOs and perhaps even with some CBOs.

4. Project Sugar

OVERVIEW

Researchers developed and tested a multifaceted intervention to improve health outcomes in African Americans with type 2 diabetes in Baltimore, MD. Each of the study's two phases involved a randomized, controlled trial. The first phase, Project Sugar 1 (1994–1999), was a so-called "four-arm trial," meaning that it compared three experimental interventions to a control group that received standard diabetes-related care (Gary, et al., 2003). The evaluation included 186 African-Americans with type 2 diabetes. Participants were randomly assigned to one of four evaluation groups that tested the effects of NCM, CHW, and combined NCM and CHW interventions to improve diabetic control. Results showed improvements in HbA1c, lipids, and blood pressure over 2 years, but sample sizes were not large enough to yield statistically significant results. The second phase, Project Sugar 2 (2000-2005), expanded the study to include (1) 542 African-American program participants who were members of a university-affiliated managed care organization, thus making it easier to achieve statistically significant results; and (2) 1908 non-participants (Gary, et al., 2009). Project Sugar 2 also narrowed down the policies under examination to a single intervention featuring a team approach. Both NCMs and CHWs conducted clinic- and home-based assessments and intervention, with feedback to participants' primary care physicians. Evaluation of the program demonstrated that those in the intensive intervention group were significantly less likely to have ER visits, compared to the control group that received standard care.

ROLES FOR NURSES AND PEOPLE WITHOUT MEDICAL TRAINING

This intervention would rely on community health workers to do home visits as well as nurses who would serve as NCMs. Congregation members without medical training would make three visits per year to the homes of program participants, during which they would conduct a random blood glucose test, monitor blood pressure, and provide immediate feedback/intervention based on those test results. These congregational volunteers would also give feedback to primary care providers, based on the test results.

[8] Further business case computations for this intervention are documented elsewhere (Hoppin, Jacobs, and Stillman, 2007).

These home-visiting roles could also be performed by nurse volunteers within participating congregations, who could add a focus on aspects of care that require nursing expertise.

RESEARCH SUPPORT

Evidence Rating

Strong: Evidence from the first randomized controlled trial suggested positive impacts, but differences between intervention and control groups were not statistically significant (Gary, et al., 2003). Effects of the second randomized trial, which was both larger and more focused, were positive and statistically significant (Gary, et al., 2009). Overall, consistent direct evidence shows the effectiveness of the intervention in improving certain targeted health care outcomes, particularly ER visits and hospitalizations. Researchers tracked (1) sociodemographic characteristics, (2) laboratory and physical assessments of clinical parameters (HbA1c, lipids, blood pressure, weight), (3) health care use (preventive health care, emergency room visits, hospitalizations), (4) health behaviors (blood glucose self-monitoring, foot care, diet, physical activity, adherence to treatment recommendations), (5) patient-centered factors (patient satisfaction, self-reported health status), and (6) psychosocial factors (depression, social support, problem solving). Researchers also estimated cost savings achieved through these interventions, which were anticipated to involve decreased ER visits and hospitalizations.

Date First Implemented

The first phase of the implementation began in 1994. The second phase began in 2000.

What They Did

Patient Population

African-Americans with type 2 diabetes and residing in inner-city Baltimore—representing an urban, low socioeconomic-status group of people of color at high risk for adverse diabetes outcomes—were recruited to participate in the study.

Description of the intervention

Project Sugar I: The first phase was a National Institutes of Health–funded, randomized, controlled four-arm trial among 186 African-Americans with type 2 diabetes. The four arms were composed of the following: (1) Usual medical care (control), (2) Usual medical care + NCM intervention, (3) Usual medical care + CHW intervention, and (4) Usual medical care + NCM + CHW (combined team intervention).

Participants in the control group continued on-going care from their previous medical providers. They also received a quarterly newsletter that discussed diabetes-related health topics and were given limited information regarding the on-going trial intervention. Participants in the NCM intervention group received coordinated care through the NCM, who was a registered nurse with training in diabetes education. Visits by the NCM—who "provided direct patient care, management, education, counseling, follow-up, referrals, and physician feedback and prompting" (Gary, et al., 2003)—took place approximately three times per year. Participants in the CHW intervention benefitted from 45- to 60-minute "face-to-face home visits and/or telephone contacts," which also took place three times a year (Gary, et al., 2003). Main responsibilities of the CHW included monitoring patient and family behavior, reinforcing adherence to treatment recommendations, mobilizing social support, and providing feedback to primary care providers. These visits also occurred approximately three times per year. Finally, participants in the combined NCM + CHW intervention received approximately three visits, each, from an NCM and a CHW during a year (for a total of six visits). Additional coordination occurred between the CHW and NCM throughout the year, using biweekly conferences.

The interventions focused on particular domains, including diet, physical activity, foot care, vision care, blood glucose self-monitoring, blood pressure control, adherence to medication and appointments, referrals, and (for tobacco users) smoking cessation. Participants were directed to focus on a subset of these domains, based on initial assessments made by the CHW or NCM after the first meeting. CHWs and NCMs attended weekly meetings with project investigators, at which intervention strategies were discussed and tailored on a case-by-case basis.

Finally, NCMs and CHWs maintained rigorous documentation of initial visits and subsequent interactions with patients. This documentation was summarized and synthesized in physician update forms, which were provided to the participants' primary care physicians on a regular basis.

Project Sugar II: The second phase expanded and focused the study design and model to include 542 African Americans who were members of a university-affiliated managed care organization. Participants were randomly assigned to one of two groups: (1) the minimal intervention group, receiving a telephone-based intervention executed by a lay-health educator; or (2) the intensive intervention group, which received the education and follow-up services of an NCM and CHW team. Patients in both groups attended an initial, baseline screening visit as well as a follow-up appointment after 24 months of enrollment in the study.

The minimal intervention included diabetes-related mailings and telephone calls every 6 months to remind participants about preventive screening. A written summary of health care utilization during the intervention period was also provided to each participant's primary care provider.

The intensive intervention group consisted of all components of the minimal intervention, *plus* individualized, culturally-tailored care provided by a NCM and a CHW, using evidence-based clinical algorithms. The NCM and CHW also gave feedback to primary care providers. Clinical algorithms directed NCMs and CHWs to use differing intensities of contact (e.g., face-to-face vs. telephone, weekly vs. monthly follow-up, faxing vs. paging providers), reflecting each participant's "level of control" of their diabetes (optimal, suboptimal, poor, very poor). Algorithms also tracked patient progress along numerous specified parameters, in turn triggering specific interventions. For example, the blood glucose algorithm classified a pre-prandial blood glucose level of 350 mg/dL (19.4 mmol/L) as "very poor." The algorithm directed the NCM or CHW to (1) call the provider to report the reading, (2) counsel the patient to make an appointment with his or her provider within seven days, and (3) plan to initiate follow-up in one week.

Participants in the intensive intervention group received a visit from a NCM at least once a year and from a CHW at least three times a year. The NCM focused on aspects of care that required nursing expertise, while the CHWs used their home visits to conduct a random blood glucose test, monitor blood pressure, and provide immediate feedback/intervention based on those test results. All information obtained using intensive intervention protocols was conveyed to participants' primary care providers by way of verbal or written communication (per the urgency of the update).

Clinical Outcomes

Project Sugar I: Compared to the control group receiving usual care, the NCM group and the CHW group showed modest declines in HbA1c after 2 years (both 0.3 percent), and the group receiving both NCM and CHW visits had a greater decline in HbA1c (0.8 percent; $P = 0.137$). After adjustment for baseline differences and/or follow-up time, the combined NCM/CHW group showed improvements in triglycerides (-35.5 mg/dl; $P = 0.041$) and diastolic blood pressure, compared to the usual care group (-5.6 mmHg; $P = 0.042$). Despite the suggestion of clinical gains, these results were not statistically significant.

Project Sugar II: At 24 months, participants in the intensive intervention group were 23 percent less likely to have ER visits than were their counterparts in the minimally intensive group. In on-treatment analyses, the reduction in ER visits was greatest for patients who received at least one additional NCM visit (41 percent decline) or at least one additional CHW visit (40 percent decline). After 36 months, patients who received an especially large number of CHW visits experienced a 47 percent drop in ER visits and a 56 percent reduction in hospitalizations (Gary, et al., 2009). These differences between the minimal and intensive intervention

groups were statistically significant. Project Sugar II also demonstrated some favorable and significant clinical results.[9]

Resources Used and Additional Considerations

Staffing

Phase I: The NCM was a registered nurse with a baccalaureate degree and training to be a certified diabetes educator. NCM interventions involved 45 minute, face-to-face clinic visits and/or telephone contacts with patients. Nurses aimed to conduct visits approximately three times per year, plus additional contacts as needed. The CHW was a local high school graduate who was enrolled in college part time and who had no formal training in health care before the study. CHW interventions were 45- to 60-min face-to-face home visits and/or telephone contacts, with an aim of conducting visits approximately three times per year, plus additional contacts as needed.

Phase II: Training for the intensive intervention (particularly for CHWs) was conducted over a period of six weeks and in six phases: (1) guidelines and practical information; (2) patient self-management education; (3) home-based assessment and education; (4) field experience; (5) skill reinforcement; and (6) maintenance and quality control.

Staffing problems limited the research team's ability to keep the same NCM present throughout the duration of the study, causing gaps in the continuity of that component of the intensive intervention.

Program Costs and/or Return on Investment

Phase I: The researchers found that during 77 percent of visits, interventionists were called upon to address needs well beyond traditional diabetes care, including finances, family responsibilities, insurance coverage, and other health concerns. At a lower cost, CHNs were able to provide comprehensive services addressing social and some medical needs. For best results, a NCM/CHW team is likely to be most effective, but study findings suggest that CHWs may also provide effective case management.

Phase II: Researchers did not make a determination regarding cost savings resulting from fewer ER visits or the intervention's cost-effectiveness.

[9] Significant improvements were observed for HDL-C (1.2[9.0] mg/dL increase) and diastolic blood pressure (−3.5 [13] mm Hg decrease) (P<.05 for both comparisons). Researchers found no other statistically significant within-group or between-group changes in clinical characteristics.

5. Individualized Management for Patient-Centered Targets (IMPaCT™)

OVERVIEW

This initiative's objective was to have CHWs implement a tailored intervention to improve post-hospital outcomes among patients who were low income and/or had limited education (i.e. "low socioeconomic status"). The intervention was termed, "Individualized Management for Patient-Centered Targets" (IMPaCT™) (Penn Medicine, 2015). The CHWs began meeting with hospitalized patients within 24 hours of admission. Visits helped the patient set goals, offered support and care coordination, and connected the patient with primary care after discharge. For patients who lacked primary care providers or were unhappy with their previous providers, CHWs helped them choose a provider and assisted in in making and keeping the first post-discharge appointment. The evaluation consisted of a controlled, randomized clinical trial at two academically affiliated Philadelphia hospitals (Kangovi, et al., 2014).[10] 446 patients were enrolled and randomly assigned to intervention and control groups. The study found promising evidence that the CHW intervention improved post-hospital primary care access, discharge communication, patient activation, mental health, and recurrent readmissions, including reductions in recurrent hospital readmissions compared to a control group.

ROLES FOR NURSES AND PEOPLE WITHOUT MEDICAL TRAINING

This intervention relies on CHWs without prior medical training. They work with patients shortly after hospital admission to identify the patients' own goals for recovery and to create a personalized plan for each patient. This intervention is designed for CHWs who have a high school diploma and personality traits such the ability to be active listeners. For the purposes of implementing the IMPaCT™ protocol, CHW participants took a college-accredited, month-long training course that used 91.5 hours of classroom time to teach skills necessary to address barriers that patients frequently encountered. Additional topics covered in this training included: motivational interviewing, professional boundaries, and core competencies of community health work. CHWs were supervised by a social worker with a master's degree and experience in case management and community organizing.

[10] The study was "single -blinded." This means that the researchers but not the participants knew whether individual participants were in the intervention or the control group.

RESEARCH SUPPORT

Evidence Rating

Moderate: The evidence consists of one randomized controlled trial with a relatively small sample, including 222 in the intervention group and 224 in a control group that received the usual standard of care. Outcomes were not risk-adjusted; instead evaluators relied on randomization for comparability between groups. The trial was conducted at two academically-affiliated Philadelphia hospitals. Fifty-nine percent of the eligible participants were enrolled. The evaluation included analysis of patient feedback. No other evaluations of similar interventions with comparable populations could be found.

Date First Implemented

The study was conducted between April 10, 2011, and October 30, 2012

What They Did

Patient Population

The study population consisted of English-speaking adults under age 65 who were (1) observation patients or inpatients and (2) either uninsured or insured by Medicaid. The patient group was expected to be discharged to home. Members lived in a high-poverty zip code in Philadelphia (Kangovi, et al., 2014).

Description of the Intervention

Patients in the control group received routine hospital care. They also worked with nurses to reconcile changes in medication regimens, discuss post-discharge needs, and receive written discharge instructions. Furthermore, patients' primary care providers received summaries of procedures undertaken at discharge and outcomes from patients' pre-discharge interactions with nurses.

Patients assigned to the intervention group received the aforementioned care, and also IMPaCT: a research-based, CHW model developed by the study team. Upon hospital admission, patients had a semi-structured interview with an assigned CHW to help establish recovery goals. Subsequently, CHWs and patients worked together to develop individualized action plans for accomplishing those recovery goals. By disseminating patient recovery goals to relevant hospital staff, CHWs served as a liaison between each patient and caregivers within the hospital. Post-discharge, the CHWs continued to help the patient's recovery process by providing tailored support through calls, text messages, and home visits. Such support might involve, for example, taking a smoker to a smoking cessation class. Finally, the CHWs helped to connect participating patients to primary care by: (1) helping patients select suitable providers based on referrals and ease of access (considering factors like transportation cost and proximity to public

transportation); (2) encouraging patients to set and attend post-discharge appointments with primary care providers, including through an offer to attend the first follow-up appointment alongside the patient; and (3) providing primary care professionals with each patient's discharge summary and recovery goals, as earlier established. Twice a week, a supervising social worker reviewed the CHW's plans for each patient. A CHW's involvement with each patient lasted for 14 days or the initial primary care appointment, whichever came last.

Clinical Outcomes

The pre-specified primary outcome was timely completion of primary care follow-up, defined as occurring within 14 days of discharge. Pre-specified secondary outcomes were quality of discharge communication, self-rated health status, satisfaction, patient activation, medication adherence, and 30-day readmission rates.

Compared to patients in the control group, intervention patients were found to be more likely to obtain timely, post-hospital primary care (60.0 percent versus 47.9 percent; P = .02; adjusted odds ratio [OR], 1.52;[11] 95 percent CI, 1.03-2.23), to report high-quality discharge communication (91.3 percent versus 78.7 percent; P = .002; adjusted OR, 2.94; 95 percent CI, 1.5-5.8), and to show greater improvements in self-reported mental health (mean change in Mental Health Score of 6.7 versus 4.5; adjusted OR 2.84, P = .02,) and patient activation (3.4 versus 1.6; adjusted OR 3.80, P = .05).[12]

There were no statistically significant differences between groups in self-reported physical health status, satisfaction with medical care, or medication adherence. Similar proportions of patients in both arms experienced at least one 30-day readmission; however, intervention patients were less likely to have multiple 30-day readmissions (2.3 percent versus 5.5 percent; *P* = .08; adjusted OR, 0.40; 95 percent CI, 0.14-1.06). Among the subgroup of 63 patients who were readmitted once, the likelihood of further readmissions fell from 40.0 percent versus 15.2 percent (*P* = .03; adjusted OR, 0.27; 95 percent CI, 0.08-0.89).

Analysis of patient feedback on the intervention showed that most patients (79.7 percent) viewed the intervention positively. The most appreciated component of the intervention was the social support

[11] An adjusted odds ratio shows the difference between intervention and control groups, after factoring out the impact of variables other than participation in the intervention. In this case, the adjusted OR of 1.52 means that, after controlling for other factors, recipients of the intervention were 52 percent more likely to receive primary care within 14 days after discharge.

[12] Patient activation scores are a measure of where patients fall along a continuum of "(1) believing the patient role is important, (2) having the confidence and knowledge necessary to take action, (3) actually taking action to maintain and improve one's health, and (4) staying the course even under stress" (Hibbard, Stockard, Mahoney, & Tusler, 2004).

provided by CHWs, which included such non-medical steps as going with patients to recreation centers and helping with family budgeting.

Resources Used and Additional Considerations

Staffing

In the intervention, two CHWs were hired as full-time employees, earning $14 per hour. If one assumes 2,000 hours a year for full-time employment that lasted from April 10, 2011, and October 30, 2012, the 222 patients involved in the intervention required 28 hours of CHW time per patient, on average.[13] These CHWs were supervised by a social worker with a master's degree and experience in case management and community organizing (Kangovi, et al., 2014).

Program Costs and/or Return on Investment

Not available.

Additional Adoption Considerations

The study has several limitations. Continued success of this intervention—as measured by outcome variables—depends principally on longitudinal care provided by primary care providers**.** The scope of impact, beyond the reported intervention phase, is thus not clear.

Further, this study's researchers did not have access to patient data on ER visits, which would have been useful because low socioeconomic status patients are at high risk for requiring ER care. Finally, the primary outcome in this study was a *self-reported* variable: completion of the follow-up visit, which may be reported with bias.

[13] These calculations assume that a FTE employee works 2,000 hours a year. The period of time involved in the study was 1.56 years.

Conclusion

When community members commit to action, it is important is to ensure their time and energy are well-spent. In this paper, we have identified five pathways through which nurses and people who lack medical training can be confident that they are making a meaningful difference in the lives of those whom they assist

Faith-based and other community organizations cannot walk these pathways alone, however. Partnerships with hospitals (or other groups that have the necessary resources and health care knowledge) are required. Fortunately, the interventions described here are each supported by strong evidence of a positive impact reducing hospital costs. This opens the door to synergistic collaborations between hospital and community that can combine the commitment and community knowledge of volunteers with the health care expertise and resources of hospitals, improving population health while slowing health care cost growth.

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