STRATEGIC INNOVATIONS FOR AFFORDABLE, SUSTAINABLE HEALTH CARE:

A Model for Health System Reform

Environmental Scan

Disease Management
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DISEASE MANAGEMENT

**Definition:** Disease management has proliferated as a method to improve the health of patients with chronic disease. Disease management has been defined as a multidisciplinary approach to care for chronic diseases that coordinates comprehensive care along the disease continuum across health care delivery systems. Alternately, Epstein, et al. defined disease management as a population-based approach to health care that identifies patients at risk, intervenes with specific programs of care, and measures outcomes. More recently, Weingarten, et al. adopted the following definition of disease management: an intervention designed to manage or prevent a chronic condition using a systematic approach to care and potentially employing multiple treatment modalities. The focus and structure of disease management programs vary by patient and provider/sponsor needs. Financial or other incentives are sometimes used to help motivate patient behavior change and/or to reward providers for their efforts to promote participation and achieve improved patient health outcomes.

One innovative approach toward disseminating information about policy options for policy makers and other stakeholders related to health care interventions (including policy options for disease management interventions) is RAND COMPARE (Comprehensive Assessment of Reform Efforts). RAND COMPARE was developed to provide tools to help decision makers assess the effects of changes in health care policies on health care system performance (such as access, quality, and cost). COMPARE gives users a comprehensive framework for examining trade-offs across policies or across different dimensions of performance for a particular policy (e.g., a policy's effect on spending compared to the effect on insurance coverage or on patient experience).

Few randomized controlled clinical trials have been conducted of these interventions, yet evidence indicates some degree of effectiveness for each.

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<th>Intervention Areas and Case Examples</th>
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<td>Disease/Risk Screening or Assessment</td>
<td>Disease screening programs aim to identify individuals at risk for or in the early stages of illness or disease. Once identified, these individuals can be referred to risk reduction and disease management programs, which may result in improved outcomes and reduced costs. The Centers for Disease Control and Prevention (CDC) and other organizations publish recommendations for disease screening initiatives. Common broadly targeted screening</td>
<td>- Studies indicate that screening is effective for early detection of disease. Program evaluations typically assess the extent of disease identified, rating cost-effectiveness by cost per Quality Adjusted Life Years (QALY) gained. - A limited number of randomized controlled trials (RCTs) indicate mixed results; factors such as screening modality, target population participation, disease focus, screening location, and frequency of screening may affect results.</td>
<td>Programs are broadly applicable across populations, diseases/conditions, and geographic areas. Groups that use disease management include: - Health departments; - Schools; - Physician group practice; - Employers; - Community groups; - Insurance providers and health maintenance organizations; and</td>
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Disease screening programs and initiatives aim for early identification of a disease or its precursors. The population may be narrowly focused to a known high-risk group or broadly focused to the general community.

The program may focus on a single disease or multiple conditions. The initiatives may incorporate physical exams, blood testing, questionnaires, or
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| other screening tools.              | programs include: high cholesterol, high blood pressure, diabetes, cervical cancer, colon and rectal cancers, HIV, sexually transmitted diseases, obesity, and breast cancer. Use of risk profiling, prediction and economic modeling to identify high-risk members earlier might increase the efficacy of disease management programs, which can then intervene earlier with those individuals whose behavior can be changed. | ● Cost effectiveness and cost-savings vary according to disease, screening modality, and frequency.  
● Successful screening programs targeting broad community populations focus on common conditions, such as high cholesterol, diabetes, and high blood pressure. Some studies have found reduced disease prevalence following a screening program.  
● Screening programs focused on less pervasive conditions may identify at-risk individuals when narrowly focused on a high-risk population; such programs may require recruitment initiatives. Several screening programs demonstrate reasonable cost effectiveness.  
● Ingenix, Inc., a consulting firm specializing in predictive modeling, reports that its retrospective Episode Risk Group (ERG) model achieves a .53-.57 R² while the prospective ERG model realizes a .18-.30 R².4  
● Some data mining techniques have been shown to have predictive power of >80% with certain conditions when large data sets are used.5 | Hospitals (e.g., acute, community, rural, urban, ambulatory care, long-term care). |
|                                     | Other Comments                                |                                                               |                                          |
|                                     | ● It is important to carefully consider program goals, focus, population, and recruitment methods before implementing a program due to the considerable variability in efficacy.  
● Review current screening recommendations prior to implementing a screening program.  
● Recruitment strategies to avoid low participation rates if necessary.  
● Ingenix, Inc., MEDai, DxCG and TC3 among other companies, provide predictive modeling software and consulting services.  
● In general, data mining and predictive modeling achieve greatest accuracy with large data sets. |                                           |                                          |
### Disease Management

#### Intervention Areas and Case Examples

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<th>Case Example</th>
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<td><strong>Case Example 1:</strong> Blue Cross Blue Shield (BCBS)</td>
<td>Predictive modeling allows BCBS to more accurately identify and characterize health plan members who are at risk for a catastrophic clinical event. Early identification and appropriate interventions for these members can lead to improved quality of life, positive health outcomes, and more effective population-based care management. Furthermore, the comprehensive clinical profiles will allow BCBSMA to develop more meaningful collaborations with their key partners - including employers and providers - to improve member health.</td>
<td>BCBS of Rhode Island reported a 10% increase in the accuracy of its underwriting and high-risk case and disease management models four months after implementing predictive modeling software. BCBSRI deployed ACG Rx-PM, which relies on retail pharmacy claims to identify high-risk cases in real time.</td>
<td>BCBS has a diverse and large membership across the U.S.</td>
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<td><strong>Case Example 2:</strong> Kaiser Permanente (KP)</td>
<td>KP aims to improve patient health and reduce medical crises through predictive modeling. The Archimedes Model used predictive modeling to forecast that “bundled” cardioprotective medications would reduce the risk of heart attack and stroke in a high-risk population by 71%.</td>
<td>A study of the effectiveness of this approach found that a disease management program providing 68,560 patients – identified as high risk via the predictive modeling – with diabetes or heart disease with a bundling of two generic, low-cost drugs (a cholesterol-lowering statin and a blood pressure-lowering drug) prevented 1,271 heart attacks and strokes.</td>
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- For increased accuracy in prediction, most analysts recommend use of large, more comprehensive data sets, which may be developed in data warehouses.
- Several statistical software options are available focused on predictive modeling approaches.
## Disease Management

### Intervention Areas and Case Examples

**Electronic (EDSS) or Computerized Clinical Decision Support Systems (CDSS), Physician Reminders**

Computer-based information systems integrate clinical and patient information to support decision-making in patient care. Disease risk estimation algorithms, clinical guidelines, and risk-based patient care advice are programmed into a software package.

The software may reside on individual desktops, PDAs, internal servers, or be Web-based.

The software may accompany or be separate from Electronic Medical Records (EMR) systems.

**What does the intervention intend to address?**

These tools aim to provide physicians and other health care providers with easy-to-access, disease-specific clinical information; algorithms; and evidence-based clinical treatment guidelines. The functionality of these tools, in a practice setting, is enhanced by increased disease-specificity capabilities of the software.

Ease-of-access of these software packages may increase their use, which may promote increased standardization of care and adherence to clinical guidelines, thus improving the quality of patient care.

These tools are appropriate for acute patient care as well as chronic disease management.

**What is the research evidence regarding impact of intervention?**

- Improved patient outcomes associated with use of EDSS/CDSS have been found for the following areas:
  - Drug dose calculations, titration, and weaning;
  - Preventive care disease management;
  - Patient outcomes;
  - Standardization of patient care; and
  - Disease risk communication.

- CDSS up-take and impact studies show generalized acceptance, use, and applicability across countries, medical specialties, and practice settings.

- Technological capacity, user IT familiarity, and/or Internet availability may affect use. Quality of the information, automatic up-dating, and specificity to clinical practices may affect up-take.

- Some studies have found differences in the level of CDSS impact by patient care setting, with greater benefits realized in acute care settings than chronic (primary care).\(^9,10\)

**How applicable to which types of markets?**

EDSS and CDSS are not market specific applications.

Users include:

- Health departments;
- Physician group practices; and
- Hospitals (e.g., acute, community, rural, urban, ambulatory care, long-term care).

### Patient Education/Self-Management Programs/Patient Action Plans/Goal Setting

Patient education and self-management programs and patient action plans aim to improve patient health outcomes, lower health care costs, and increase patient autonomy over day-to-day health care decisions.

These programs and tools are based on the belief that increased education will lead to more appropriate decision-making and self-care behaviors. Specifically, these education programs and tools aim to increase patient knowledge about a specific condition so that they have improved adherence to treatment and medication regimens, and make more informed decision-making.

**What does the intervention intend to address?**

Patient education and self-management programs traditionally focus on providing information and improving technical skills, while self-management programs emphasize decision-making and problem-solving skills.

**What is the research evidence regarding impact of intervention?**

- Patient action plans can improve health outcomes for patients with a variety of chronic conditions.

- Statistically significant results have been obtained following patient education programs in the following areas:
  - Better adherence to medical regimen,
  - Better adherence to pharmaceutical regimen,
  - Increased knowledge of medical terms,
  - Improvements in patient disease control,
  - Increased disease-specific knowledge,
  - Lower systolic blood pressure (in a population of hypertensive patients who

- These programs are very broadly applicable across populations, diseases/conditions, age groups, and geographic areas, including countries.

**How applicable to which types of markets?**

Users include:

- Health departments;
- Community groups;
- Insurance providers and health maintenance organizations;
- Employers;
- Physician group practices; and
- Hospitals (e.g., acute, community, rural, urban, ambulatory care, long-term care).
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<td>Patient education and self-management training may be offered via written materials, visuals, and one-on-one or group training sessions. Patient action plans are disease-specific written or computerized tools focused on assisting patients to quickly detect and treat exacerbations. These tools facilitate patient self-management. They may also provide some education in interventions to improve health status.</td>
<td>decisions regarding when to seek physician or emergency room treatment.</td>
<td>received disease specific education), o Fewer re-hospitalizations and death in chronic heart failure patients, o Improved adherence to diet restrictions, and o Reduced physician visits. ● Studies of patient self-management programs report statistically significant results in: o Proper medication use, o Reduced exacerbations in COPD patients, and o Self-efficacy in disease management. ● Other studies have found non-statistically significant improvements in the following: o Diabetic glycemic control, o Days off from work, o Reduced physician visits, and o Reduced emergency department visits. Studies evaluating efficacy of program by modality have found that Internet, self-paced programs more effective than physician-provided education.</td>
<td>● These programs are applicable across populations, diseases/conditions, and geographic areas, including countries. ● Users include: o Health departments; o Health maintenance organizations; o Larger physician practice groups; o Prisons; o Pre-hospital emergency services; and Hospitals (e.g., acute, community, rural, urban, ambulatory care, long-term care).</td>
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<td>Remote monitoring aims to support patient care and self-management to improve patient health outcomes and lower health care costs by providing patients with continued support after hospital discharge or between physician appointments. Remote monitoring and support may identify and/or prevent illness-related complications and maintain patient compliance with treatment and medication regimens, outcomes related to reduced health care costs, and improved patient outcomes.</td>
<td>Telemonitoring has been found to: o Reduce hospital length of stay, o Reduce mortality, o Reduce the number of hospitalizations, o Improve health status measures, o Lower health care costs, o Reduce the number of emergency room visits, o Increase patient compliance with treatment regimen, and o Improve symptom control. Telehealth has been found to: o Reduce hospital length of stay, o Improve symptom control, o Reduce mortality, and</td>
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REMOTE MONITORING AND PATIENT SUPPORT

These approaches include:
- Telemonitoring,
- Telehealth,12
- Telephone Reminders,13 and
- Postal Reminders.
Remote monitoring interventions may be used across disciplines for patients with chronic illness and in primary care practices. They may utilize Internet, telephone, or other remote modality. They may be used to monitor patient physical status or
### Disease Management

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<td>symptoms, review patient self-care efforts, answer patient questions, make changes to patient treatment regimens, provide patient education, and remind patients of appointments. Telemonitoring devices transmit health information to monitoring centers via telephone or Internet. May be combined with telehealth. Telehealth services are generally provided by nurses or allied health providers via telephone or Internet.</td>
<td>With pre-intervention education, these programs may be implemented successfully in individuals with no computer or previous remote monitoring experience. Remote monitoring may be particularly useful for patients in remote settings or who have difficulty accessing patient care centers. Regions with limited telephone or Internet connectivity may have difficulty implementing these programs effectively.</td>
<td>Improve adherence to medication regimen. Patient reminders have been found to increase compliance with appointments and with treatment regimen.</td>
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**Other Comments**

- With pre-intervention education, these programs may be implemented successfully in individuals with no computer or previous remote monitoring experience. Remote monitoring may be particularly useful for patients in remote settings or who have difficulty accessing patient care centers. Regions with limited telephone or Internet connectivity may have difficulty implementing these programs effectively.

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**Peer, Social, or Community Support Programs**

Support programs offer group or one-to-one support for patients with chronic or long-term illness. They provide a structured setting in which patients and/or family members receive social support, guidance, and education about their disease or condition. These programs may be conducted in health care or community settings, though the Internet is an increasingly popular venue. Groups may be facilitated by a nurse or other health care provider. Peer-to-peer and lay-led programs are also common.

These programs aim to increase patient autonomy over day-to-day health care decisions and improve their ability to cope with disease exacerbations. Specifically, these programs provide a forum for sharing knowledge and support using peer and social support networks.

Although support groups have been associated with certain improvements, limited studies of them have been conducted; no cost-effectiveness analysis of U.S.-based support programs could be found. Some studies have found no improvement in measured outcomes.

These programs are applicable across populations and geographic areas. Smaller geographic regions may have increased difficulty attaining goal participation rates.
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<tr>
<td><strong>Behavior and Lifestyle Modification Programs</strong></td>
<td>These programs aim to reduce occurrence of unhealthy behaviors, improve patient health status, and improve patient health outcomes.</td>
<td>● Studies show mixed results, dependent on program details and participant motivation. Financial and other incentives are sometimes used to help motivate participants. ● Internet-based behavior modification programs may be less effective than in-person sessions.16 ● No cost-effectiveness analysis of U.S.-based support programs was identified.</td>
<td>● These programs are applicable across populations and geographic areas, including countries. ● Smaller geographic regions may have increased difficulty attaining goal participation rates. ● Users include: o Health departments; o Health maintenance organizations; o Physician practice groups; o Community organizations; o Disease-specific non-profit organizations; o Employers; o Prisons; and o Hospitals (e.g., acute, community, rural, urban, ambulatory care, long-term care).</td>
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**Other Comments**

- Efficacy will vary dependent on program focus, structure, recruitment, implementation, and other factors.
- Programs should be based on recommended guidelines and provide evidence-based information.
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| **(CHRONIC) DISEASE MANAGEMENT REGISTRIES** | Registry programs seek to assist health care providers to more systematically provide and monitor the health care for and status of patients with chronic disease. Systematic management and tracking of patients may lead to patients receiving recommended care at increased rates. More consistent provision of health care and evidence-based treatments improves health outcomes, lowers overall health care use, and lowers health care costs. | Registry use has been associated with:  
- Increased disease indicator monitoring,  
- Provision of tobacco advice,  
- Increased frequency of exams for co-morbid conditions,  
- Increased provision of self-management support,  
- Greater provider adherence to clinical guideline recommendations, and  
- Improvement in certain disease-specific health indicators. | Registries are suitable for diverse market conditions, and are applicable across populations and geographic areas. Users include:  
- Health Departments;  
- Health maintenance organizations;  
- Physician practice groups;  
- Community organizations;  
- Disease-specific non-profit organizations;  
- Prisons; and  
- Hospitals (e.g., acute, community, rural, urban, ambulatory care, long-term care). |

**Computerized disease registries** track and manage disease-specific information for individual patients and populations. A registry supports care management, outreach, quality improvement, and outcome research. These registries offer several different report options, such as patient-specific reports on disease status and events, exception reports to identify patients overdue for exams or other health care needs, and aggregate reports on efficacy of patient care teams or organizations in disease-specific population care. Registries may be locally developed, purchased, or publicly available software.

A registry may reside on a PC or on a local, vendor, or other server and accessed via Internet. The registry may handle a single or multiple diseases. It may be a stand-alone program or incorporated into an Electronic Medical Record (EMR).

Patient information may be entered manually or be downloaded from sources, such as claims, disease or pharmacy systems, or EMRs.

**Basic Uses:**
- Advanced planning of patient care, based on evidence-based protocols.
- Providing ‘opportunistic’ care – that is, take every opportunity to provide care, even if it is not the reason for the visit.
- Monitoring quality indicators to evaluate effectiveness of process improvements.
- Identifying gaps in performance.

**Advanced Uses:**
- Stratify patients by severity in order to target planned care.
- Provide patient-specific outreach reminders.

**Other Comments**
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<td>Create individual patient care plans with goals, track patient progress against the plan, and identify subgroups of patients based on plan progress.</td>
<td>The proportion of diabetic patients who had been seen within the previous three years, but who had not had an appointment within the previous year decreased from 28.2% in January 2003, to 6.5% by January 2006.</td>
<td>Registries are suitable for diverse market conditions.</td>
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<tr>
<td>Identify subpopulations (by gender, age, geographic area) to differentiate process improvement interventions.</td>
<td>The average A1C for all patients with diabetes was 8.4% in January 2003. By January 2006, that figure was 7.5%.</td>
<td>Registry up-take shows generalized acceptance and use by the staff of a community health center.</td>
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<tr>
<td>Identify subpopulations with special needs.</td>
<td>In January 2003, the proportion of patients with A1C levels &gt; 10% was 18.2%. By January 2006, it had declined to 10.8%.</td>
<td>Practices and providers with larger numbers of patients with chronic disease may realize most benefit from these programs.</td>
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<tr>
<td>Provide performance feedback to providers and staff.</td>
<td>HHCL implemented several initiatives concurrently with the diabetes registry. However, only an estimated 50% of patients participated in other activities. This suggests a positive effect of improved management and tracking on patient outcomes.</td>
<td>Other CHCs employing diabetes disease registries have reported similar findings.</td>
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<tr>
<td>Identify ‘non-compliant’ patients to diagnose causes and target interventions.</td>
<td>Other CHCs employing diabetes disease registries have reported similar findings.</td>
<td>Data are not available on the other registry disease focus areas.</td>
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<td>Organize, coordinate, and schedule ancillary and community-based services.</td>
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<td>Create and manage provider panels.</td>
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<td>Deliver transparent provider-specific feedback.</td>
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<td>Identify patients for clinical trials.</td>
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<td>Distribute a newsletter to patients including current performance data.</td>
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<td>Summarize utilization improvement and cost savings for negotiations with payers and networks, and to obtain grant funding.</td>
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**Case Example 1:**

**Holyoke Health Center Chronic Disease Registry**

Since 1970, Holyoke Health Center (HHC), a community health center located in Holyoke, MA, has been providing medical and dental care. Its two sites serve approximately 16,000 patients annually, most of whom are Spanish speaking. Over 3,000 of the center’s adult patients have diabetes, asthma, HIV, or depression. HHC utilizes disease registries for these four key chronic diseases to better manage patient care.

Patients stay in the registry until three years have elapsed in which there is no contact with clinical or support services.

Asthma registry: Data entry form includes a short version of asthma guidelines to help guide severity assessment and medication management. Providers receive individual data regarding asthma patients. The asthma case manager independently follows patients entered into the registry- a new intervention as previously all patients had to be referred by a physician.

Depression registry is currently being validated.

Diabetes registry is used to print out individual provider’s outcomes and combined provider data. Physician champion discusses outcome data with providers on a monthly basis. Registry is utilized to identify and follow-up with patients who have not been seen by their providers in the last four months. Registry data are used to identify patients newly diagnosed with diabetes. All data are reviewed and analyzed monthly.

The proportion of diabetic patients who had been seen within the previous three years, but who had not had an appointment within the previous year decreased from 28.2% in January 2003, to 6.5% by January 2006.

The average A1C for all patients with diabetes was 8.4% in January 2003. By January 2006, that figure was 7.5%.

In January 2003, the proportion of patients with A1C levels > 10% was 18.2%. By January 2006, it had declined to 10.8%.

HHC implemented several initiatives concurrently with the diabetes registry. However, only an estimated 50% of patients participated in other activities. This suggests a positive effect of improved management and tracking on patient outcomes.

Other CHCs employing diabetes disease registries have reported similar findings.

Data are not available on the other registry disease focus areas.
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<td>Approximately 1,188 patients registered.</td>
<td>HIV registry: utilized to print out individual</td>
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### Clinical Guideline Creation and/or Execution Engines

A clinical guideline creation or execution engine is a computerized platform that facilitates development or testing of clinical guidelines, or both. Clinical guidelines are clinical standards of treatment, disease-specific, which serve to guide patient management and to standardize care. Historically, expert panels develop guidelines. More recently, computerized software programs have been used to do so.

These tools aim to provide physicians and other health care providers with the ability to store, analyze, create, and disseminate clinical treatment guidelines. The functionality of these tools, in a practice setting, is enhanced with increased disease-specificity capabilities of the software and use of common software platforms. Increased use of clinical treatment guidelines will promote increased standardization of care and adherence to clinical guidelines, thus improving the quality of patient care. These tools are appropriate for acute patient care as well as chronic disease management.

Clinical guidelines are intended to shape practice patterns, which may differ across market areas.

Examples of creation and execution engines include:

- Digital Electronic Guidelines Library (DeGeL), a web-based, modular and distributed architecture;
- GLIF3 Guideline Execution Engine (GLEE), a tool for executing guidelines;
- NewGuide, a framework for modeling and executing clinical practice guidelines;
- GuideLine Acquisition, Representation and Execution (GLARE), a system to acquire and execute clinical guidelines;
- Health Care Services release 2 (HeCaSe2), an agent-based platform that offers health care services to users;

### Other Comments

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### Disease Management

#### Interventions Areas and Case Examples

<table>
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<tr>
<th>What does the intervention intend to address?</th>
<th>What is the research evidence regarding impact of intervention?</th>
<th>How applicable to which types of markets?</th>
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</table>
| • Standards-based Sharable Active Guideline Environment (SAGE), the result of collaboration among research groups at six institutions; and  
  • Specification Execution and Management Plan (SpEM), a framework for supporting the management of clinical guidelines. |
| • This review did not identify RCTs evaluating the impact of pay-for-performance incentives. Most studies incorporated a pre-/post-analysis of patient outcomes and visits.  
  • Incentives may contribute to improved patient outcomes and reduced health care utilization and costs.  
  • Non-financial incentives that will promote the participant in either patient or peer groups might be equally effective.  
  • Pay-for-performance is associated with greater adherence to clinical treatment guidelines, though findings are mixed.  
  • Incentives may have more impact on physicians and smaller practices than larger groups or facilities unless the reward reaches a proportionate value of revenue from smaller unit/entity to larger entity.  
  • Incentive structures focused on administrative improvements may indirectly result in worsened patient outcomes.  
  • This review identified one study examining cost-effectiveness of a hospital incentive program. Results indicated cost-effectiveness of the program in terms of Quality of Life Years.  
  • Cost-effectiveness analyses of pay-for-performance programs are sparse. |
| Pay-performance incentives are suitable for diverse market conditions. Programs may be tailored to meet local capabilities and health situations.  
  • Up-take of incentive programs has been found to be significantly associated with region, with HMOs in the northeast and west much more likely to offer these programs, and those in the south much less likely. |

#### Provider Incentives/Pay-for-Performance

Incentives, financial or not, are inducements to encourage or reinforce the delivery of evidence-based practices that promote better patient outcomes. Incentives may be either desirable rewards or undesirable consequences.

Pay-for-performance incentives are becoming an increasingly popular tool in quality improvement, disease management, and wellness promotion strategies. Pay-for-performance incentives award physicians, providers, medical practices, or hospitals an incentive bonus for good patient outcomes.

Pay-for-performance historically has been focused on patient outcomes, but increasingly focuses on quality. Improvements may be structural, clinical process, satisfaction, quality focused, or a combination.

Popular clinical indicators include high compliance with the desired frequency of immunizations, Pap smears, mammographic and colonoscopy screening, and the use of hemoglobin A1c for screening and management of diabetes.

Pay-for-Performance structures include:
• Competitive and non-competitive awards to providers meeting a set target,
• Competitive and non-competitive awards to providers who improve, and
• Reward and penalty systems to reward high

Fee-for-service payments fail to promote and may even discourage guideline-based treatment. An effective disease management program may lead to lower revenues for providers under fee-for-service, since quality improvement activities are not billable and acute care visits decrease with improved care.

Pay-for-performance programs attempt to compensate for this discrepancy in focus by rewarding physicians, hospitals, and others for initiatives undertaken to improve patient care and care processes.

The goal is to improve patient outcomes by rewarding physicians for achieving those outcomes. Improved patient outcomes will lead to lower health care costs.
### SECTION 2 ● DISEASE MANAGEMENT

#### INTERVENTION AREAS AND Case Examples

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| compliance or patient outcomes and to penalize low compliance. | ● The Centers for Medicare & Medicaid Services (CMS) uses many pay-for-performance strategies.  
● Many state Medicaid programs have implemented some form of pay-for-performance program.  
● Providers or hospitals with large high-risk or chronically ill populations may be disproportionately penalized. Risk adjusted payments for patient mix differences may resolve this problem.  
● Strict adherence to clinical treatment guidelines in all patients may not be appropriate. Some discretion should be allowed providers to exercise their clinical judgment.  
● Pay-for-performance incentives may reward those providers with higher performance at baseline. | |

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### SECTION 2 ● ENDNOTES


ALTARUM INSTITUTE integrates objective research and client-centered consulting skills to deliver comprehensive, systems-based solutions that improve health and health care. A nonprofit serving clients in the public and private sectors, Altarum employs more than 350 individuals and is headquartered in Ann Arbor, Michigan with additional offices in the Washington, DC area; Sacramento, California; Atlanta, Georgia; Portland, Maine; and San Antonio, Texas.

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Vision
Altarum Institute demonstrates and is sought for leadership in identifying, understanding, and solving critical systems issues that impact the health of diverse and changing populations. Altarum is acknowledged as a valued, collaborative, and collegial institute of the utmost competence and integrity.

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