The American healthcare delivery system can be modeled as six nested levels: patient, population, care team, organization, network, and environment. Research opportunities exist in all levels of the healthcare system, and these research opportunities are large technology-based, model-based or practice-based.
Introduction

The current American healthcare system is in crisis. According to the Institute of Medicine, the cost for healthcare per person in the United States is the highest among the top 21 industrialized nations. The achievable level of healthcare in the United States is one of the highest globally, yet the delivery of “best practices” is inconsistent and healthcare is not guaranteed to all citizens. Engineering can be used to transform the healthcare system into one that is safe, effective, patient-centered, timely, efficient, and equitable.

An NAE/IOM study (Reid et al. 2007) suggested that due to the complexity of the American healthcare system, little work has been done to effectively engage the system as a whole. Their review of the system used a four-level breakdown of healthcare engineering research. An NSF study (Rardin 2007) offered an expanded six level breakdown. Our aim is to develop that structure for healthcare integration and we thus define the patient-population-team-organization-network-environment (PPTONE) model, as is seen in Figure 1.

![Figure 1: PPTONE Model](image)

This literature review is organized by the structure suggested in Rardin’s NSF study. Research topics are organized by level in the PPTONE model and then categorized as technology-based, model-based or practice-based. Largely, the works included in this literature review are research done by members of the Integrated Healthcare Delivery Systems Committee at The Pennsylvania State University or other researchers at The Pennsylvania State University. Each research topic is then coded according to potential with H, M, or L for High, Moderate, and Low potential respectively.
Abstract: During routine anaesthesia, an airway physical examination should be conducted in all patients to estimate whether tracheal intubation is easy or difficult. In clinic, some anaesthetists usually do this by examining single item although most of the specialists agree that full consideration of multiple features of airway physical examination rather than single one would enable anaesthetists to improve the prediction accuracy when encountering a difficult airway. The application of machine learning tools has shown its advantage in medical aided decision. The purpose of this study is to construct a medical decision support system based on support vector machines with 13 physical features for tracheal intubation predication ahead of anaesthesia. A total of 264 medical records collected from patients suffering from a variety of diseases ensure the generalization performance of the decision system. Moreover, the robustness of the proposed system is examined using 4-fold cross-validation method and results show the SVM-based decision support system can achieve average classification accuracy at 90.53%, manifesting its great application prospect of supporting clinic aided diagnosis with full consideration of multiple features of airway physical examination.

Abstract: An integrated view of the automated diagnostic systems combined with spectral analysis techniques in the classification of electroencephalogram (EEG) signals is presented. The paper includes illustrative and detailed information about implementation of automated diagnostic systems and feature extraction/selection from the EEG signals. The major objective of the paper is to be a guide for the readers, who want to develop an automated diagnostic system for classification of the EEG signals. Toward achieving this objective, this paper presents the techniques which should be considered in developing automated diagnostic systems. The author suggests that the content of the paper will assist to the people in gaining a better understanding of the techniques in the classification of the EEG signals.


Abstract: The article presents an introduction to articles published within this edition of the journal focusing on medical decision support systems and automated diagnostic systems. These include “Augmentation of a nearest neighbour clustering algorithm with a partial supervision strategy for biomedical data classification,” by Salem et al, “Comparison of different classifier algorithms for diagnosing macular and optic nerve diseases,” by Polat et al, and “Electromyography signal analysis using wavelet transform and higher order statistics to determine muscle contraction,” by Hussain et al.

Patient Decision Support


Abstract: This paper reviews the research and development around a consumer health informatics system CHESS (The Comprehensive Health Enhancement Support System) developed and tested by the Center for Health Systems Research and Analysis at the University of Wisconsin. The review places particular emphasis on what has been found with regard to the acceptance and use of such systems by high risk and underserved groups.


Abstract: Breast cancer patients received in-home Internet-enabled computers with either an Interactive Cancer Communication System (providing information, decision-making, and emotional support) or access to the Internet along with links to high-quality
breast cancer sites. Both experimental groups received training. The control group received either a book or an audiotape on cancer. Breast cancer patients do not benefit (and may even be hurt) by providing computers with Internet access and URLs to high quality breast cancer sites. The chaotic Internet environment with many interfaces and overwhelming, conflicting information creates confusion and anxiety. A system with one simple interface and integrated information, communication and skills services can help patients even after computers are removed.

Treatment Optimization


Abstract: The goal of this paper is to describe the role that control engineering principles can play in developing and improving the efficacy of adaptive, time-varying interventions. It is demonstrated that adaptive interventions constitute a form of feedback control system in the context of behavioral health. Consequently, drawing from ideas in control engineering has the potential to significantly inform the analysis, design, and implementation of adaptive interventions, leading to improved adherence, better management of limited resources, a reduction of negative effects, and overall more effective interventions. This article illustrates how to express an adaptive intervention in control engineering terms, and how to use this framework in a computer simulation to investigate the anticipated impact of intervention design choices on efficacy. The potential benefits of operationalizing decision rules based on control engineering principles are particularly significant for adaptive interventions that involve multiple components or address co-morbidities, situations that pose significant challenges to conventional clinical practice.


Abstract: Chemotherapy with indisulam in combination with a standard dose of carboplatin was not well tolerated in a 3-weekly regimen in a Phase I dose escalation study. Myelosuppression was the dose limiting toxicity. • This pharmacokinetic–pharmacodynamic (PK–PD) study was performed to suggest a dosing regimen for the combination therapy indisulam–carboplatin that is well tolerated in patients. This PK–PD study supports the selection of indisulam 500 mg m<sup>-2</sup> and a dose of carboplatin to achieve an AUC of 6 mg min<sup>-1</sup> ml<sup>-1</sup> in a 4-weekly regimen as the recommended dose for future studies. AIMS Indisulam and carboplatin have shown synergistic activity in preclinical studies. In a dose escalation study of the combination, a treatment delay was frequently required in a 3-weekly regimen to allow recovery from myelosuppression from previous cycles. A 4-weekly
regimen was better tolerated, but had a decreased dose-intensity which may compromise efficacy. The aims of this study were (i) to develop a pharmacokinetic–pharmacodynamic (PK–PD) model to describe the myelosuppressive effect of the combination, and (ii) to use this model to select a dosing regimen for Phase II evaluation.

Minimally Invasive Surgical Tools


Abstract: Internal drainage of pancreatic pseudocysts can be accomplished by traditional open or minimally invasive laparoscopic or endoscopic approaches. This study aimed to evaluate the primary and overall success rates and clinical outcomes after laparoscopic, endoscopic, and open pancreatic cystgastrostomy for pancreatic pseudocysts.

Records of 83 patients undergoing laparoscopic (n = 16), endoscopic (n = 45), and open (n = 22) pancreatic cystgastrostomy were analyzed on an intention-to-treat basis.

There were no significant differences (p < 0.05) in the mean patient age (years), gender, body mass index (BMI) (kg/m(2)), etiology of pancreatitis (% gallstone), or size (cm) of pancreatic pseudocyst between the groups. Grade 2 or greater complications occurred within 30 days of the primary procedure for 31.5% of the laparoscopic patients, 15.6% of the endoscopic patients, and 22.7% of the open patients (nonsignificant differences). The follow-up evaluation for 75 patients (90.4%) was performed at a mean interval of 9.5 months (range, 1-40 months). The primary compared with the overall success rate, defined as cyst resolution, was 51.1% vs. 84.6% for the endoscopic group, 87.5% vs. 93.8% for the laparoscopic group, and 81.2% vs. 90.9% for the open group. The primary success rate was significantly higher (p < 0.01) for laparoscopic and open groups than for the endoscopic group, but the overall success rate was equivalent across the groups (nonsignificant differences). Primary endoscopic failures were salvaged by open pancreatic cystgastrostomy (n = 13), percutaneous drainage (n = 3), and repeat endoscopic drainage (n = 6).

Laparoscopic and open pancreatic cystgastrostomy both have a higher primary success rate than endoscopic internal drainage, although repeat endoscopic cystgastrostomy provides overall success for selected patients.
Population

Patient Screening and Monitoring


Abstract: We used wireless-capsule endoscopy to assess patients with obscure or uncontrolled gastrointestinal bleeding. The capsule endoscope contains a miniature video camera, a light source, batteries, and a radio transmitter Video images are transmitted by means of radio telemetry to aerials taped to the body that allow images to be captured. The strength of the signal is used to calculate the position of the capsule in the body. Moving images from a period as long as six hours are stored on a portable recorder. With the approval of the ethics committee, four patients swallowed the device. We present here the first images of pathologic conditions in the human small bowel we obtained using this new endoscopic system (Given Imaging, Yoqneam, Israel).

Wellness and Behavior Change


Abstract: The internet has been used as a method to deliver various health interventions (eg, weight management, smoking cessation, increasing physical activity). An electronic search (ie, PubMed, PsycInfo, Web of Science) for internet-based physical activity interventions among adults yields fewer than 25 studies. Although many have considered physical activity as one element of a multifactorial behavioural intervention, few have focused exclusively on changing sedentary behaviour. Overall, current results are encouraging and it appears that response to an internet-based physical activity intervention is similar to response to other more established, effective interventions. Given that primary care referrals for physical activity are successful in changing sedentary behaviour to some extent, there is an urgent need for investigations into the effect of using an internet-based physical activity programme within the context of primary care. Although no studies that have combined an established internet-based physical activity programme with primary care were found, there is evidence that significant progress would probably be made by providing clinicians with information on internet-based physical activity programmes.
Abstract: By addressing the reproductive intentions and contraceptive practices and needs of every patient, providers may be able to decrease women’s chances of experiencing unintended pregnancies and support women in achieving planned and well-timed pregnancies. By addressing the health promotion needs of every patient and examining and addressing her health profile for reproductive risks, irrespective of her desires for pregnancy, it is likely that more women will enter pregnancy with high levels of preconception wellness and that healthier women and healthier pregnancies and infants will result. The importance of the integration of reproductive planning and health promotion into women's routine healthcare is further emphasized when the potentially far-reaching effects of reproductive outcomes (such as unintended pregnancies, adverse pregnancy outcomes, pregnancy complications, and sexually transmitted infections) on women’s health, well-being, and life circumstances are considered.

Abstract: This qualitative narrative review examines the potential returns from providing smoking cessation treatments (SCTs) through an insurance plan's standard benefit package versus through an optional supplementary wellness ('rider') program. Research indicates most employers offer SCTs as part of a rider available for purchase. Studies demonstrate that the higher the cost of SCTs, the lower the SCT participation rates; when employees receive SCTs, smoking cessation rates increase, effecting lower employee healthcare costs and improved productivity. Employers may receive a considerable return on the investment of offering SCTs as part of comprehensive insurance benefit for their employees as opposed to a rider.

Abstract: A variety of factors limit the ability of clinicians to offer intensive counseling to patients with unhealthy behaviors, and few patients (2%–5%) are referred to the community counseling resources that do offer such assistance. A system that could increase referrals through an efficient collaborative partnership between community programs and clinicians could have major public health implications; such was the subject of this feasibility evaluation. METHODS: At nine primary care practices, an electronic linkage system (eLinkS) was instituted to promote health behavior counseling
and to automate patient referrals to community counseling services. Patients were offered 9 months of free counseling for weight loss, smoking cessation, and problem drinking at a choice of venues: group counseling, telephone counseling, computer care, and usual care. The delivery of behavioral counseling, measured by the 5A's (ask, address, advise, assess, agree, arrange) and patients' reported experiences with eLinkS, was examined. RESULTS: For 5 weeks eLinkS was used, until high referral volumes depleted counseling funds. Of the 5679 patients visiting the practices, 71% had an unhealthy behavior. Of these patients, 10% were referred for intensive counseling from a community program, most often for weight loss. Counseling and referrals occurred regardless of visit type—wellness, acute, or chronic care. eLinkS was used more often for middle-aged adults and women and by more-experienced clinicians. CONCLUSIONS: The intervention increased the rate at which patients were referred for intensive behavioral counseling compared to current practice norms. Given the evidence that intensive counseling is more effective in promoting behavior change, implementing eLinkS could have substantial public health benefits.

Personalized, Predictive Care


Abstract: The ability of an automated system used to identify pneumonia and heart failure (HF) patients in real time and prompt clinical interventions was evaluated. An automated system evaluated all adult patients with an emergency department (ED) visit or hospital admission for possible pneumonia in real time for 31 days. Two quality-indicator alerts were sent to appropriate clinicians for possible interventions. The system evaluated all hospitalized adult patients for HF for 30 days. A list of possible HF patients printed every 12 hours and was used for possible interventions.


Background: The etiology and significance of flu-like symptoms often appearing before myocardial infarction should be clarified. Methods: In a case-control study of 323 matched controls and a random sample of 110 out of 351 cases the presence of infection symptoms during the preceding four weeks before admission were asked and blood samples taken. Results: Enterovirus (EV), herpes simplex virus (HSV), and Chlamydia pneumoniae IgA titers were significantly higher in cases than in controls (p50.001, 0.008 and 0.046, respectively). Flu-like symptoms appeared significantly more often in patients than in controls the most common one being fatigue (p50.001). In
controls with fatigue, EV and HSV titers showed a trend to be higher (1.50 vs 1.45 and 4.29 vs 3.73) than in controls without fatigue but only HSV titers were statistically significantly higher (3.47 vs 3.96, p=0.02). Even CRP and amyloid A concentrations (3.49 vs 2.08, p=0.0001 and 5.70 vs 3.77 mg/l, p=0.003, respectively) as well as C4 (0.40 vs 0.44, p=0.02) were higher in controls with fatigue. Conclusions: Odds ratios for a coronary event in a logistic regression model were 4.79 for fatigue and 2.72 for EV antibody levels in their fourth quartile. A linear-by-linear association test showed increasing number of single symptoms with higher EV titer quartiles (p<0.004).
Abstract: This study is the first part of a larger study assessing factors that influence successful implementation of EMR in ambulatory care settings. The purposes of this study were to identify specific attitudes or factors that should be targeted before implementation an EMR project, and demonstrate empirical support for a model of perceived usefulness of EMR. We found that computer experience, computer anxiety, and perceptions of organizational support predict the degree to which physicians and mid-level practitioners view the MER effort positively. Strategies for the successful management of EMR implementation include engaging the physicians and practitioners in computer activities prior to implementation and providing strong organizational support before and during the redesign effort.

Abstract: Electronic medical record systems improve the quality of patient care and decrease medical errors, but their financial effects have not been as well documented.
The purpose of this study was to estimate the net financial benefit or cost of implementing electronic medical record systems in primary care. Implementation of an electronic medical record system in primary care can result in a positive financial return on investment to the health care organization. The magnitude of the return is sensitive to several key factors.

**Bedside Technology**


Abstract: Intra-abdominal pressure measurement is essential to the diagnosis of patients with intraabdominal hypertension or abdominal compartment syndrome. The most common method for measuring intra-abdominal pressure (IAP) is the intravesicular or "bladder" technique, which requires electronic monitoring technology not available on the typical surgical ward. Herein we describe and validate a simple, rapid screening method for bedside IAP measurement using the patient's indwelling urinary catheter and a readily available intravenous tubing extension. Validation of this technique across the clinically important IAP diagnostic spectrum demonstrated acceptable bias (1.6 mm Hg; 95% confidence interval 1.4-1.8) with limits of agreement of 0.36 to 2.8. This demonstrates good agreement between the two IAP methods and validates the bedside technique as a simple, cost-effective and reproducible method for screening IAP measurements outside of the critical care setting.


Abstract: This work presents an innovative nanorobot architecture based on nanobioelectronics for diabetes. The progressive development toward the therapeutic use of nanorobots should be observed as the natural result from some ongoing and future achievements in biomedical instrumentation, wireless communication, remote power transmission, nanoelectronics, new materials engineering, chemistry, proteomics, and photonics. To illustrate the nanorobot integrated circuit architecture and layout described here, a computational approach with the application of medical nanorobotics for diabetes is simulated using clinical data. Integrated simulation can provide interactive tools for addressing nanorobot choices on sensing, hardware design specification, manufacturing analysis, and methodology for control investigation. In the proposed 3D prototyping, a physician can help the patient to avoid hyperglycemia by means of a handheld device, like a cell phone enclosed with cloth, that is used as a smart portable device to communicate with nanorobots. Therefore, this architecture provides a suitable choice to establish a practical medical nanorobotics platform for in vivo health monitoring.

**Clinical Reminders**


Abstract: Older adults are commonly prescribed sedative-hypnotic (SH) medications when hospitalized, yet these drugs are associated with important adverse effects such
as falls and delirium. To identify provider-perceived benefits or barriers of a computer-based reminder regarding appropriate use of SH medications. Qualitative study using semi-structured interviews. Thirty-six house staff physicians at a university hospital. Information was collected regarding the experiences of prescribing an SH using a computer order entry system with a reminder intervention. Clinicians were asked about their perceptions of the reminder and what they found most and least useful about it. Responses were analyzed using grounded theory methodology. The 36 participants (including 29 interns) had prescribed an SH medication for a hospitalized patient over age 65 years. Three themes associated with benefits of a computer reminder were identified: increasing awareness of safety, including risk of delirium, falls, and general patient safety risks; usefulness of information technology; and the value of the educational content, including geriatric pharmacology review and nonpharmacologic treatment options. Barriers included the demands of the reminder with regard to time needed to read the reminder, the role of clinician experience with regard to preserving clinical autonomy, and the information content of the reminder, including its being too basic or not relevant for a particular patient. The mean satisfaction rating for the reminder was 8.5 (±0.9 SD), with 10 indicating high satisfaction. Improving decision support systems involves an understanding of how clinicians respond to real-time strategies encouraging better prescribing.


Abstract: Recommendations for routine laboratory monitoring to reduce the risk of adverse medication events are not consistently followed. We evaluated the impact of electronic reminders delivered to primary care physicians on rates of appropriate routine medication laboratory monitoring. Design: We enrolled 303 primary care physicians caring for 1,922 patients across 20 ambulatory clinics that had at least one overdue routine laboratory test for a given medication between January and June 2004. Clinics were randomized so that physicians received either usual care or electronic reminders at the time of office visits focused on potassium, creatinine, liver function, thyroid function, and therapeutic drug levels.

We identified high rates of appropriate laboratory monitoring, and electronic reminders did not significantly improve these monitoring rates. Future studies should focus on settings with lower baseline adherence rates and alternate drug-laboratory combinations.

*Patient Safety*

Abstract: We describe the evolution and implementation of the inpatient medication reconciliation process at Mayo Clinic, an academic tertiary care center based in Rochester, Minnesota. The clinic is composed of 3 integrated hospitals, receiving 60,000 admissions per year to a total of 1,951 beds. The clinic is staffed by more than 1,500 physicians, 21,077 allied health staff, and 1,414 physicians in training. To accomplish medication reconciliation successfully at an institutional level, a pilot project was initiated and tested in the family medicine hospital service in April 2005. As the pilot project was implemented, several key concepts surfaced as being critical for expansion to the whole organization.


Abstract: Comparing the management of errors, stress, and teamwork between medical staffs and airline cockpit crews indicated that the airline flight officers handled these factors much more efficiently. Surveys interviewed 1,033 medical personnel and more than 30,000 airline flight officers. Pilots were less likely to deny fatigue than surgeons or anesthetists at a rate of 26% to 70% to 47%. Almost all pilots and intensive care personnel rejected hierarchies which keep juniors from adding input to senior staff, but only 55% of surgeons rejected the hierarchies. Additionally, more than half of intensive care staff said it was difficult to discuss errors.


Abstract: Clinical medicine may be able to reduce the number of accidents by using an adaptation of a system originally designed for risk analysis in complex industrial settings. Dividing risk into active and latent failures is the basis. Active failures include such things as using the wrong syringe or neglecting precautions. Latent failures go to management structure such as heavy workloads, lack of supervision, and rapid organizational changes. With an analytical framework in place, the number of hospital-caused injuries to patients may be reduceable.


Abstract: A 19-yr-old woman underwent Cesarean section and delivered a healthy infant. Postoperatively, morphine sulfate (2 mg bolus, lockout interval of six minutes, four-hour limit of 30 mg) was ordered, to be delivered by an Abbott Lifecare 4100 Plus II Infusion Pump. A drug cassette containing 1 mg•mL⁻¹ solution of morphine was unavailable, so the nurse used a cassette that contained a more concentrated solution (5 mg•mL⁻¹). 7.5 hr after the PCA was started, the patient was pronounced dead. Blood samples were obtained and autopsy showed a toxic concentration of morphine. The available evidence is consistent with a concentration programming error where morphine 1 mg•mL⁻¹ was entered instead of 5 mg•mL⁻¹. Based on a search of such
incidents in the Food and Drug Administration MDR database and other sources and on a denominator of 22,000,000 provided by the device manufacturer, mortality from user programming errors with this device was estimated to be a low likelihood event (ranging from 1 in 33,000 to 1 in 338,800), but relatively numerous in absolute terms (ranging from 65–667 deaths). Anesthesiologists, nurses, human factors engineers, and device manufacturers can work together to enhance the safety of PCA pumps by redesigning user interfaces, drug cassettes, and hospital operating procedures to minimize programming errors and to enhance their detection before patients are harmed.

Team Productivity


Abstract: This paper contributes to research on organizational learning by investigating specific learning activities undertaken by improvement project teams in hospital intensive care units and proposing an integrative model to explain implementation success. Organizational learning is important in this context because medical knowledge changes constantly and hospital care units must learn new practices if they are to provide high-quality care. To develop a model of factors affecting improvement project teams driving essential organizational learning in health care, we draw from three streams of related research-best-practice transfer (BPT), team learning (TL), and process change (PC). To test the model's hypotheses, we collected data from 23 neonatal intensive care units seeking to implement new or improved practices. We first analyzed the frequency of specific learning activities reported by improvement project participants and discovered two distinct factors: learn-what (activities that identify current best practices) and learn-how (activities that operationalize practices in a given setting). Next, ordinary least squares (OLS) regression analyses supported three of our four hypotheses. Specifically, a high level of supporting evidence for a unit’s portfolio of improvement projects was associated with implementation success. Learn-how was positively associated with implementation success, but learn-what was not. Psychological safety was associated with learn-how, which was found to mediate between psychological safety and implementation success.


Abstract: The impact of verbal communication on laparoscopic team performance was examined. A total of 24 dyad teams, comprised of residents, medical students, and office staff, under-went 2 team tasks using a previously validated bench model. Twelve teams (feedback groups) received instant verbal instruction and feedback on their performance from an instructor which was compared with 12 teams (control groups)
with minimal or no verbal feedback. Their performances were both video and audio taped for analysis. Surgical backgrounds were similar between feedback and control groups. Teams with more verbal feedback achieved significantly better task performance ($P = .002$) compared with the control group with less feedback. Impact of verbal feedback was more pronounced for tasks requiring team cooperation (aiming and navigation) than tasks depending on individual skills (knotting). Verbal communication, especially the instructions and feedback from an experienced instructor, improved team efficiency and performance.
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**Patient Scheduling and Flow**


Abstract: Many service industries (e.g., walk-in clinics, vehicle inspection facilities, and data-processing centers) have customers who choose among congested facilities, and select the facility with the lowest combination of travel cost plus congestion cost at the facility. In general, customers over-utilize attractive facilities, causing higher costs than if customers were assigned to facilities to minimize total costs. Optimal facility prices induce customers to select facilities that minimize total cost. We find optimal facility prices and show they equal charging customers for the impact (net costs and benefits) they cause for others. We explore a rich flexibility that allows a range of optimal prices, useful when negotiating the implementation of facility fees. Facility prices can be positive or negative (price discounts), and can be adjusted to be all positive, or to provide net subsidy or net revenue. We contribute to unifying and generalizing several disparate streams of research.


Abstract: Hospital emergency departments in the US are facing increasing challenges due to growth in patient demand for their services, and inability to increase capacity to match demand. We report on a new approach to patient flow in emergency departments, and a simulation model of the approach. Initial results from the model show that the approach is feasible, and a pilot study demonstrates substantial improvements in patient care.

Abstract: Background and Objectives: Open access scheduling decreases waiting time to see physicians by using same-day appointment scheduling. In primary care residency training, continuity of care may be difficult to preserve with this method of scheduling because requirements for rotations often results in residents being unavailable in their primary clinic practice. Our objective was to examine continuity of care in a family medicine residency clinic during a 1-year period prior to implementation of open-access scheduling and during a 1-year period after open access scheduling started. Methods: Two indices to measure continuity were used: the Usual Provider Continuity Index (UPC) and the Modified Modified Continuity Index (MMCI). The Mann-Whitney test was used to determine different in the UPC and MMCI between groups. Results: The mean UPC and MMCI scores decreased with open access scheduling. Mean UPC was 0.59 with traditional scheduling versus 0.55 with open access scheduling. Mean MMCI was 0.51 for traditional scheduling and 0.44 with open access. Conclusion: Continuity of care decreased in our clinic after implementation of open access scheduling. Our results have implications for all primary care residency training programs since one of the hallmarks of primary care is maintaining continuity in the physician-patient relationship.

Facility and Staff Scheduling


Abstract: This paper describes a two-stage approach to nurse scheduling that considers both nurse preferences and hospital constraints. In the auction stage, nurses bid for their preferred working shifts and rest days using “points”. An optimization model awards shifts to the highest bidders insofar as possible while maintaining hospital requirements. In the schedule completion stage, an optimization model allocates the unfilled shifts to nurses who have not yet met their minimum required hours. The approach is demonstrated via a case study in the emergency department at York Hospital. A schedule with a high percentage of awarded bids was generated in a few minutes of computer time. Further experimentation suggests that the approach works well under a variety of conditions.


Abstract: The article focuses on a study of nurses in three dozen medical and surgical units in U.S. hospitals. According to the study, nurses spend twice as much time away from the bedside than at it. Investigators collected data from 767 nurses at 17 health systems on how and where nurses spent their time, and how far they walked. Marilyn Chow, vice president of patient care services at Kaiser Permanente, claims that healthcare’s dysfunction creates burdens for nurses, as does poorly designed technology.

Facilities Location and Design


Abstract: The concept of a team-based model for delivery of care has been critical at Our institution for improving efficiency and safety. Despite these measures, difficulties Continue to Occur during lengthy operating room procedures. Using a novel team-based practice model, a multidisciplinary team was organized to improve efficiency in microsurgical breast reconstruction. We describe development of an intraoperative pathway for deep inferior epigastric perforator (DIEP) flap breast reconstruction and its impact on various Outcomes. Implementation of an intraoperative pathway led to improvements in operative time, cost, quality measures, and staff satisfaction. Refinement of the pathway with team resolution of variances might continue to improve outcomes. Complex, multi-team procedures can derive benefits from standardization and intraoperative pathway development.


Abstract: The facility layout problem is concerned with finding feasible locations for a set of interrelated objects that meet all design requirements and maximize design quality in terms of design preferences. The contribution of this paper is a new framework, named annealed neural network, for efficiently finding competitive solutions for the facility layout problem. This framework arises from the combination of Hopfield neural networks and simulated annealing. The first is a representation model of the layout problem and the second is a search algorithm for finding the optimum or near optimum solutions. The annealed neural network combines characteristics of the simulated annealing algorithm and the Hopfield neural network. Annealed neural network exhibits the rapid convergence of the neural network, while preserving the solution quality afforded by simulated annealing. Strategies for setting reasonable penalty factor in objective function and temperature in simulated annealing procedure were proposed. A case study of a hospital building with 28 facilities was employed to demonstrate that this model is rather efficient to solve the architectural layout problem, and it is amenable to fast computation for large layout problems.

*Quality Management*


Abstract: Health care clinicians successfully apply proven medical evidence in common acute, chronic, or preventive care processes less than 80 percent of the time. This low level of reliability at the basic process level means that health care's efforts to improve reliability start from a different baseline from most other industries, and therefore may require a different approach. This paper describes The Institute for Healthcare
Improvement's (IHI) current approach to improving health care reliability, including a useful nomenclature for levels of reliability, and a focus on improving reliability of basic health care processes before moving on to more sophisticated high reliability organization concepts. Early IHI work with a community of health care reliability innovators has identified four themes in health care settings that help to explain at least a portion of the gap in process reliability between health care and other industries. These include extreme dependence on hard work and personal vigilance, a focus on mediocre benchmark outcomes rather than process, great tolerance of provider autonomy, and failure to create systems that are specifically designed to reach articulated reliability goals. This paper describes our recommendations for the initial steps health care organizations' might take, based on these four themes, as they begin to move toward higher reliability.


Abstract: Pressure ulcer healing is an important quality measure for nursing homes, but the factors that predict healing have not been well studied. Using the Minimum Data Set, the authors identified candidate variables for a logistic regression, risk-adjustment model to predict ulcer healing. The authors then assessed model discrimination and calibration. Finally, the authors compared unadjusted with risk-adjusted performance for the individual facilities within a nursing home chain. Significant predictors of healing included mobility in bed, presence of a stage 2 ulcer (compared with a stage 4 ulcer), absence of paraplegia and quadriplegia, and absence of end-stage illness. The model C statistic was 0.67, and the calibration was acceptable. Judgments about nursing performance varied in 2 cases depending upon whether unadjusted or risk-adjusted performance was used. The model that the authors developed contains credible predictors of healing. Pressure ulcer healing may be one of many indicators used to evaluate nursing home quality.


Abstract: A number of sources publish health care quality reports in the United States, but there is limited information about achievable performance in primary care settings. The objective of this article is to report Achievable Benchmarks of Care (ABCs) for 54 quality indicators. Eighty-seven practices participating in a demonstration project in the Practice Partner Research Network (PPRNet), representing 35 US states and 711 969 patients, were included in the analyses. PPRNet practices use a common electronic medical record (Practice Partner, Seattle, Washington). ABCs ranged from 25% to 99%. High ABCs ( [?] 90%) were achieved for blood pressure screening, lipid screening, and avoiding antibiotics in upper respiratory infection. Some calculated ABCs may be lower than the actual ABCs due to incomplete data recording or abstracting. Primary care practices can achieve high performance across a number of quality indicators, and PPRNet ABCs can serve as benchmarks for primary care practitioners and payers.

Abstract: Home health aides are at the front line of the home health industry, raising quality of care issues and human resource (HR) management challenges. Total quality management (TQM) provides a framework to help meet those challenges. The authors investigated the relationship between TQM and HR effectiveness in home health agencies. Results suggest that TQM practices are related to HR effectiveness. Suggestions are offered to make human resource management consistent with a TQM culture.
Network

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Secure Information Sharing


Abstract: Medical applications have already been integrated into mobile devices (e.g. Tablet PCs, PDAs and smart phones) and are being used by medical personnel in treatment centers, for retrieving and examining patient’s Electronic Health Records (EHR). In such mobile healthcare applications, specific attention is drawn towards the security requirements since the transmission of sensitive medical data through a public network renders the problem of communication privacy. In this paper we present an approach to transfer the medical records of an individual by using the existing infrastructure of mobile operators. To achieve that, we propose the application of existing technologies in 3G networks such as the generic bootstrapping architecture (GBA) to enable the secure transfer of EHR data. The paper presents the corresponding applicability scenarios, initial results from a prototype test bed and discusses the feasibility of the proposed solution along with its limitations.
Abstract: The health assistance of people living in rural areas represents an issue of great relevance, because of the costs related to moving health operators, the time needed to reach remote sites, and the high number of people needing health care. At the same time, some assistance requests may be solved through a remote interaction with the patient, without the need of a medical examination. Starting from these considerations, our paper proposes a telecom solution, based on the interactive features of digital terrestrial television, that makes possible an easy (and low cost) audio and video connection between the patient and either an information server and a health care center. Due to the private nature of the information exchanged, a certified procedure is requested and implemented, through the use of smart cards. All these functions can be accomplished through a proper configuration of the receiver middleware, and a suited interactive application.

Abstract: e-Science projects face a difficult challenge in providing access to valuable computational resources, data and software to large communities of distributed users. On the one hand, the raison d’être of the projects is to encourage members of their research communities to use the resources provided. On the other hand, the threats to these resources from online attacks require robust and effective security to mitigate the risks faced. This raises two issues: ensuring that (1) the security mechanisms put in place are usable by the different users of the system, and (2) the security of the overall system satisfies the security needs of all its different stakeholders. A failure to address either of these issues can seriously jeopardize the success of e-Science projects.

The aim of this paper is to firstly provide a detailed understanding of how these challenges can present themselves in practice in the development of e-Science applications. Secondly, this paper examines the steps that projects can undertake to ensure that security requirements are correctly identified, and security measures are usable by the intended research community. The research presented in this paper is based on four case studies of e-Science projects. Security design traditionally uses expert analysis of risks to the technology and deploys appropriate countermeasures to deal with them. However, these case studies highlight the importance of involving all stakeholders in the process of identifying security needs and designing secure and usable systems.
Abstract: Ensuring the security of medical records is becoming an increasingly important problem as modern technology is integrated into existing medical services. As a consequence of the adoption of electronic medical records in the health care sector, it is becoming more and more common for a health professional to edit and view a patient's record using a tablet PC. In order to protect the patient's privacy, as required by governmental regulations in the United States, a secure authentication system to access patient records must be used. Biometric-based access is capable of providing the necessary security. On-line signature and voice modalities seem to be the most convenient for the users in such authentication systems because a tablet PC comes equipped with the associated sensors/hardware. This paper analyzes the performance of combining the use of on-line signature and voice biometrics in order to perform robust user authentication. Signatures are verified using the dynamic programming technique of string matching. Voice is verified using a commercial, off the shelf, software development kit. In order to improve the authentication performance, we combine information from both on-line signature and voice biometrics. After suitable normalization of scores, fusion is performed at the matching score level. A prototype bimodal authentication system for accessing medical records has been designed and evaluated on a small truly multimodal database of 50 users, resulting in an average equal error rate (EER) of 0.86%.

Collaborative Operations


Abstract: Multidisciplinary teams are an essential aspect of modern organizational work. These teams often work in information-rich environments but little is known about their collaborative information seeking (CIS) behavior. We have been studying the CIS behavior of teams in the context of medical care. We conducted an ethnographic field study of a multidisciplinary patient care team in an emergency department to identify (a) team information needs and (b) situations that trigger collaborative information seeking activities. We identified seven categories of information needs as expressed by questions asked by team members. The majority of questions focused on medical information, but there were a larger than expected percentage of questions focusing on organizational information. We also identified three triggers for CIS activities. These triggers are: (1) lack of expertise, (2) lack of immediately accessible information, and (3) complex information needs. The questions and triggers highlight the importance of face-to-face communication during CIS activities and how CIS activities could lead to interruptive workplaces. We also discuss organizational and technical implications for supporting CIS behavior of teams.

Abstract: Case studies of 6 hospitals with in-depth semi-structured interviews with providers of breast cancer care and their support staff. Content analysis of interviews revealed 7 different coordination mechanisms including tracking of referrals, patient support, regularly-scheduled multidisciplinary meetings, feedback of performance data, use of protocols, computerized systems, and a single physical location. No site had any systematic mechanism to track results of referrals or receipt of care provided by other physicians. All physicians used follow-up appointments to check on patients' receipt of care, but only half of the physicians had an approach to follow up missed appointments. Real-time multidisciplinary meetings with a patient management focus and systematic use of patient support programs, such as patient educators and navigators, were perceived to be valuable. Numerous coordination mechanisms exist. No site has the ability to systematically track care provided by multiple different specialists. The most valued mechanisms are under the hospital's aegis. Hospitals should consider implementing coordination mechanisms to improve delivery of multidisciplinary care.


Purpose. This study evaluates the collaborative features of a critical care system, CV, used in a surgical intensive care unit (SICU). In the evaluation, we take a socio-technical perspective—a view that the technical features of the system and social features of the work are fundamentally interrelated.

Methods. We utilized qualitative data collection and analysis methods. We undertook seven months of observations and conducted more than thirty interviews of healthcare providers in the SICU.

Results. We found that there are a wide variety of collaborative activities such as morning rounds and medication administration that a critical care system must support. We further found that CV supports healthcare providers by providing them awareness of others’ activities.

Discussion. We discuss the issue of awareness in greater detail. We also provide some recommendations on how to evaluate how well a system supports collaborative features such as multiple perspectives on information, workflow dependences, and context.


Abstract: Collaborative information behavior is an essential aspect of organizational work; however, we have very limited understanding of this behavior. Most models of information behavior focus on the individual seeker of information. In this paper, we report the results from two empirical studies that investigate aspects of collaborative information behavior in organizational settings. From these studies, we found that collaborative information behavior differs from individual information behavior with respect to how individuals interact with each other, the complexity of the information need, and the role of information technology. There are specific triggers for
transitioning from individual to collaborative information behavior, including lack of domain expertise. The information retrieval technologies used affect collaborative information behavior by acting as important supporting mechanisms. From these results and prior work, we develop a model of collaborative information behavior along the axes of participant behavior, situational elements, and contextual triggers. We also present characteristics of collaborative information system including search, chat, and sharing. We discuss implications for the design of collaborative information retrieval systems and directions for future work. (c) 2007 Elsevier Ltd. All rights reserved.


Abstract: Breast disease diagnosis and management is a quintessential example of a process requiring multidisciplinary coordination. European guidelines consider a coordinated team approach to be the standard of care. While the necessity of multidisciplinary coordination of breast healthcare is recognized in the US, its adoption in a practical sense has been fragmented and incomplete. Interdisciplinary communication and coordination has become the cornerstone of effective cancer care, but it is not supported financially or practically by a healthcare infrastructure that primarily focuses on the reimbursement of individual specialists for procedures and therapies rather than the process by which these therapies are optimally selected and integrated. Practical obstacles to interdisciplinary care are complicated by the heterogeneity of healthcare systems that must necessarily adapt to differences in population distribution, variability in access to care, availability of trained specialists, varied models of medical care delivery, and structure of insurance coverage. The American Society of Breast Disease (ASBD) is a multidisciplinary group that focuses on how interdisciplinary breast cancer care can be successfully delivered. Since much of quality improvement hinges on outcome measurement, metrics of quality interdisciplinary care are needed to assess how well we are doing in different healthcare venues. In November 2006, the ASBD held a colloquium entitled Ensuring Optimal Interdisciplinary Breast Care in the United States, the purpose of which was to develop a framework of quality indicators related to multidisciplinary and interdisciplinary care that can be used to assess the degree to which interdisciplinary communication and coordination is taking place.

Emergency Collaboration


Abstract: We believe that an enterprise data warehouse (EDW) is a solution to provide access to the information needed during the time of such disasters. An EDW is developed to meet the needs of strategic decision making that operational data sources
and systems such as online transaction processing (OLTP), by design, cannot support. Particularly, an EDW is considered a source of informational data to aid strategic decision making rather than operational data for supporting day to day business operations. Over the last few years, EDW has become an important tool for most large organizations across different industries such as retail, health care, financial services, and manufacturing. While EDW is traditionally developed for strategic decision making, we present an architectural extension for EDW that can potentially help health care providers continue their services during and in the aftermath of large-scale disasters, such as Katrina, by providing operational data when and where it is needed. We develop this extension based on our study of the Veteran Health Administration’s (VHA) information technology (IT) systems and responses during Hurricane Katrina.


Abstract: Emergency department (ED) resuscitation requires the coordinated efforts of an interdisciplinary team. Human errors are common and have a negative impact on patient safety. Although crisis resource management (CRM) skills are utilized in other clinical domains, most emergency medicine (EM) caregivers currently receive no formal CRM training.

The objectives were to compile and compare attitudes toward CRM training among EM staff physicians, nurses, and residents at two Canadian academic teaching hospitals.

Emergency physicians (EPs), residents, and nurses were asked to complete a Web survey that included Likert scales and short answer questions. Focus groups and pilot testing were used to inform survey development. Thematic content analysis was performed on the qualitative data set and compared to quantitative results.

The response rate was 75.7% (N = 84). There was strong consensus regarding the importance of core CRM principles (i.e., effective communication, team leadership, resource utilization, problem-solving, situational awareness) in ED resuscitation. Problems with coordinating team actions (58.8%), communication (69.6%), and establishing priorities (41.3%) were among factors implicated in adverse events. Interdisciplinary collaboration (95.1%), efficiency of patient care (83.9%), and decreased medical error (82.6%) were proposed benefits of CRM training. Communication between disciplines is a barrier to effective ED resuscitation for 94.4% of nurses and 59.7% of EPs (p = 0.008). Residents reported a lack of exposure to (64.3%), yet had interest in (96.4%) formal CRM education using human patient simulation.

Nurses rate communication as a barrier to teamwork more frequently than physicians. EM residents are keen to learn CRM skills. An opportunity exists to create a novel interdisciplinary CRM curriculum to improve EM team performance and mitigate human error.

Abstract: Our objective was to use a human simulation training educational environment to develop multidisciplinary team skills and improve medical emergency team (MET) performance. We report findings of a crisis team training course that is focused on organization. Each course had four components: (1) a web based presentation and pretest before the course; (2) a brief reinforcing didactic session on the day of the course; (3) three of five different simulated scenarios; each followed by (4) debriefing and analysis with the team. Three of five simulator scenarios were used; scenario selection and order was random. Trainees did not repeat any scenario or role during the training. Participants were video recorded to assist debriefing. Debriefing focused on reinforcing organizational aspects of team performance: assuming designated roles independently, completing goals (tasks) assigned to each role, and directed communication.

Simulated survival (following predetermined criteria for death) increased from 0% to 89%. Training multidisciplinary teams to organize using simulation technology is feasible. This preliminary report warrants more detailed inquiry.

**Supply Chain Management**


Abstract: Traditional cost-effectiveness analysis (CEA) assumes that program costs and benefits scale linearly with investment—an unrealistic assumption for epidemic control programs. This paper combines epidemic modeling with optimization techniques to determine the optimal allocation of a limited resource for epidemic control among multiple noninteracting populations. We show that the optimal resource allocation depends on many factors including the size of each population, the state of the epidemic in each population before resources are allocated (e.g. infection prevalence and incidence), the length of the time horizon, and prevention program characteristics. We establish conditions that characterize the optimal solution in certain cases.


Abstract: This article describes four current applications of supply chain management network methodologies to health care systems and identifies potential ways to improve purchasers’ return on investment. In particular, information exchanges, purchase decision, and payment agreement components of integrated, supply chains are described.
First, visual depictions of the health care supply chain are developed from a purchaser's perspective. Next, five nationwide programs designed to realign incentives and rewards across the health care supply chain are described. Current individual efforts to coordinate the health care supply chain do not act on all of the actors necessary to improve outcomes, promote safety, and control costs. Nevertheless, there are indications that several of the individual efforts are coming together. If national efforts touching on all critical elements can coordinate with purchasers, then the health care supply chain's performance may improve significantly.


Abstract: Due to the diversity of its players, the American healthcare sector has experimented with different types of integrated supply chain management systems for medical supplies. In the 1980s, US distributors were offering customers the so-called stockless replenishment method, whereby the distributor picks and packs products according to the particular needs of each patient care unit and, in most cases, delivers them directly. By the late 1990s, stockless agreements had run out of steam, as distributors sought to optimize the balance between their efforts expended in hospital replenishment and the hospitals' inventory savings. Among the various refCTIONS and initiatives aimed at finding such a new balance, we focused on the experience of a Quebec (Canada) hospital adopting a hybrid version of the stockless system, under which the distributor supplied high-volume products for the patient care unit in case quantities, leaving the institution's central stores to break down bulk, purchases of low-volume products into point-of-use format (eaches). The study reveals marginal benefits from the hybrid method for both the institution and the distributor. However, it also reveals the importance of the manufacturer's role with respect to packing formats, and demonstrates that the rearrangement of storage areas can generate substantial savings, opening the way to means for improving the healthcare sector supply chain.

Home Care


Abstract: We conducted a systematic review to identify studies on the effect of home telehealth on clinical care outcomes. The search was restricted to peer-reviewed publications (published between 2001 and 2007) about studies conducted in home or residential settings. The search yielded 154 potential articles and dissertations. A total of 29 articles met the inclusion criteria and were included in a meta-analysis. The weighted mean effect size for the overall meta-analysis was 0.50, and the z-statistic was 3.0, indicating that telehealth had a moderate, positive and significant effect (P _ 0.01) on clinical outcomes. Subanalyses also indicated positive significant effects of telehealth for some disease categories (heart disease and psychiatric conditions), but not others (diabetes), patient populations and telehealth interventions. Overall, the
metaanalysis indicated that telehealth positively affects clinical outcomes of care, even in different patient populations.


Abstract: This study investigated management practices used to promote telehealth services, focusing on strategic goals for adopting telehealth. Interviews with senior managers from 19 home health agencies identified three strategic goals for adopting telehealth: (1) cost containment, (2) clinical excellence, and (3) technological preeminence. Organizational documents were analyzed to determine the extent to which the telehealth program was featured in marketing materials. Documents included the organization’s brochure, newspaper ads and articles, and each home health agency’s web site. Results showed that marketing practices vary widely but are correlated with motivations to adopt telehealth. The organizations with the highest marketing scores emphasize clinical excellence as a major reason for using telehealth, whereas those with the lowest marketing scores tend to focus on cost containment.


Abstract: Increasingly, home health agencies are considering the value of implementing telehealth technologies. However, questions arise concerning how to most effectively manage and use this technology to benefit patients, nurses, and the organization. Performance measurement models will be beneficial to managers and decision makers in the home health field by providing quantitative information for present and future planning of staff and technology usage in the home health agency (HHA). This paper presents a model that predicts the average daily census of the HHA as a function of parameters statistically identified as important. Average daily census was chosen as the outcome variable because it is a proxy measure of organizational capacity. The model suggests that including a telehealth system in the home health agency increases average daily census by 40-90% depending on the number of nurse FTEs and amount of travel hours per month. The use of a video system, compared to a non-video monitoring system, further increases the productivity by the home health agency.

**Provider-to-Provider Telehealth**


Abstract: This article presents a study identifying benefits and challenges of a novel hospital-to-hospital information technology (IT) outsourcing partnership (HHP). The partnership is an innovative response to the problem that many smaller, rural hospitals face: to modernize their IT infrastructure in spite of a severe shortage of resources. The investigators studied three rural hospitals that outsourced their IT infrastructure,
through an HHP, to a larger, more technologically advanced hospital in the region. The study design was based on purposive sampling and interviews of senior managers from the four hospitals. The results highlight the HHP’s benefits and challenges from both the rural hospitals’ and vendor hospital’s perspectives. The HHP was considered a success: a key outcome was that it has improved the rural hospitals’ IT infrastructure at an affordable cost. The investigators discuss key elements for creating a successful HHP and offer preliminary answers to the question of what it takes for an HHP to be successful.


Abstract: We used live telemedicine consultations to assist remote providers in the examination of sexually assaulted children presenting to rural, underserved hospitals. We hypothesized that telemedicine would increase the ability of the rural provider to perform a complete and accurate sexual assault examination. The use of telemedicine to assist in the examination of sexually assaulted children presenting to underserved, rural communities results in significant changes in the methods of examination and evidence collection. It is possible that this model of care results in increased quality of care and appropriate forensic evidence collection.


Abstract: Telehealth has great potential to improve access to care, but its adoption in routine healthcare has been slow. The lack of clarity about the value of telehealth implementations has been one reason cited for this slow adoption. The Center for Information Technology Leadership has examined the value of telehealth encounters in which there is a provider both with the patient and at a distance from the patient. We considered three models of telehealth: store-and-forward, real-time video, and hybrid systems. Evidence from the literature was extrapolated using a computer simulation, which found that the hybrid model was the most cost effective. The simulation predicted savings of $4.3 billion per year if hybrid telehealth systems were implemented in emergency rooms, prisons, nursing home facilities, and physician offices across the United States. We also conducted a sensitivity analysis to determine which factors most influence costs and savings. Payers, providers, and policy-makers should work together to remove the barriers to the adoption of telehealth so that this cost savings can be realized in the U. S. healthcare system.

**Perverse Incentives**


Abstract: The perverse incentives that could emanate from Medicare’s current prescription drug benefit design are examined. Perverse incentives are caused by risk
adjustments for stand-alone prescription drug benefits. An analysis shows that the implementation of Medicare’s drug benefit design requires regulations that will control drug prices and plan practices.


Abstract: Third party payers for health care, when introducing policies to promote equity, through formulas for resource allocation by capitation, and efficiency, through prospective payment by case-mix, have sought to make adjustments for "unavoidable" hospital costs, which are caused by structural characteristics and are beyond the scope of local hospital management. To date, however, most published studies of such estimates have been inadequate. This paper reports the development of a generalisable model that aims to produce sound estimates of "unavoidable" hospital costs and shows how this stochastic multilevel model can be used to estimate unavoidable costs per unit of measurable output, identify sources of allocative inefficiency, and capture systematic variations in costs between different types of hospitals, through prospective payment by case-mix or formulas for resource allocation by capitation. The application of the model to Portuguese hospitals has identified various causes of allocative inefficiencies: centrally-determined distributions of beds and doctors, a lack of local flexibility, systems with perverse incentives, and the existence of diseconomies of scale.
### Environment

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**Capitation vs. Pay for Procedures**


Abstract: The study used 1992-2000 data from the Medicare Current Beneficiary Survey and corresponding Medicare claims. Pairs of comorbidities were formed based on prior evidence about possible synergy between these conditions and activities of daily living (ADLs) deficiencies, and included heart disease and cancer, lung disease and cancer, stroke and hypertension, stroke and arthritis, congestive heart failure (CHF) and osteoporosis, diabetes and coronary artery disease, and CHF and dementia.

Information about beneficiary functional status should be incorporated in reimbursement models. Underpaying providers who care for populations with multiple comorbidities may provide severe disincentives for managed care plans to enroll such individuals and to appropriately manage their complex and costly conditions.


Abstract: The CEA used an observational study comparing fee for service (FFS) versus capitation for Medicaid cases with severe mental illness (n=522). Under capitation,
services were provided either directly (direct capitation [DC]) by not-for-profit community mental health centers (CMHC), or in a joint venture between CMHCs and a for-profit managed behavioral health organization (MBHO). A capitation model with a for-profit element was more cost-effective for Medicaid patients with severe mental illness than not-for-profit capitation or FFS models.

Pay for Performance


Abstract: This paper is a report of a study conducted to describe changes in practice team size and composition, and the workload of doctors and nursing staff, before (2003) and after (2005) the introduction of the pay-for-performance contract for general practice. This paper is a report of a study conducted to describe changes in practice team size and composition, and the workload of doctors and nursing staff, before (2003) and after (2005) the introduction of the pay-for-performance contract for general practice.


Abstract: The authors identify those who are responsible for improving health care quality and outline their obligations. The present a framework which they believe will help promote systems for rewarding genuine quality rather than isolated performance. They explain that health systems should maximize efficiency. They note that resource limitations do not preclude an understanding of population-level quality that is patient-centered. The pay for performance approach to improve quality is also discussed.


Abstract: A health care coalition in Maine has piloted a performance-based incentive payment program that creates a single statewide program, based on common standards. Incentive payments were funded by a hospital's financial guarantee that was matched by employers. A two-step incentive allocation methodology differentiates adequate and superior performance. The incentive model is sufficiently flexible to accommodate different settings and evolving performance standards. This case study provides useful insights to payers and hospitals that are considering similar regional initiatives, emphasizing the collaborative context that underscored this venture.

Consumer-Based Healthcare
Abstract: Engaging consumers to be more active participants in their health and health care is an appealing strategy for reforming the U.S. health care system, but little is known about how to mount and sustain communitywide consumer engagement initiatives. The Robert Wood Johnson Foundation launched a program in 2006 in fourteen communities to align forces around improving quality and efficiency by promoting public reporting and expanding the involvement of consumers in all facets of their care. These multistakeholder organizations provide an early glimpse into the opportunities and challenges that lie ahead as policymakers attempt to integrate consumers more completely in their reform strategies.

Abstract: There is an emerging consensus in the health policy community that informed and engaged consumers have a vital role to play in improving the quality of care that the U.S. health system delivers to patients. The expectation is that when consumers are armed with the right information, they will demand high-quality services from their providers, choose treatment options wisely, and become active participants and self-managers of their own health and health care. Yet the choices consumers face when attempting to navigate the health system can be dizzying—from how to select health plans and providers to the pros and cons of alternative treatment options. In fact, the choices are becoming increasingly complex as new alternatives are becoming increasingly common and patients and health consumers are being asked to pay more of the costs. Two pressing questions for the policy community are the following: (a) How much can and should we expect of consumers and patients, particularly in terms of driving reform of the health care system, and what is the evidence base for these expectations? (b) How can we ensure that consumers have the tools and information they need to play the active role we are asking of them?

Note: This is an introduction to a supplement on Consumer-Directed Healthcare.

Cross Subsidization

Abstract: Market power and adverse selection are prevalent features of the market for pre-paid health plans. However, most of the literature on adverse selection considers extreme cases: either perfect competition or monopoly. If instead health plans are horizontally differentiated, then (i) profits derived from each low risk are higher than from each high risk and (ii) when the profits derived from each high risk are negative (cross-subsidization), a health authority as informed as the health plans can implement a
Pareto-improvement. Both local and global deviations from *cross-subsidization* are addressed within a Nash equilibrium framework.


Abstract: Discusses government regulation governing the *cross-subsidization* in hospital care in the United States. Origins, principles, and theories of regulation; Universal practice of *cross-subsidizing* patient services in the American healthcare system as the predominant mode of hidden regulation in the industry; Importance of regulation in hospital care.

*Predictive Care Transformation*
References


