PCASE4

DIVERSITY OF ANTIBIOTIC USE AND BACTERIAL RESISTANCE

Polk R[1], Pakyz A[2], Oinonen M[3]
[1]Virginia Commonwealth University School of Pharmacy, School of Pharmacy, VA, USA, [2]Virginia Commonwealth University, Richmond, VA, USA, [3]University HealthSystem Consortium, Oak Brook, IL, USA

Organization: The University HealthSystem Consortium (UHC; http://www.uhc.edu) hospitals and Virginia Commonwealth University.

Problem or Issue Addressed: Nationwide rates of bacterial resistance among nosocomial pathogens are increasing. Mathematical models and limited clinical data suggest that greater diversity (or heterogeneity) of antibiotic use may decrease rates of resistance.

Goals: The goal of this investigation is to determine if an increase in diversity of antibiotic use at UHC hospitals will be associated with an improvement in rates of resistance. The UHC is an alliance of 97 academic medical centers and affiliated hospitals. UHC hospitals that also subscribe to the Clinical Resource Manager program were asked to participate in a long-term, multihospital antimicrobial use and surveillance program in 2003. We retrieved claims data for systemic antibiotic use administered to adult inpatients beginning in year 2002 (N = 31 hospitals) and through 2005 (N = 35 hospitals). Using 5 classes of antibiotics that are commonly administered for treatment of nosocomial infections (aminoglycosides, 3/4th generation cephalosporins, fluoroquinolones, carbapenems, and b-lactamase inhibitor combinations) we applied Simpson's Index of Diversity (D) to arrive at a diversity measure for each hospital. We also collected annual antibiograms from most hospitals for 2002 through 2004, and we focused on methicillin-resistant Staphylococcus aureus (MRSA) and fluoroquinolone-resistant Pseudomonas aeruginosa (FQRPa). We determined both the proportion of resistant isolates (% resistant) and the rate of resistance isolates (no. organisms/1000 admissions) for MRSA and FQRPa. Hospitals with a Diversity Index less than the median diversity value for year 2004 (i.e., D < 0.722) were offered an educational intervention. The intervention consisted of a visit to each hospital by the principal investigator (PI, REP) at the investigator's expense. During the visit, a 45 minute educational presentation was given to the hospital antibiotic committee regarding the potential merits of diversity of antibiotic use, and to provide benchmarking information regarding diversity and resistance in MRSA and FQRPa to each hospital.

Outcomes: The hypotheses to be tested and their outcomes included: 1) Would hospitals extend an offer for the PI to visit and give a presentation; 2) in response to the intervention, would hospitals purposefully change antibiotic use toward greater diversity; and 3) would resistance rates and proportions of resistant MRSA and FQRPa improve following a change toward greater diversity of use.

Implementation Strategy: An e-mail was sent in the summer of 2006 to pharmacy and infection control personnel at 17 hospitals with low diversity (above). This text of the message included a brief review of the potential value of diversity, each hospital's diversity score and an offer to provide the intervention (above). The intervention had to occur by the end of 2006, and 5 hospitals responded positively. The last of 5 interventions was made on 12/5/06.

Results: It is too early to say if hospitals will adopt policies to change antibiotic use that will result in greater diversity of use during 2006, but it appears doubtful for the following reasons: 1) The "diversity hypothesis" does not seem to be familiar to many of the contact persons; 2) the potential benefit of diversity of antibiotic use is not yet established; only two small-scale prospective investigations have been published; 3) antibiotic formularies and antibiotic use appear to be driven more by acquisition costs of therapy than by concerns regarding resistance; and 4) programs to implement greater diversity will probably require an increase in the use of relatively expensive antibiotics, such as the carbapenems.

Lessons Learned: 1) In retrospect, it may have been preferable to select hospitals for intervention based on resistance rates (e.g., resistance rates greater that the median value), rather than on diversity of antibiotic use (i.e., D less than the median value). This strategy may have generated more offers for the intervention. 2) The costs of bacterial resistance are not well studied and an argument that a reduction in rates of resistance will carry cost benefits is difficult to make at this time. 3) The methods that can be used by a hospital that will result in greater diversity of antibacterial drug use and that are relatively straight-forward and practical are not yet worked out. Computer guided antimicrobial selection will be the most feasible method to implement greater diversity, but this is not yet commonly available.

In spite of these limitations we will continue to monitor antibiotic use and rates of resistance through 2009 in order to examine relationships between diversity of use and changes in rates of bacterial resistance. In addition we will monitor and measure other relevant and potentially confounding variables such as infection control efforts, hospital policy toward antibiotic use (e.g., formulary restriction, etc.) and the impact of community acquired (CA) infections on rates of nosocomial resistance, such as CA-MRSA.

PCASE5

APPLIED PHARMACOECONOMICS IN ACADEMIC MEDICINE: VALIDATION OF CONCEPT

Schoenhaus R, Daniels C
University of California San Diego, San Diego, CA, USA

Organization: University of California, San Diego Medical Center

Problem or Issue Addressed: Increasing pharmacy budget & inappropriate medication use. Rapidly rising inpatient pharmacy budget, lack of evidence-based guidelines for medication use, and potentially unsafe medication practices created opportunity for improvement within the University of California, San Diego Medical Center (UCSDMC) Inpatient Services.

Goals: Goals for the applied pharmacoeconomics pharmacist specialist position included "hard-dollar" savings to exceed 180% of salary expense after 1 year. Savings were to include decreased drug expense only, excluding cost-avoidance. Clinical outcomes research was to be performed to ensure quality of patient care was improved or maintained.

Outcomes items used in the decision: Clinical and financial outcomes are being assessed through a unique total cost of patient care model and multiple medication use evaluation projects. Ongoing outcomes research is based on medical chart review, trends in DRG coding data, and true changes in patient expense tracked through TSI Eclipsys® mainframe hospital data linked to patient encounter(s). Comparisons will also be made to reported clinical outcomes at other academic medical centers using the UHC Clinical Resource Manager Database®.

Implementation Strategy: Initial review of current medication use practice yielded several ideas for projects with high potential return on investment. Collaboration with various surgical and medicine stakeholders resulted in improved medication use policy, stricter criteria for medication use, and research plans to assess outcomes. Enforcement of formulary policy was achieved through changes in practice supported by theUCSDMC

Pharmacy & Therapeutics (P&T) Committee, including indication-specific medication order sets in the computerized provider order entry (CPOE) system. Compliance with therapeutic substitutions or changes in preferred medication use was rapid, mainly due to provider inability to circumvent indication-specific drug and dosage recommendations programmed into the order entry system. Major pharmacoeconomics projects included improved VTE prophylaxis with emphasis on prioritizing a single low-molecular weight heparin (LMWH), cost-saving antifungal therapeutic substitutions, appropriate use of factor VIIa in abdominal transplant and aprotinin in cardiothoracic surgery.

Results: Financial return on investment on the selected UCSDMC pharmacoeconomic projects exceeded goals for the new pharmacist position. Projects were all initiated within the Medical Center between February and April 2006. As of November 2006 approximate cost savings to date were: VTE prophylaxis ($29K), antifungal substitutions ($212K), factor VIIa ($140K) and aprotinin ($80K). Projected annual savings for these projects is anticipated to reach $800,000. Considering salary and benefits for the new pharmacist specialist position, annualized benefit to cost ratio will be approximately seven. In other words, for every dollar spent on an applied pharmacist specialist roughly $7.00 was returned in actual drug savings. All medication-related savings were calculated using actual direct costs to UCSDMC (i.e., no charge or charge to cost ratios were utilized). Financial savings from improved patient safety (i.e., fewer adverse events) through appropriate medication use has not yet been quantified, but is anticipated to be substantial.

Lessons Learned: The rapid success of the applied pharmacoeconomics projects within UCSDMC suggests a similar strategy may be beneficial at other academic medical centers. Financially responsible medication use does not necessarily result in inferior patient outcomes when evidence-based guidelines are enforced through a multidisciplinary process. In fact, such a process may ultimately result in superior financial and clinical outcomes for patients.

PCASE6

CLINICAL OUTCOMES ASSESSMENT IN BEHAVIORAL HEALTH CARE: SEARCHING FOR PRACTICAL SOLUTIONS

Madan A, Borckardt J, Weinstein B, Wagner M, Cooney H, Herbert J
Medical University of South Carolina, Charleston, SC, USA

Organization: Medical University of South Carolina, Department of Psychiatry and Behavioral Science, Charleston, SC 29425, USA.

Problem or Issue Addressed: Many national quality management initiatives in behavioral health care have focused on tracking and managing adverse events, clinical processes measures, and cost variables. Relatively less attention has been paid to indices of clinical improvement.

Goals: In response to an administrative need for systematic outcomes assessments within an expanding quality management program, the authors developed a web-based patient-reported outcomes management system (Psychiatry Clinical Outcomes Management System [PSYCOMS]) to assess patients' endorsement of psychiatric symptomatology at each outpatient clinic visit. Rather than create an infrastructure limited to providing only evaluation of overall clinic performance, the authors developed a system capable of providing additional evaluation of clinical functioning at the patient/clinician level. While providing the necessary outcomes data related to clinical efficacy, the authors aimed to develop the PSYCOMS system to be: brief, simple, valuable, relevant, acceptable, and available, thus in line with recommendations in the scientific literature regarding outcomes assessment protocols.

Outcomes items used in the decision: One of the major goals in the development of the PSYCOMS system was to keep the focus on practicality and utility rather than conventionality. As such, the authors developed a brief but comprehensive (12-item), original symptom checklist that was designed to capture a full array of psychiatric problems. The rating-system was designed to mimic numeric rating scales (simple) that are often used in clinical practice to quantify level of distress or dysfunction (particularly in pain management where clinicians routinely ask patients to rate their level of pain using a 1 to 10 scale). The authors modified this approach to capture a full array of psychiatric issues (valuable and relevant) rather than focus on disease-specific symptom clusters. Preliminary psychometric analyses indicate adequate internal consistency (alpha = 0.85) and good item-total correlations; however, the scale was not designed to comprehensively capture a comprehensive picture of psychiatric disorders and functioning. Rather, the goal was to get a quick "snapshot" of patients' symptom distress and/or dysfunction across a full array of clinical problems.

Implementation Strategy: Using simple HTML and PHP scripts the authors developed an online administration of the symptom checklist, allowing for automatic entry of data into a centralized database and real-time clinical progress reports at the patient/clinician level. Additionally, higher-level clinic performance dashboards have been made available online for administrative review of patient functioning and/or clinic performance over time. The website is housed on the local intranet, protected behind a firewall, and cannot be accessed from outside the network. Limited patient information is stored in the database (e.g., only encrypted medical record numbers, age and sex) to minimize internet security risks and eliminate the possibility of unauthorized access to patient information.

Results: Preliminary data suggest that administrative staff and patients tolerate the data collection tool well. There have been minimal problems with patients not knowing how to point and click (or touch the screen) on their numeric ratings. By staff report, the rating scale takes, on average, less than one minute to complete. Clinicians find the patient-level reports useful in tracking patient symptoms over time, and hospital administrators appreciate the availability of timely reports capable of providing meaningful information at the patient, clinician, and clinic level. Informal training on accessing the data took approximately 30 minutes.

Lessons Learned: Despite the initial cost of purchasing hardware (~$500/clinic), the PSYCOMS system is largely self-contained and requires little maintenance. Accessing the database and converting data to a specified file format (e.g., Microsoft Excel) is relatively easy, but more complex analyses and drill-downs require trained quality and outcomes management and administrative personnel. Of note, the authors have had to limit clinicians and administrators from making causal inferences based on data collected through this system. While not capable of providing causal information, tracking clinical improvement can yield important and useful patient and clinic level information, especially if clinic-level performance seems to indicate that patients are not improving as a function of visits to the clinic, potentially prompting a closer look at the needs of the patients and the services provided within a clinic.