

References: Iatrogenesis

REF ID: 2821

Level IV: Non-experimental study

Topic 1: Risks

Al-Asmary, S. M., Al-Helali, N. S., Abdel-Fattah, M. M., Al-Jabban, T. M., & Al-Bamri, A. M. (2004). Nosocomial urinary tract infection. risk factors, rates and trends.[see comment]. *Saudi Medical Journal*, 25(7), 895-900.

Journal Article. Multicenter Study

OBJECTIVE: This report aims at both estimation of the rates of overall nosocomial and urinary tract infection (UTI) and their linear trends as well as studying the potential risk factors of patients admitted to Al-Hada, Rehab and Prince Sultan military hospitals and developed nosocomial UTIs (NUTIs). **METHODS:** A case-control study on 206 discharged patients with confirmed UTI and 618 controls without UTI was carried out between August 2001 through to July 2003 to study risk factors for nosocomial UTI as well as hospital records during the period (1998-2002) were reviewed for calculation of the overall annual nosocomial infection and nosocomial UTI rates. **RESULTS:** Multiple logistic regression analysis showed that duration of hospital stay, unit of admission, history of diabetes mellitus or debilitating diseases, and duration and number of urinary catheters were independently associated with increased risk of NUTIs. The mean incidence rate of overall nosocomial infection along the study period (1998-2002) was 2.82, while the mean incidence rate of UTI nosocomial infection was 0.85 per 100 discharged patients. Urinary tract infection represents approximately 31.7% of overall nosocomial infection throughout the study period. **CONCLUSION:** Urinary tract infections comprise approximately one third of nosocomial infections. The results, thus, indicated that to reduce the incidence of UTI nosocomial infection, it was important to take factors that can be managed into consideration. Therefore, the involved persons should pay more attention and set practical and effective guidelines for the hospital.

REF ID: 2780

Level IV: Non-experimental study

Topic 1: Risks

Al-Awadi, K., Kehinde, E. O., Al-Hunayan, A., & Al-Khayat, A. (2005). Iatrogenic ureteric injuries: Incidence, aetiological factors and the effect of early management on subsequent outcome. *International Urology & Nephrology*, 37(2), 235-241.

Journal Article

OBJECTIVE: To investigate the changing pattern in incidence, aetiological factors and the effect of early diagnosis and surgical treatment on the outcome of iatrogenic ureteric injuries in our Urology Unit over a 5 year period. **PATIENTS/METHODS:** All patients with ureteric injuries caused as a result of any surgical procedures (iatrogenic ureteric injuries) were studied during a 5 year period (1998-2002). Data collected and analysed included yearly incidence of injury, aetiological factors, modalities of treatment and the outcome of management of the injuries. During the study period, our general surgical colleagues had a policy of requesting "J" stent insertion prior to major abdominopelvic surgical procedures. During the same period, in nearly all difficult cases of ureteroscopy (URS) + lithoclast lithotripsy+/-Dormia basket, a ureteric catheter or "J" stent was prophylactically inserted by urological surgeons. **RESULTS:** There were 82 iatrogenic ureteric injuries in 75 patients over the 5 year period. The total number of iatrogenic ureteric injuries declined from 26 (31.7%) in 1998 to 10 (11.8%) in 2002. Urological, obstetrics and gynaecological and general surgical procedures were involved in 69(84.1%), 7(8.7%), and 4(4.9%) of the injuries respectively. The commonest types of injuries encountered were; injury to ureteric mucosa post URS or lithoclast calculi disintegration 34 (41.5%), complete ureteric perforation 15 (18.3%) and false passage 15 (18.3%). The most severe complications encountered were complete ureteric avulsions 3 (3.75%) and loss of ureteral segment 2 (2.4%). The commonest treatment options used were "J" stent insertion or ureteric catheter placement (48, 59.4%),

percutaneous nephrostomy (17, 20.7%), laparotomy and removal of suture on tied ureters (5, 6.1%). Two (2.4%) nephrectomies were performed because of poor renal function in one patient and severe damage to a functioning renal unit during a difficult retroperitoneal surgery in another patient. Recognition and treatment of ureteric injuries at the time of surgery was associated with less morbidity compared to those in whom the diagnosis was delayed. The overall successful resolution of ureteric injuries in this series was 77/82 (93.9%). There was no mortality attributable to these ureteric injuries. CONCLUSION: In our Unit, the incidence of significant iatrogenic ureteric injuries has shown a decline over a 5-year period. We attribute this trend to the prophylactic use of "J" stents or ureteric catheter placement and good surgical technique during major abdomino-pelvic surgeries in our hospital. Endourological procedures are the commonest causes of ureteric injuries. Prompt diagnosis and institution of appropriate corrective surgical procedures often result in a very satisfactory outcome in about 94% of cases.

REF ID: 2918

Level IV: Non-experimental study

Topic 3: Assessment

Amighi, J., Sabeti, S., Schlager, O., Mlekusch, W., Exner, M., & Lalouschek, W. et al. (2004). Low serum magnesium predicts neurological events in patients with advanced atherosclerosis. *Stroke*, 35(1), 22-27.

Journal Article, Research, Tables/Charts

BACKGROUND AND PURPOSE: Magnesium (Mg) deficiency is thought to be a risk factor for cerebrovascular atherosclerosis and complications. We investigated the prognostic impact of Mg serum levels with respect to the occurrence of neurological events in patients with advanced atherosclerosis. **METHODS:** We prospectively studied 323 patients with symptomatic peripheral artery disease and intermittent claudication (197 men; median age, 68 years). Serum Mg was determined, and patients were followed for a median of 20 months (interquartile range, 12 to 25 months) for the occurrence of neurological events, defined as ischemic stroke and/or carotid revascularization (carotid endarterectomy or carotid stenting). Multivariate Cox proportional hazards analysis was applied to assess the association of serum Mg (in tertiles) and neurological events. **RESULTS:** Neurological events occurred in 35 patients (11%) (15 patients with stroke, 13 with carotid revascularization, and 7 with stroke and subsequent revascularization). Compared with patients in the highest tertile of Mg serum levels (>0.84 mmol/L), patients with Mg serum values <0.76 mmol/L (lowest tertile) exhibited a 3.29-fold increased adjusted risk (95% CI, 1.34 to 7.90; P=0.009) for neurological events, but patients with Mg serum values of 0.76 mmol/L to 0.84 mmol/L (middle tertile) had no increased risk (adjusted hazard ratio, 1.10; 95% CI, 0.35 to 3.33; P=0.88). Mg serum levels were not associated with all-cause mortality (P=0.87) or coronary events (P=0.67) during follow-up. **CONCLUSIONS:** Low Mg serum levels indicate an increased risk for neurological events in patients with symptomatic peripheral artery disease, favoring Mg substitution therapy in those patients with advanced atherosclerosis.

REF ID: 2885

Level IV: Non-experimental study

Topic 1: Risks

Appelgren, P., Hellstrom, I., Weitzberg, E., Soderlund, V., Bindslev, L., & Ransjo, U. (2001). Risk factors for nosocomial intensive care infection: A long-term prospective analysis. *Acta Anaesthesiologica Scandinavica*, 45(6), 710-719.

Journal Article

BACKGROUND: To identify risk factors for nosocomial infection in intensive care and to provide a basis for allocation of resources. **METHODS:** Long-term prospective incidence study of risk factors for nosocomial infection in the surgical-medical intensive care unit of a university hospital. **RESULTS:** A total of 2671 patients were admitted during four years, and 562 of 574 patients staying >48 h were observed during 4921 patient days (median length of stay 5 days, range 2-114). Of these, 196 (34%) patients had 364 nosocomial infections after median 8-10 days, an infection rate of 14/100 admissions. Infection prolonged length of stay 8-9 days and doubled the risk of death. The infections were 17%

blood stream, 26% pneumonias, 34% wound, 10% urinary tract and 13% other infections. The incidence of bloodstream infection declined significantly during the study years, from 12% to 5%. In multiple regression analysis, the important variables for infection were central venous catheter, mechanical ventilation, pleural drainage and trauma with open fractures. High age, immunosuppression and infection on admission did not influence the risk of acquiring infection. Trauma patients constituted 24% of the study population. Trauma with open fractures increased the risk of infection more than twice ($P=0.003$), mainly due to wound infections. **CONCLUSION:** Trauma cases, with open fractures, were the patients most at risk of infection, despite low disease severity scores. Resources to prevent nosocomial infection should be allocated to these patients.

REF ID: 2878

Level IV: Non-experimental study

Topic 3: Assessment

Arozullah, A. M., Khuri, S. F., Henderson, W. G., Daley, J., & Participants in the National Veterans Affairs Surgical Quality Improvement Program. (2001). Development and validation of a multifactorial risk index for predicting postoperative pneumonia after major noncardiac surgery.[see comment]. *Annals of Internal Medicine*, 135(10), 847-857.

Journal Article. Validation Studies

BACKGROUND: Pneumonia is a common postoperative complication associated with substantial morbidity and mortality. **OBJECTIVE:** To develop and validate a preoperative risk index for predicting postoperative pneumonia. **DESIGN:** Prospective cohort study with outcome assessment based on chart review. **SETTING:** 100 Veterans Affairs Medical Centers performing major surgery. **PATIENTS:** The risk index was developed by using data on 160 805 patients undergoing major noncardiac surgery between 1 September 1997 and 31 August 1999 and was validated by using data on 155 266 patients undergoing surgery between 1 September 1995 and 31 August 1997. Patients with preoperative pneumonia, ventilator dependence, and pneumonia that developed after postoperative respiratory failure were excluded. **MEASUREMENTS:** Postoperative pneumonia was defined by using the Centers for Disease Control and Prevention definition of nosocomial pneumonia. **RESULTS:** A total of 2466 patients (1.5%) developed pneumonia, and the 30-day postoperative mortality rate was 21%. A postoperative pneumonia risk index was developed that included type of surgery (abdominal aortic aneurysm repair, thoracic, upper abdominal, neck, vascular, and neurosurgery), age, functional status, weight loss, chronic obstructive pulmonary disease, general anesthesia, impaired sensorium, cerebral vascular accident, blood urea nitrogen level, transfusion, emergency surgery, long-term steroid use, smoking, and alcohol use. Patients were divided into five risk classes by using risk index scores. Pneumonia rates were 0.2% among those with 0 to 15 risk points, 1.2% for those with 16 to 25 risk points, 4.0% for those with 26 to 40 risk points, 9.4% for those with 41 to 55 risk points, and 15.3% for those with more than 55 risk points. The C-statistic was 0.805 for the development cohort and 0.817 for the validation cohort. **CONCLUSIONS:** The postoperative pneumonia risk index identifies patients at risk for postoperative pneumonia and may be useful in guiding perioperative respiratory care.

REF ID: 2900

Level I: Systematic review

Topic 4: Management

Avenell, A., & Handoll, H. H. G. (2006). Nutritional supplementation for hip fracture aftercare in older people. *The Cochrane Library*, (1)

Journal Article, Research, Systematic Review

A substantive amendment to this systematic review was last made on 09 February 2005. Cochrane reviews are regularly checked and updated if necessary. **Background:** Fractures of the hip are an important cause of later ill health and mortality in older people. People with hip fractures are often malnourished at the time of fracture, and have poor food intake in hospital. **Objectives:** This review assesses the effects of nutritional interventions in older people recovering from hip fracture. **Search strategy:** We searched the Cochrane Musculoskeletal Injuries Group Specialised Register, the Cochrane Central Register of Controlled Trials (The Cochrane Library issue 3, 2004), MEDLINE (1966 to

October week 1 2004), Nutrition Abstracts and Reviews, EMBASE, BIOSIS, CINAHL, HEALTHSTAR, the National Research Register and reference lists. We contacted investigators and handsearched four nutrition journals. Selection criteria: Randomised and quasi-randomised trials of nutritional interventions for mainly older people (aged over 65 years) with hip fracture. Data collection and analysis: Both authors independently selected trials, extracted data and assessed trial quality. We sought additional information from all trialists, and pooled data for primary outcomes. Main results: Eighteen randomised trials involving 1306 participants were included. Overall trial quality was poor; specifically in terms of allocation concealment, assessor blinding and intention-to-treat analysis. This, and the limited availability of outcome data, mean that the following results must be interpreted with caution. Eight trials evaluated oral multinutrient feeds: these provided non-protein energy, protein, some vitamins and minerals. Oral feeds had no statistically significant effect on mortality (15/161 versus 17/176; relative risk (RR) 0.89, 95% confidence interval (CI) 0.47 to 1.68) but may reduce 'unfavourable outcome' (combined outcome of mortality and survivors with complications) (14/66 versus 26/73; RR 0.52, 95% CI 0.32 to 0.84). Four trials examining nasogastric multinutrient feeding showed no evidence of an effect on mortality (RR 0.99, 95% CI 0.50 to 1.97), but the studies were heterogeneous regarding case mix. There was insufficient information for other outcomes. The specific effect of protein given in an oral feed was tested in three trials. There was no evidence for an effect on mortality (RR 1.38, 95% CI 0.82 to 2.34). Protein supplementation may have reduced the number of long term complications and days spent in rehabilitation wards. Two trials, testing intravenous thiamin (vitamin B1) and other water soluble vitamins, or 1-alpha-hydroxycholecalciferol (an active form of vitamin D) respectively, produced no evidence of effect for either vitamin supplement. Authors' conclusions: While some evidence exists for the effectiveness of oral protein and energy feeds, overall the evidence for the effectiveness of nutritional supplementation remains weak. Future trials are required which overcome the defects of the reviewed studies, particularly inadequate size, methodology and outcome assessment. [CINAHL Note: The Cochrane Collaboration systematic reviews contain interactive software that allows various calculations in the MetaView.]

REF ID: 2823

Level IV: Non-experimental study

Topic 4: Management

Babcock, H. M., Zack, J. E., Garrison, T., Trovillion, E., Jones, M., & Fraser, V. J. et al. (2004). An educational intervention to reduce ventilator-associated pneumonia in an integrated health system: A comparison of effects. *Chest*, 125(6), 2224-2231.

Journal Article. Multicenter Study

STUDY OBJECTIVES: To determine whether an educational initiative could decrease rates of ventilator-associated pneumonia in a regional health-care system. **SETTING:** Two teaching hospitals (one adult, one pediatric) and two community hospitals in an integrated health system. **DESIGN:** Preintervention and postintervention observational study. **PATIENTS:** Patients admitted to the four participating hospitals between January 1, 1999, and June 30, 2002, who acquired ventilator-associated pneumonia. **INTERVENTION:** An educational program for respiratory care practitioners and ICU nurses emphasizing correct practices for the prevention of ventilator-associated pneumonia. The program included a self-study module on risk factors for, and strategies to prevent, ventilator-associated pneumonia and education-based in-services. Fact sheets and posters reinforcing the information were posted throughout the ICU and respiratory care departments. **MEASUREMENTS AND RESULTS:** Completion rates for the module were calculated by job title at each hospital. Rates of ventilator-associated pneumonia per 1,000 ventilator days were calculated for all hospitals combined and for each hospital separately. Overall 635 of 792 ICU nurses (80.1%) and 215 of 239 respiratory therapists (89.9%) completed the study module. There were 874 episodes of ventilator-associated pneumonia at the four hospitals during the 3.5-year study period out of 129,527 ventilator days. Ventilator-associated pneumonia rates for all four hospitals combined dropped by 46%, from 8.75/1,000 ventilator days in the year prior to the intervention to 4.74/1,000 ventilator days in the 18 months following the intervention ($p < 0.001$). Statistically significant decreased rates were observed at the pediatric hospital and at two of

the three adult hospitals. No change in rates was seen at the community hospital with the lowest rate of study module completion among respiratory therapists (56%). **CONCLUSIONS:** Educational interventions can be associated with decreased rates of ventilator-associated pneumonia in the ICU setting. The involvement of respiratory therapy staff in addition to ICU nurses is important for the success of educational programs aimed at the prevention of ventilator-associated pneumonia.

REF ID: 2849

Level IV: Non-experimental study

Topic 1: Risks

Ballesteros, S., Ramon, F., Martinez-Arrieta, R., Larrotcha, C., & Cabrera, J. (2003). Ten years of iatrogenic intoxications from the spanish poison control center. *Veterinary & Human Toxicology*, 45(2), 93-94.

Journal Article

Iatrogenic incidents involving drugs are the main type of nosocomial intoxications reported to the Spanish Poison Control Center. We examined 231 such incidences from January 1991 to December 2000; 46.1% were route errors, 42.4% overdoses and 7.3% administration to the wrong patient. The most important cause of error in hospitals and dentist consults was route confusions and overdoses in primary health care units. In 56.2% of the dose errors the patient was a child < 2y old in a pediatric inpatient setting, involving the iv route; the common administered drugs were anti-infectives, anticoagulants, analgesics and sedatives. Poison Control Centers have an important role in the prevention of iatrogenic intoxications.

REF ID: 2903

Level IV: Non-experimental study

Topic 3: Assessment

BarbosaSilva, M. C. G., & Barros, A. J. D. (2005). Bioelectric impedance and individual characteristics as prognostic factors for post-operative complications. *Clinical Nutrition*, 24(5), 830-838.

Journal Article, Research, Tables/Charts

Background & aims Malnutrition increases morbidity and mortality in surgical patients, and for this reason, several nutritional markers have been used as prognostic tools to identify surgical patients under a higher risk to develop complications in post-operative period. Few studies show the impact of nutritional markers after controlling for others variables, such as age and severity of disease. A new method, bioelectric impedance analysis (BIA), and its parameter, phase angle, have been described as a prognostic tool in several clinical situations, but they have never been studied in surgical population. The objective of this work is to assess the importance of nutritional variables and parameters from BIA as predictors of post-operative complications in a multivariable regression model. Methods The nutritional status of 225 adult patients scheduled to undergo gastrointestinal surgery was assessed by several methods, including bioelectric impedance analysis and subjective global assessment. Potential confounding factors were also studied. Patients were screened for post-operative complications until hospital discharge. Results Weight loss greater than 10%, subjective global assessment, nutritional risk assessment, ECM/BCM ratio and phase angle (from BIA) were the prognostic factors significantly associated with post-operative complications in the crude analysis. After adjusting for sex, age, marital status, tumors and pre-operative infections, only phase angle remained as a prognostic factor (RR=4.3; CI95% 1.6-11.8 for phase angle <-0.8 sd), while the other nutritional variables lost their association with post-operative complications. Conclusion Phase angle remains as an important prognostic factor for postoperative complications, even after adjusting for other individual predictors and confounders. Its utility in the identification of patients eligible for nutritional therapy has now to be evaluated.

REF ID: 2936

Level IV: Non-experimental study

Topic 1: Risks

Barnett, S. D., Halpin, L. S., Speir, A. M., & Lefrak, E. (2002). Risk factors predicting pneumonia in patients aged 80 and older after cardiac surgery. *Journal of the American Geriatrics Society*,

50(7), 1313-1314.

Journal Article, Letter, Research, Tables/Charts

None

REF ID: 2846

Level IV: Non-experimental study

Topic 3: Assessment

Baune, B., Kessler, V., Patris, S., Descamps, V., Casalino, E., & Quenon, J. L. et al. (2003).

[Medicinal iatrogenics in hospitals. A survey on a given day]. *Presse Medicale*, 32(15), 683-688.

Journal Article

OBJECTIVE: Medicinal iatrogenics are responsible for hospital admissions but also occur in hospitals. In view of the lack of knowledge, prevalence and nature of the adverse drug-related events (ADE) in the Bichat-Claude Bernard hospital group in Paris, and because of the potential severity of the latter, the Local drug committee has decided to develop a policy to manage these risks. METHOD: The first stage consisted in a transversal study on a given day in the departments in which patients are hospitalised for more than 24 hours, in order to assess the prevalence, severity and preventability of ADE and to search for factors of risk. RESULTS: 107 ADE were observed in 89 patients on the day of the survey (9.9% global prevalence of ADE [CI 95%: 8.8% - 11.0%]). Among the latter, 57 patients had exhibited at least one adverse event during their hospitalisation, i.e., a prevalence of 6.3% ([CI 95%: 4.7% - 7.9%]). Two thirds of these patients were hospitalised in medical departments. These nosocomial ADE (nosocomial adverse drug events) were serious or severe in 73% of cases and 25% could have been avoided. The only clearly identified risk factor was the number of drugs prescribed. CONCLUSION: This review has drawn the attention of the medical and paramedical community to the need to define vigilance markers, and has provided some elements of response that should be further completed by a prospective cohort study.

REF ID: 2751

Level V: Case report

Topic 1: Risks

Bhalla, K., Ennis, D. M., & Ennis, E. D. (2005). Hypercalcemia caused by iatrogenic hypervitaminosis A. *Journal of the American Dietetic Association*, 105(1), 119-121.

Journal Article, Case Study, Tables/Charts

REF ID: 2782

Level IV: Non-experimental study

Topic 1: Risks

Bismark, M. M., Brennan, T. A., Paterson, R. J., Davis, P. B., & Studdert, D. M. (2006).

Relationship between complaints and quality of care in new zealand: A descriptive analysis of complainants and non-complainants following adverse events. *Quality & Safety in Health Care*, 15(1), 17-22.

Case Reports. Journal Article

OBJECTIVES: To estimate the proportion and characteristics of patients injured by medical care in New Zealand public hospitals who complain to an independent health ombudsman, the Health and Disability Commissioner ("the Commissioner"). DESIGN: The percentage of injured patients who lodge complaints was estimated by linking the Commissioner's complaints database to records reviewed in the New Zealand Quality of Healthcare Study (NZQHS). Bivariate and multivariate analyses investigated sociodemographic and socioeconomic differences between complainants and non-complainants. SETTING: New Zealand public hospitals and the Office of the Commissioner in 1998. POPULATION: Patients who lodged claims with the Commissioner (n = 398) and patients identified by the NZQHS as having suffered an adverse event who did not lodge a complaint with the Commissioner (n = 847). MAIN OUTCOME MEASURES: Adverse events, preventable adverse events, and complaints lodged with the Commissioner. RESULTS: Among adverse events identified by the NZQHS, 0.4% (3/850) resulted in complaints; among serious, preventable adverse events 4% (2/48) resulted in complaints. The propensity of injured patients to complain increased steeply with the severity of the injury: odds of

complaint were 11 times greater after serious permanent injuries than after temporary injuries, and 18 times greater after deaths. Odds of complaining were significantly lower for patients who were elderly (odds ratio (OR) 0.2, 95% confidence interval (CI) 0.1 to 0.4), of Pacific ethnicity (OR 0.3, 95% CI 0.1 to 0.9), or lived in the most deprived areas (OR 0.3, 95% CI 0.2 to 0.6). CONCLUSION: Most medical injuries never trigger a complaint to the Commissioner. Among complaints that are brought, severe and preventable injuries are common, offering a potentially valuable "window" on serious threats to patient safety. The relatively low propensity to complain among patients who are elderly, socioeconomically deprived, or of Pacific ethnicity suggests troubling disparities in access to and utilisation of complaints processes.

REF ID: 2913

Level V: Case report

Topic 1: Risks

Blackmore, S. J., Cranshaw, J., & Soar, J. (2005). Barium sulphate aspiration and lung injury. *Care of the Critically Ill*, 21(1), 26-28.

Journal Article, Case Study, Diagnostic Images

Aspiration is a life-threatening complication of a barium swallow investigation. An 84-year-old man aspirated high-density barium sulphate contrast medium during a barium swallow examination. He developed acute respiratory distress syndrome (ARDS) within hours and died 18 days later in the intensive care unit (ICU). Aspiration of contrast medium allowed the distribution of the aspirate to be visualised on the chest radiograph. Risk factors, mechanism of lung injury, and treatment of this rare but serious complication of a barium swallow examination are discussed.

REF ID: 2801

Level IV: Non-experimental study

Topic 1: Risks

Blaszyk, H., Wild, P. J., Oliveira, A., Kelly, D. G., & Burgart, L. J. (2005). Hepatic copper in patients receiving long-term total parenteral nutrition. *Journal of Clinical Gastroenterology*, 39(4), 318-320.

Journal Article

GOALS: To assess the possibility of iatrogenic hepatic copper overload in adult patients on long-term total parenteral nutrition (TPN). BACKGROUND: TPN predisposes to hepatic copper accumulation through disturbances of the enterohepatic bile acid pool, but iatrogenic copper overload through TPN solutions may occur as well. STUDY: Quantitative hepatic copper and multiple clinical, biochemical, and histopathologic parameters were compared between patients with long-term TPN associated liver disease (n = 28) and patients with drug-induced cholestatic liver disease (n = 10). RESULTS: Eighty-nine percent of TPN patients and all controls had mildly elevated hepatic tissue copper, but 29% of TPN patients had levels above the diagnostic threshold for Wilson's disease. Quantitative hepatic copper correlated positively with serum aspartate aminotransferase (P = 0.001, r = 0.59), total bilirubin (P < 0.001, r = 0.65), and direct bilirubin (P < 0.001, r = 0.63) in TPN patients, but not in controls. The amount of hepatic copper did not correlate with the duration of TPN (median, 1.9 years; range, 0.3-18.0 years) or serum copper levels. TPN patients with significant cholestasis accumulated more copper than patients with no or only minimal cholestasis (P = 0.002). CONCLUSIONS: Significant hepatic copper overload in TPN patients occurs through chronic cholestasis in TPN-associated liver disease and is independent from the total duration of TPN. Iatrogenic copper overload through trace elements in TPN solutions does not seem to be a significant factor.

REF ID: 2826

Level V: Literature review

Topic 1: Risks

Bliss, M. R. (2004). The rationale for sitting elderly patients in hospital out of bed for long periods is medically unsubstantiated and detrimental to their recovery. *Medical Hypotheses*, 62(4), 471-478.

Journal Article. Review

The notorious statement by Asher about the dangers of bed rest [Brit Med J 1947; ii: 967-8] which continues to be quoted out of context in leading medical journals today is inapplicable to modern short stay elderly hospital patients and has little medical foundation. 'Blood clotting in the veins' is more likely to result from venous stasis during sitting than from lying down. 'Lime draining from the bones' refers to subjects' spending weeks, not hours, in the horizontal position and similar losses have been shown to occur in healthy people immobilised in chairs for long periods during the day. Constipation is common in sick old people and there is no evidence that 'scybalae stacking up the colon' is more likely to occur in bed than in a chair. The 'flesh rotting from the seat', or pressure sores, occur as frequently or more frequently, in sick patients nursed in chairs as in bed. 'Urine leaking from the distended bladder' may be reduced in very debilitated old people sitting in chairs, but at the expense of impaired renal function associated with reduced perfusion in the upright posture and exacerbated incontinence due to a compensatory diuresis at night. The 'spirit evaporating from the soul' today is more likely to afflict old patients who are exhausted by prolonged chair nursing and orthostatic hypotension due to age or illness. Recent studies in intensive care patients have highlighted the hypotension due to vasodilatation which can occur in infection and trauma. There is no evidence that nosocomial pneumonia is reduced by sitting patients out of bed, and lack of sleep is likely to exacerbate infection and delay recovery. Preventing patients from lying down when they feel the need is a violation of their rights and has been shown to be probably as injurious as the Victorian practice of preventing healthy patients from getting up. Physiotherapy is obviously important but patients should be allowed to decide for themselves how long they spend in or out of bed. [References: 72]

REF ID: 2752

Level V: Case report

Topic 3: Assessment

Bobba, R. K., & Arsur, E. L. (2004). Septic shock in an elderly patient on dialysis: Enema-induced rectal injury confusing the clinical picture. *Journal of the American Geriatrics Society*, 52(12), 2144.

Journal Article, Case Study, Diagnostic Images

REF ID: 2834

Level V: Case report

Topic 1: Risks

Bolland, M. J., Bagg, W., Thomas, M. G., Lucas, J. A., Ticehurst, R., & Black, P. N. (2004). Cushing's syndrome due to interaction between inhaled corticosteroids and itraconazole. *Annals of Pharmacotherapy*, 38(1), 46-49.

Case Reports. Journal Article

OBJECTIVE: To report a case of an interaction between inhaled corticosteroids and itraconazole causing iatrogenic Cushing's syndrome and provide a review of the relevant literature. **CASE SUMMARY:** A 70-year-old white woman on long-term treatment with high-dose inhaled corticosteroids for asthma was diagnosed as having *Scedosporium apiospermum* infection of the skin and subcutaneous tissues. As a result, she was treated with itraconazole for 2 months. She subsequently developed Cushing's syndrome due to a probable cytochrome P450-mediated interaction between itraconazole and budesonide. She also had secondary adrenal insufficiency requiring prolonged treatment with replacement hydrocortisone. **DISCUSSION:** Budesonide is a potent glucocorticoid that is metabolized in the liver by the CYP3A4 isoenzyme to inactive metabolites. Itraconazole is a potent cytochrome P450 inhibitor. It can inhibit the metabolism of oral or inhaled corticosteroids, producing cortisol excess leading to Cushing's syndrome and adrenal insufficiency. An assessment of causality indicated a possible adverse interaction between itraconazole and budesonide. **CONCLUSIONS:** The combination of itraconazole and inhaled corticosteroids is increasingly being used to treat conditions such as allergic bronchopulmonary aspergillosis. Clinicians need to be aware of the potential for an interaction between such a combination.

REF ID: 2827

Level IV: Non-experimental study

Topic 1: Risks

Boockvar, K., Fishman, E., Kyriacou, C. K., Monias, A., Gavi, S., & Cortes, T. (2004). Adverse events due to discontinuations in drug use and dose changes in patients transferred between acute and long-term care facilities. *Archives of Internal Medicine*, 164(5), 545-550.

Journal Article. Multicenter Study

BACKGROUND: Care transitions are commonplace for ill older adults, but no studies to our knowledge have examined the occurrence of iatrogenic harm from medication changes during patient transfer. **OBJECTIVES:** To identify medication changes during transfer between hospital and nursing home and adverse drug events (ADEs) caused by these changes. **METHODS:** Participants were residents of 4 nursing homes in the New York City metropolitan area admitted to 2 academic hospitals. Nursing home and hospital medical records were reviewed to identify changes in medication regimens between sites. Medications were matched and compared regarding dosage, route, and frequency of administration. Two physician investigators used structured implicit review to identify ADEs attributable to transfer-related medication changes. **RESULTS:** During a total of 122 admissions, the mean numbers of medications altered during transfer from nursing home to hospital and hospital to nursing home were 3.1 and 1.4, respectively ($P < .001$ for comparison). Most changes in drug use were discontinuations, followed by dose changes and class substitutions. Of 71 bidirectional transfers that were reviewed by 2 physician investigators, ADEs attributable to medication changes occurred during 14 (20%). The overall risk of ADE per drug alteration ($n = 320$) was 4.4% (95% confidence interval, 2.5%-7.4%). Although most medication changes (8/14) implicated in causing ADEs occurred in the hospital, most ADEs (12/14) occurred in the nursing home after nursing home readmission. **CONCLUSIONS:** Medication changes are common during transfer between hospital and nursing home and are a cause of ADEs. Research is needed on interinstitutional patient care and systems interventions designed to prevent ADEs.

REF ID: 2868

Level V: Case report

Topic 3: Assessment

Bostwick, J. M., & Philbrick, K. L. (2002). The use of electroencephalography in psychiatry of the medically ill. *Psychiatric Clinics of North America*, 25(1), 17-25.

Case Reports. Journal Article

The psychiatrist considering recommending an EEG should look for acute changes in the history or examination suggestive of an organic cause. If he or she judges that the EEG will help to clarify or confirm the diagnostic impression already formulated, it is worth considering whether adding provocative maneuvers could increase the yield. The authors cannot overemphasize the importance of using the EEG in correlation to further inform old-fashioned clinical detective work already in process, particularly when the EEG could rule out a potential organic contributor to a psychiatric phenotype. For routine screening without an elevated index of suspicion or for thoughtless "fishing expeditions," EEG results will surely disappoint.

REF ID: 2876

Level VI: Opinion

Topic 1: Risks

Burt, C. W. (2001). Emergency health care encounters for adverse effects of medical treatment. *Managed Care Interface*, 14(12), 39-42.

Journal Article

There are approximately 1.4 million visits annually to emergency departments of nonfederal, general, and short-stay hospitals for adverse effects of medical treatment. These include visits for injuries and illnesses sustained through complications of medical and surgical care, including adverse drug reactions. The rate of visits for adverse effects has increased from 3.1 visits per 1,000 persons in 1992 to 5.2 visits in 1999. Visit rates are substantially higher for persons aged 65 years and older.

REF ID: 2879

Level III: Individual experimental study

Topic 2: Prevention

Caparros, T., Lopez, J., & Grau, T. (2001-Dec). Early enteral nutrition in critically ill patients with a high-protein diet enriched with arginine, fiber, and antioxidants compared with a standard high-protein diet. the effect on nosocomial infections and outcome. *Jpen: Journal of Parenteral & Enteral Nutrition*, 25(6), 299-308.

Clinical Trial. Journal Article. Multicenter Study. Randomized Controlled Trial

BACKGROUND: This study was designed to evaluate the effects of a high-protein formula enriched with arginine, fiber, and antioxidants compared with a standard high-protein formula in early enteral nutrition in critically ill patients. **METHODS:** For this study, 220 patients were enrolled in a prospective, multicenter, single-blind, randomized trial in 15 Spanish intensive care units (ICUs). The primary end-points were the incidence density rates of nosocomial infections, ICU and hospital length of stay, ICU and in-hospital mortality, and mortality at 6-month follow-up. **RESULTS:** The patients in the control and study groups had similar baseline characteristics. The study group had a lower incidence of catheter-related sepsis (0.4 episodes/1000 ICU days) than the control group (5.5 episodes/1000 ICU days), with a relative risk (RR) of 0.07 (95% confidence interval [CI] 0.01 to 0.54, p 2 days showed a trend toward decreased mortality).

REF ID: 2935

Level V: Literature Review

Topic 6: Comprehensive

Curry, L. C., & Hogstel, M. O. (2002). Nursing assessment and intervention: Preventing fall-related injuries in long-term care facilities. *Annals of Long-Term Care*, 10(1), 29-35.

Journal Article, Review, Tables/Charts

Falls are a major problem in long-term care facilities. They may result in various serious complications or death, the implication of which is increased litigation. A number of medical diagnoses, medication side effects, equipment and/or environmental problems, and inadequate staffing of long-term care facilities are some of the factors that may cause falls. One of the medical diagnoses that should be considered in relation to fall-related fractures is osteoporosis—a chronic, yet pharmacologically preventable and reversible disease that occurs in many older women and men. The most dangerous complication of progressive osteoporosis is fracture of the hip caused by a fall. Therefore, the environment of long-term care facilities must be carefully assessed for safety, and all staff members as well as patients and their family members need to be educated on the prevention, diagnosis, and treatment of osteoporosis.

REF ID: 2796

Level III: Quasi-experimental study

Topic 4.5: Management-surgery

Danzi, G. B., Sesana, M., Capuano, C., Baglini, R., Bellosta, R., & Luzzani, L. et al. (2005). Compression repair versus low-dose thrombin injection for the treatment of iatrogenic femoral pseudoaneurysm: A retrospective case-control study. *Italian Heart Journal: Official Journal of the Italian Federation of Cardiology*, 6(5), 384-389.

Journal Article

BACKGROUND: It has been shown that thrombin injection is a safe and effective technique for the treatment of iatrogenic femoral pseudoaneurysm. The aim of this study was to evaluate and compare the use of ultrasound-guided low-dose thrombin injections with ultrasonographically-guided compression repair in the treatment of iatrogenic femoral arterial pseudoaneurysm. **METHODS:** We compared two cohorts of patients treated for iatrogenic femoral pseudoaneurysm: the first included 38 patients who underwent ultrasonographically-guided compression repair as a first-step approach between January 1998 and November 2002; the second included 21 patients treated with ultrasound-guided low-dose thrombin injection between December 2002 and December 2003. **RESULTS:** Both groups had similar demographic characteristics and aneurysm sizes ($p = 0.72$). Compression was successful in 24/38 patients (63%); the 14 persistent aneurysms were surgically repaired (37%). The primary thrombin injection of a mean dose of 185+/-95 U/ml (range 100-400 U/ml) successfully obliterated all of the 21

pseudoaneurysms (success rate 100 vs 63% in the compression group, $p = 0.004$). Thrombosis occurred within an average of 12+/-15 s of thrombin injection. Sedation was used in 42% of the patients undergoing compression and in none of those receiving thrombin ($p = 0.001$). The duration of hospitalization was significantly longer in patients undergoing compression therapy (9.8+/-5.6 vs 5.6+/-1.4 days, $p = 0.001$). **CONCLUSIONS:** Ultrasound-guided low-dose thrombin injection appears to be more effective in reducing the need for surgical repair when used to treat iatrogenic femoral pseudoaneurysm, is better tolerated by the patients, and requires a shorter hospital stay.

REF ID: 2768

Level IV: Non-experimental study

Topic 1: Risks

De Jonghe, B., Sharshar, T., Lefaucheur, J., Authier, F., DurandZaleski, I., & Boussarsar, M. et al. (2002). Caring for the critically ill patient. paresis acquired in the intensive care unit: A prospective multicenter study. *JAMA: Journal of the American Medical Association*, 288(22), 2859-2867.

Journal Article, Research, Tables/Charts

CONTEXT: Although electrophysiologic and histologic neuromuscular abnormalities are common in intensive care unit (ICU) patients, the clinical incidence of ICU-acquired neuromuscular disorders in patients recovering from severe illness remains unknown. **OBJECTIVES:** To assess the clinical incidence, risk factors, and outcomes of ICU-acquired paresis (ICUAP) during recovery from critical illness in the ICU and to determine the electrophysiologic and histologic patterns in patients with ICUAP. **DESIGN:** Prospective cohort study conducted from March 1999 to June 2000. **SETTING:** Three medical and 2 surgical ICUs in 4 hospitals in France. **PARTICIPANTS:** All consecutive ICU patients without preexisting neuromuscular disease who underwent mechanical ventilation for 7 or more days were screened daily for awakening. The first day a patient was considered awake was day 1. Patients with severe muscle weakness on day 7 were considered to have ICUAP. **MAIN OUTCOME MEASURES:** Incidence and duration of ICUAP, risk factors for ICUAP, and comparative duration of mechanical ventilation between ICUAP and control patients. **RESULTS:** Among the 95 patients who achieved satisfactory awakening, the incidence of ICUAP was 25.3% (95% confidence interval [CI], 16.9%-35.2%). All ICUAP patients had a sensorimotor axonopathy, and all patients who underwent a muscle biopsy had specific muscle involvement not related to nerve involvement. The median duration of ICUAP after day 1 was 21 days. Mean (SD) duration of mechanical ventilation after day 1 was significantly longer in patients with ICUAP compared with those without (18.2 [36.3] vs 7.6 [19.2] days; $P = .03$). Independent predictors of ICUAP were female sex (odds ratio [OR], 4.66; 95% CI, 1.19-18.30), the number of days with dysfunction of 2 or more organs (OR, 1.28; 95% CI, 1.11-1.49), duration of mechanical ventilation (OR, 1.10; 95% CI, 1.00-1.22), and administration of corticosteroids (OR, 14.90; 95% CI, 3.20-69.80) before day 1. **CONCLUSIONS:** Identified using simple bedside clinical criteria, ICUAP was frequent during recovery from critical illness and was associated with a prolonged duration of mechanical ventilation. Our findings suggest an important role of corticosteroids in the development of ICUAP.

REF ID: 2783

Level IV: Non-experimental study

Topic 1: Risks

de Lassence, A., Timsit, J. F., Tafflet, M., Azoulay, E., Jamali, S., & Vincent, F. et al. (2006). Pneumothorax in the intensive care unit: Incidence, risk factors, and outcome. *Anesthesiology*, 104(1), 5-13.

Journal Article. Multicenter Study

BACKGROUND: The risk factors and outcomes of critically ill patients with iatrogenic pneumothorax (IP) have not been studied in a large unselected intensive care unit (ICU) population. **METHODS:** The authors studied a prospective cohort of adults admitted for more than 24 h. Data were collected at ICU admission and daily by senior physicians until ICU discharge. Risk factors for IP were identified in the entire cohort. A matched nested case-control study was used to evaluate the excess risk of IP in

decedents. RESULTS: Of the 3,499 patients, 69 with pneumothorax before ICU admission were excluded. Of the remaining 3,430 patients, 94 experienced IP within 30 days (42 due to barotrauma and 52 due to invasive procedures). The cumulative incidence of IP was 1.4% (95% confidence interval [CI], 1.0-1.8) on day 5 and 3.0% (95% CI, 2.4-3.6) on day 30. Risk factors for IP (hazard ratio [95% CI]) were body weight less than 80 kg (2.4 [1.3-4.2]), history of adult immunodeficiency syndrome (2.8 [1.2-6.4]), diagnosis of acute respiratory distress syndrome (5.3 [2.6-11]) or cardiogenic pulmonary edema at admission (2.0 [1.1-3.6]), central vein or pulmonary artery catheter insertion (1.7 [1.0-2.7]), and use of inotropic agents during the first 24 h (2.1 [1.3-3.4]). Excess risk of IP in decedents was 2.6 (95% CI, 1.3-4.9; P = 0.004). CONCLUSION: Iatrogenic pneumothorax is a life-threatening complication seen in 3% of ICU patients. Incorporating risk factors for IP into preventive strategies should reduce the occurrence of IP.

REF ID: 2773

Level IV: Non-experimental study

Topic 1: Risks

de Oliveira, A. C., Ciosak, S. I., Ferraz, E. M., & Grinbaum, R. S. (2006). Surgical site infection in patients submitted to digestive surgery: Risk prediction and the NNIS risk index. *American Journal of Infection Control*, 34(4), 201-207.

Journal Article

BACKGROUND: Some problems have been reported with the power of the National Nosocomial Infection Surveillance (NNIS) risk index to predict the risk of surgical site infections (SSI) for specific procedures. OBJECTIVES: To develop an alternative risk prediction index for SSI and to compare the performance with the NNIS index. METHODS: A prospective cohort study was carried out with all (609) patients submitted to digestive tract surgery in 2 general teaching hospitals in the city of Sao Paulo, Brazil, from August 2001 through March 2002. RESULTS: The final incidence rate of SSI was 24.5%; 149 cases of SSI were identified: 33 (22.1%) during hospitalization and 116 (77.9%) after discharge. Logistic multivariate analysis was used for construction of the model. Obesity, surgery risk, adjusted duration, and video laparoscopic surgery were statistically significant (P < .05) for all previous procedures. The performance of the NNIS model in this study showed a low predictive capacity for the occurrence of SSI as determined by the receiver operating characteristic (ROC) curve (0.627; 95% CI: 0.575-0.678) compared with the alternative model developed with this population (0.732; 95% CI: 0.685-0.779). CONCLUSION: The presence of obesity, adjusted duration, and surgery risk significantly increased the risk for SSI. The NNIS risk index was not significant for SSI in the sample studied, and laparoscopic access was associated with a significant reduction in the risk for SSI. Although the NNIS index is a well-known and simple index, other models depicting variables related to SSI with a better sensitivity and specificity can be developed. Additional studies are required to confirm our results.

REF ID: 2791

Level IV: Non-experimental study

Topic 1: Risks

Demirbas, O., Batyraliev, T., Eksi, Z., & Pershukov, I. (2005-Oct). Femoral pseudoaneurysm due to diagnostic or interventional angiographic procedures. *Angiology*, 56(5), 553-556.

Journal Article

The authors investigated the incidence of, diagnostic methods for, and treatment strategies for iatrogenic femoral pseudoaneurysms in their hospital and compared the results with those in the literature. The hospital records of 25,273 patients who had coronary or peripheral angiography and angioplasty in Sani Konukoglu Medical Center from September 1997 to December 2002 were collected retrospectively. All the complications were detected and femoral pseudoaneurysm cases were selected. Diagnostic criteria and treatment strategy were documented. All results were compared with the literature. Femoral pseudoaneurysm was the second in number of complications and bleeding the first. Twenty-eight patients with pseudoaneurysm were diagnosed with color Doppler ultrasound (US) imaging (0.11%). Eleven of these closed spontaneously within 3-7 days. Image-guided compression therapy was applied to the remaining 17 and was effective in 10. The remaining 7 patients were operated on successfully. In

this series the incidence of iatrogenic femoral pseudoaneurysm was comparable with the literature (0.02%-2%). Color Doppler US is the best diagnostic tool for this complication, and no other method was necessary. Eleven cases of spontaneous closure may show a rather benign prognosis, but close follow-up is advised. Image-guided compression is also an effective and noninvasive method of therapy for this complication. In late cases with a thick neck, surgery should be done immediately. It is easy to prevent rather than treat this complication. The similar incidence in the literature and in this series shows that a number of complications are to be expected, and so prompt and early diagnosis and effective treatment are very important. Application of good external compression after catheterization, selecting the thinnest introducer, use of B-mode and color Doppler US imaging for suspected cases, and image-guided compression therapy are also effective in early cases with a thin neck of the aneurysm.

REF ID: 2136

Level IV: Non-experimental study

Topic 1: Risks

Dhondt, T. D., Beekman, A. T., Deeg, D. J., & Van Tilburg, W. (2002). Iatrogenic depression in the elderly. results from a community-based study in the netherlands. 393=*Social Psychiatry.& Psychiatric Epidemiology*, 37(8), 393-8.

IM; Journal Article; Multicenter Study

BACKGROUND: The aim of this study was to investigate the association between the use of medication and depression in the elderly. **METHOD:** A cross-sectional population-based study was conducted. Associations between the use of medication and depression are corrected for eight other etiological correlates of depression. The sample consisted of 2646 elderly people living in 11 municipalities in the Netherlands. Subjects were taken from the Longitudinal Aging Study Amsterdam, a 10-year longitudinal study on predictors and consequences of changes in well-being and autonomy in the older population. Associations are expressed in odds ratios (95 % Confidence Intervals) between the use of (groups of) medication and depression. Results are adjusted for age, sex, urbanicity, socioeconomic status, physical health, social and interpersonal support, comorbidity with other psychiatric disease and personality. The Population Attributable Risk percentage was calculated for selected groups of medication. **RESULTS:** After correction for competing risk factors of depression, 22 individual medications and nine groups of medications had unique associations with depression. **CONCLUSIONS:** The use of depressogenic medication is an independent etiological factor in the pathogenesis of depression.

REF ID: 2891

Level IV: Non-experimental study

Topic 1: Risks

Dumont, C. J. P., Keeling, A. W., Bourguignon, C., Sarembock, I. J., & Turner, M. (2006). Predictors of vascular complications post diagnostic cardiac catheterization and percutaneous coronary interventions. *DCCN: Dimensions of Critical Care Nursing*, 25(3), 137-142.

Journal Article, Case Study, Research, Tables/Charts

Care of patients after cardiac catheterization and/or percutaneous coronary intervention is largely the responsibility of nurses. The identification of risk factors for vascular complications from these procedures is important for the development of protocols to prevent complications. This article describes a retrospective, descriptive, and correlational study of 11,119 patients who underwent cardiac catheterization and/or percutaneous intervention, with femoral artery access, in the years 2001 to 2003. Increased risk for vascular complications was found in patients who were older than 70 years, were female, had renal failure, underwent percutaneous intervention, and had a venous sheath.

REF ID: 2907

Level VI: Opinion

Topic 2: Prevention

Dunn, D. (2005). Preventing perioperative complications in an older adult: Learn how his advancing age affects his risks so you can take steps to head off trouble... previously published in

Nursing2004, volume 34, issue no. 11, pp. 36-42 (2004). *Holistic Nursing Practice*, 19(2), 54-61.

Journal Article, CEU, Exam Questions, Tables/Charts

REF ID: 2901

Level V: Case REport

Topic 2: Prevention

Edmonds, C. R., Liguori, G. A., & Stanton, M. A. (2005). Two cases of a wrong-site peripheral nerve block and a process to prevent this complication. *Regional Anesthesia and Pain Medicine*, 30(1), 99-103.

Journal Article, Case Study, Protocol, Research, Tables/Charts

OBJECTIVE: The purpose of this study was to develop a system to prevent laterality errors while performing peripheral nerve blockade. CASE REPORT: The report depicts 2 cases of peripheral nerve blocks being performed on the wrong (nonoperative) extremity. An analysis of the circumstances in each case reveals distractions, schedule changes, and communication breakdown, which contributed to the error. A protocol to prevent these errors from occurring in the future, based on the Joint Commission on Accreditation of Healthcare Organizations guidelines, to eliminate "wrong-site" surgical procedures is developed and discussed. CONCLUSIONS: The anesthesiologist plays an important role in preventing wrong-site peripheral nerve blockade and surgery. The protocol developed for "Pre-Anesthetic Site Verification" as a supplement to our preoperative site verification policy is invaluable in preventing wrong-site anesthesia and surgery.

REF ID: 2894

Level IV: Non-experimental study

Topic 3: Assessment

Eveillard, M., Mortier, E., Lancien, E., Lescure, F., Schmit, J., & Barnaud, G. et al. (2006).

Consideration of age at admission for selective screening to identify methicillin-resistant staphylococcus aureus carriers to control dissemination in a medical ward. *American Journal of Infection Control*, 34(3), 108-113.

Journal Article, Research, Tables/Charts

BACKGROUND: Methicillin-resistant Staphylococcus aureus (MRSA) has become an increasingly important pathogen responsible for hospital-acquired infections. Our study was to evaluate the efficiency of our selective screening program for methicillin-resistant Staphylococcus aureus (MRSA) carriers at admission to nonintensive care units. METHODS: During 6 months, all patients were screened at admission to an internal medicine ward, at which time they were classified as patients at risk of carriage (PRC) and those with no known risk factor. The amplitude of cross transmission was estimated using various indicators during this universal screening period and during the same calendar period of the preceding year (selective screening). RESULTS: The prevalence of MRSA carriage at admission was 5.5%. Among the 22 carriers identified, only 10 were PRC. Age >80 years was significantly associated with MRSA carriage upon admission (OR, 3.5; P 80 years of age to our PRC definition would increase screening sensitivity (15 carriers identified for 128 patients sampled) and would enable early implementation of barrier precautions for the additional carriers identified.

REF ID: 2875

Level IV: Non-experimental study

Topic 1: Risks

Eveillard, M., Quenon, J. L., Rufat, P., Mangeol, A., & Fauvelle, F. (2001). Association between hospital-acquired infections and patients' transfers. *Infection Control & Hospital Epidemiology*, 22(11), 693-696.

Journal Article

OBJECTIVE: To assess the risk of nosocomial infection in transferred patients and to determine whether transfer is only a risk marker or is independently associated with nosocomial infection. DESIGN: Retrospective analysis. SETTING: A 400-bed general hospital in the Paris area. PATIENTS: All the patients hospitalized on the days of the surveys were included. METHODS: Epidemiological analysis of data collected in four annual nosocomial infection prevalence surveys conducted between

1993 and 1996. RESULTS: Of the 1,326 patients included in the four surveys, 70 (5.3%) had been transferred from another hospital and 199 (15.0%) from another ward of our hospital. Transferred patients more frequently had known risk factors of nosocomial infection: age >65 years (P7 days on the day of the survey (P7 days on the day of the survey (P7 days on the day of the survey (P7 days on the day of the survey (P7 days, and having had at least one invasive procedure were independent risk factors of infection. CONCLUSION: According to this study, patient transfer is both a risk marker (associated with several known risk factors) and independently associated with nosocomial infection. The origin of a transferred patient is readily known at admission. It would be useful to adopt specific measures for such patients, particularly if they have other risk factors of nosocomial infection, both to protect them and to prevent transmission of the infection to other hospitalized patients.

REF ID: 2890

Level I: Systematic Review

Topic 4: Management

Fernandez, R. S., & Griffiths, R. D. (2006). Duration of short-term indwelling catheters -- a systematic review of the evidence. *Journal of WOCN*, 33(2), 145-155.

Journal Article, CEU, Exam Questions, Research, Systematic Review, Tables/Charts

OBJECTIVE: A systematic review on the effect of duration of catheterization on urinary retention.

MATERIALS AND METHODS: Published and unpublished randomized and nonrandomized control trials from January 1966 to July 2004 comparing the effects of duration of catheterization on patient outcomes were systematically reviewed. Relative risks (RR) for dichotomous data and a weighted mean difference for continuous data were calculated with 95% confidence intervals (CI). Where synthesis was inappropriate, a narrative overview was undertaken. RESULTS: Eight trials were included. Two trials on patients following urethrotomy demonstrated no statistically significant difference in the number of patients developing restenosis, epididymitis, or urethral pain at any follow-up periods. Two trials comparing removal of the indwelling urethral catheter within 24-48 hours to usual surgical criteria after transurethral surgery demonstrated no statistically significant difference in the number of patients requiring recatheterization. However, significant reduction in the length of hospitalization was reported after removal of the indwelling urethral catheter within 24-48 hours. An increased risk of urinary tract infection was found when the catheter was removed after 48 hours. Catheter removal on day 1 compared to day 3 after vaginal or retropubic surgery demonstrated no statistically significant difference in urinary retention or urinary tract infection. CONCLUSIONS: No significant differences in patient outcome were found, but the timing of catheter removal is a balance between avoiding infection by early removal and circumventing voiding dysfunction by later removal. Shorter catheterizations appear to reduce mean length of hospital stay.

REF ID: 2926

Level I: Systematic review

Topic 1: Risks

Fick, D. M., Agostini, J. V., & Inouye, S. K. (2002). Delirium superimposed on dementia: A systematic review. *Journal of the American Geriatrics Society*, 50(10), 1723-1732.

Journal Article, Research, Systematic Review, Tables/Charts

Delirium in a patient with preexisting dementia is a common problem that may have serious complications and poor prognostic implications. The purpose of this paper was to conduct a systematic review of the medical literature on delirium superimposed on dementia, specifically to review studies on prevalence, associated features, outcomes, and management. Areas of controversy and gaps in our knowledge of this problem are highlighted. Finally, an agenda for future research is proposed. Fourteen studies were reviewed, including seven prospective studies, three retrospective studies, two cross-sectional studies, and two clinical trials. For the review of the literature on delirium superimposed on dementia, we searched MEDLINE from January 1966 through February 2002 for research studies with primary sources of data. Selection criteria for inclusion of articles in this study were inclusion of data on subjects with delirium superimposed on dementia, inclusion of a validated operational

definition/measures of dementia and delirium, actual data on persons with delirium and dementia reported in the paper, and reporting of primary data. MEDLINE was searched using the following key search terms: delirium, acute confusion, cognitive impairment, Alzheimer's disease, dementia, delirium superimposed on dementia, and elderly. The prevalence of delirium superimposed on dementia ranged from 22% to 89% of hospitalized and community populations aged 65 and older with dementia. To date, only one reported study systematically identified associated factors and interventions for delirium superimposed on dementia, but several studies examining outcomes have found that adverse events are associated with delirium in persons with dementia, including accelerated and long-term cognitive and functional decline, need for institutionalization, rehospitalization, and increased mortality. This paper highlights the dearth of research on delirium superimposed on dementia and stresses the importance of early recognition and prevention of delirium in persons with dementia.

REF ID: 2758

Level V: Case study

Topic 1: Risks

Finn, K. M. (2003). Hospital-acquired acute renal failure -- what hospitalists need to know. *Journal of Clinical Outcomes Management, 10(4), 214-223.*

Journal Article, Case Study, Tables/Charts

Acute renal failure (ARF) is a predominantly hospital-acquired disorder with multiple etiologies. Iatrogenic causes are responsible for an estimated half of all cases. As such, the hospitalist needs to be able to diagnose ARF, interpret the laboratory studies in its workup, and understand the treatment options available. In particular, hospitalists should be familiar with both the causes and prevention of iatrogenic ARF.

REF ID: 2906

Level IV: Non-experimental study

Topic 1: Risks

Fischer, I. D., Krauss, M. J., Dunagan, W. C., Birge, S., Hitcho, E., & Johnson, S. et al. (2005). Patterns and predictors of inpatient falls and fall-related injuries in a large academic hospital. *Infection Control and Hospital Epidemiology, 26(10), 822-827.*

Journal Article, Research, Tables/Charts

OBJECTIVES Most research on hospital falls has focused on predictors of falling, whereas less is known about predictors of serious fall-related injury. Our objectives were to characterize inpatients who fall and to determine predictors of serious fall-related injury. **METHODS** We performed a retrospective observational study of 1,082 patients who fell (1,235 falls) during January 2001 to June 2002 at an urban academic hospital. Multivariate analysis of potential risk factors for serious fall-related injury (vs no or minor injury) included in the hospital's adverse event reporting database was conducted with logistic regression to calculate adjusted odds ratios (aORs) with 95% confidence intervals (CI95). **RESULTS** The median age of patients who fell was 62 years (interquartile range, 49-77 years), 50% were women, and 20% were confused. The hospital fall rate was 3.1 falls per 1,000 patient-days, which varied by service from 0.86 (women and infants) to 6.36 (oncology). Some (6.1%) of the falls resulted in serious injury, ranging by service from 3.1% (women and infants) to 10.9% (psychiatry). The most common serious fall-related injuries were bleeding or laceration (53.6%), fracture or dislocation (15.9%), and hematoma or contusion (13%). Patients 75 years or older (aOR, 3.2; CI95, 1.3-8.1) and those on the geriatric psychiatry floor (aOR, 2.8; CI95, 1.3-6.0) were more likely to sustain serious fall-related injuries. **CONCLUSIONS** There is considerable variation in fall rates and fall-related injury percentages by service. More detailed studies should be conducted by floor or service to identify predictors of serious fall-related injury so that targeted interventions can be developed to reduce them

REF ID: 2788

Level IV: Non-experimental study

Topic 3: Assessment

Formiga, F., Chivite, D., Mascaro, J., Ramon, J. M., & Pujol, R. (2005). No correlation between mini-nutritional assessment (short form) scale and clinical outcomes in 73 elderly patients

admitted for hip fracture. *Aging-Clinical & Experimental Research*, 17(4), 343-346.

Journal Article

BACKGROUND AND AIMS: Malnutrition in general and protein deficiency in particular, both upon admission and during the recovery period, may adversely influence the clinical outcome after hip fracture. This study investigates the relationship between nutritional status measured by the Mini-Nutritional Assessment short form (MNA-SF) and biological markers in elderly hip-fractured patients. **METHODS:** A prospective study in a university hospital. The MNA-SF nutritional scale and laboratory values (serum albumin, cholesterol, total lymphocyte count) were assessed within three days after hip fracture surgery. **RESULTS:** Seventy-three patients were included: 61 (84%) were women and 12 men. Mean age was 81.5+/-7.1 years. In-hospital mortality was 10%. The mean MNA-SF score was 11+/-0.5 (range 3-14); according to these values, 39 patients (53%) were at risk of malnutrition. MNA-SF scores were not significantly correlated to patients' laboratory values. Fourteen episodes of nosocomial infection were diagnosed in 11 patients, and 6 patients developed pressure ulcers during hospitalization. **CONCLUSIONS:** MNA-SF test scale values reflect a clinical process in post-operative hip-fractured patients which is different from serum albumin, cholesterol or lymphocyte count.

REF ID: 2803

Level IV: Non-experimental study

Topic 3: Assessment

Forster, A. J., Andrade, J., & van Walraven, C. (2005-Apr). Validation of a discharge summary term search method to detect adverse events. *Journal of the American Medical Informatics Association*, 12(2), 200-206.

Journal Article. Validation Studies

OBJECTIVE: Adverse events are poor health outcomes caused by medical care. Measuring them is necessary for quality improvements, but current detection methods are inadequate. We performed this study to validate a previously derived method of adverse event detection using term searching in physician-dictated discharge summaries. **DESIGN:** This was a retrospective, chart review study of a random sample of 245 adult medicine and surgery patients admitted to a multicampus academic medical center in 2002. **MEASUREMENTS:** The authors used a commercially available search engine to scan discharge summaries for the presence of 104 terms that potentially indicate an adverse event. Summaries with any of these terms were reviewed by a physician to determine the term's context. Screen-positive summaries had a term that was contextually indicative of an adverse event. We used a two-stage chart review as the gold standard to determine the true presence or absence of an adverse event. **RESULTS:** The average patient age was 62 years (standard deviation 18.6) and 55% were admitted to a medical service. By gold standard criteria, 48 of 245 patients had an adverse event. Term searching classified 27 cases with an adverse event, with 11 true positives; 218 cases were classified as not having an adverse event, with 181 true negatives. The sensitivity, specificity, and positive and negative predictive values were 0.23 (95% confidence interval [CI]=0.11-0.35), 0.92 (95% CI=0.88-0.96), 0.41 (95% CI=0.25-0.59), and 0.83 (95% CI=95% 0.77-0.97), respectively. **CONCLUSION:** Although the sensitivity of the method is low, its high specificity means that the method could be used to replace expensive manual chart reviews by nurses.

REF ID: 2825

Level IV: Non-experimental study

Topic 1: Risks

Forster, A. J., Asmis, T. R., Clark, H. D., Al Saied, G., Code, C. C., & Caughey, S. C. et al. (2004). Ottawa hospital patient safety study: Incidence and timing of adverse events in patients admitted to a canadian teaching hospital.[see comment]. *CMAJ Canadian Medical Association Journal*, 170(8), 1235-1240.

Journal Article

BACKGROUND: Adverse events are poor patient outcomes that are due to medical care. Studies of hospital patients have demonstrated that adverse events are common, but few data describe the timing of them in relation to hospital admission. We evaluated characteristics of adverse events affecting patients

admitted to a Canadian teaching hospital, paying particular attention to timing. **METHODS:** We randomly selected 502 adults admitted to the Ottawa Hospital for acute care of nonpsychiatric illnesses over a 1-year period. Charts were reviewed in 2 stages. If an adverse event was judged to have occurred, a physician determined whether it occurred before or during the index hospitalization. The reviewer also rated the preventability, severity and type of each adverse event. **RESULTS:** Of the 64 patients with an adverse event (incidence 12.7%, 95% confidence interval [CI] 10.1%-16.0%), 24 had a preventable event (4.8%, 95% CI 3.2%-7.0%), and 3 (0.6%, 95% CI 0.2%-1.7%) died because of an adverse event. Most adverse events were due to drug treatment, operative complications or nosocomial infections. Of the 64 patients, 39 (61%, 95% CI 49%-72%) experienced the adverse event before the index hospitalization. **INTERPRETATION:** Adverse events were common in this study. However, only one-third were deemed avoidable, and most occurred before the hospitalization. Interventions to improve safety must address ambulatory care as well as hospital-based care.

REF ID: 2831

Level IV: Non-experimental study

Topic 2: Prevention

Forster, A. J., Clark, H. D., Menard, A., Dupuis, N., Chernish, R., & Chandok, N. et al. (2004). Adverse events among medical patients after discharge from hospital.[see comment][erratum appears in CMAJ. 2004 mar 2;170(5):771]. *CMAJ Canadian Medical Association Journal*, 170(3), 345-349.

Journal Article. Multicenter Study

BACKGROUND: Adverse events (AEs) are adverse outcomes caused by medical care. Several studies have indicated that a substantial number of patients experience AEs before or during hospitalization. However, few data describe AEs after hospital discharge. We determined the incidence, severity, preventability and ameliorability of AEs in patients discharged from the general internal medicine service of a Canadian hospital. **METHODS:** At a multisite Canadian teaching hospital, we prospectively studied patients who were consecutively discharged home or to a seniors' residence from the general internal medicine service during a 14-week interval in 2002. We used telephone interview and chart review to identify outcomes after discharge. Two physicians independently reviewed each outcome to determine if the patient experienced an AE. The severity, preventability and ameliorability of all AEs were classified. **RESULTS:** During the study period, outcomes were determined for 328 of the 361 eligible patients, who averaged 71 years of age (interquartile range 54-81 years). After discharge, 76 of the 328 patients experienced at least 1 AE (overall incidence 23%, 95% confidence interval [CI] 19%-28%). The AE severity ranged from symptoms only (68% of the AEs) or symptoms associated with a nonpermanent disability (25%) to permanent disability (3%) or death (3%). The most common AEs were adverse drug events (72%), therapeutic errors (16%) and nosocomial infections (11%). Of the 76 patients, 38 had an AE that was either preventable or ameliorable (overall incidence 12%, 95% CI 9%-16%). **INTERPRETATION:** Approximately one-quarter of patients in our study had an AE after hospital discharge, and half of the AEs were preventable or ameliorable.

REF ID: 2917

Level V: Program evaluation

Topic 4: Management

Foster, E., Hillegass LJ, I. I. I., & Phillips, S. L. (2004). Demonstration program: An interdisciplinary approach at a falls and mobility clinic. *Annals of Long-Term Care*, 12(5), 27-32.

Journal Article, Case Study, Pictorial, Tables/Charts

This intervention program is a means of preventing falls in those identified as at risk. Members who respond in the affirmative to the secondary risk screen are referred to the Falls and Mobility Clinic for evaluation, where an interdisciplinary team assesses for contributing medical problems, medication-related adverse effects, mobility/functional impairments, and cognitive function to determine appropriate interventions. The comprehensive team approach can uncover direct or contributing causes of falls that are amenable to medical therapy or other corrective interventions. A large proportion of falls and their related complications in elderly persons are probably preventable with careful medical and

environmental evaluation and both therapeutic and preventive interventions. Therefore, a vigorous diagnostic and preventative approach is appropriate for all older patients who have fallen, as well as for those at high risk for falling.

REF ID: 2904

Level VI: Opinion

Topic 4.3: Management-medication

Foust, J. B., Naylor, Boling, P. A., & Cappuzzo, K. A. (2005). Opportunities for improving post-hospital home medication management among older adults. *Home Health Care Services Quarterly*, 24(1/2), 101-122.

Journal Article, Tables/Charts

Effective post-hospital home medication management among older adults is a convoluted, error-prone process. Older adults, whose complex medication regimens are often changed at hospital discharge, are susceptible to medication-related problems (e.g. Adverse Drug Events or ADEs) as they resume responsibility for managing their medications at home. Human error theory frames the discussion of multi-faceted, interacting factors including care system functions, like discharge medication teaching that contribute to post-hospital ADEs. The taxonomy and causes of post-hospital ADEs and related risk factors are reviewed, as we describe in high-risk older adults a population that may benefit from targeted interventions. Potential solutions and future research possibilities highlight the importance of interdisciplinary teams, involvement of clinical pharmacists, use of transitional care models, and improved use of informational technologies.

REF ID: 2908

Level I: Systematic review

Topic 1: Risks

Frazier, S. C. (2005). Geropharmacology. health outcomes and polypharmacy in elderly individuals: An integrated literature review. *Journal of Gerontological Nursing*, 31(9), 4-11.

Journal Article, Pictorial, Research, Systematic Review, Tables/Charts

The purpose of this integrated literature review was to determine the extent of research available related to polypharmacy and its effect on the health out-comes of the elderly population. A search of the Cumulative Index of Nursing and Allied Health Literature and Medline was conducted for studies published between 1995 and 2003 that linked polypharmacy and outcomes in the elderly population. The 16 studies in this integrative literature review were conducted in the United States, Canada, Australia, and Europe. Polypharmacy was shown to be a statistically significant predictor of hospitalization, nursing home placement, death, hypoglycemia, fractures, impaired mobility, pneumonia, and malnutrition. The effect of polypharmacy on elderly individuals is significant as demonstrated by this literature review. Nurses are in a unique position to monitor and potentially eliminate adverse effects of a complex medication regimen. Nursing research on polypharmacy and its effects on nursing-sensitive outcomes will help define guidelines for prevention and intervention.

REF ID: 2916

Level IV: Non-experimental study

Topic 1: Risks

Fu, A. Z., Liu, G. G., & Christensen, D. B. (2004). Inappropriate medication use and health outcomes in the elderly. *Journal of the American Geriatrics Society*, 52(11), 1934-1939.

Journal Article, Equations & Formulas, Research, Tables/Charts

Inappropriate medication use is a major problem for the elderly. Although increasing attention has been paid to inappropriate prescription medication use, most previous research has been limited to the investigation of prevalence and trends. Few studies provide the empirical evidence for the adverse effect of inappropriate medication use on health outcomes at the national level. This study is the first attempt to assess the relationship between inappropriate prescription use and health status for the elderly in the United States. Based on the 1996 Medical Expenditure Panel Survey, inappropriate medication use in a national representative elderly population was first identified using Beers criteria. A survey type of ordered probit model was then estimated to quantify the effect of inappropriate drug use on patient self-

perceived health status measured using a five-point scale (poor, fair, good, very good, and excellent). After controlling for a set of possible confounding factors, it was found that individuals using inappropriate medications in Round 1 were more likely than those not using inappropriate medications to report poorer health status in Round 2. Other risk factors for poor health status include a higher number of prescriptions, being black, having low education, and having one or more chronic diseases. This study provides strong evidence of a significant adverse effect of inappropriate medication use on patient health status. These findings lend partial support to the use of Beers criteria in assessing the quality of prescribing and the appropriateness of medication use in the elderly population.

REF ID: 2760

Level IV: Non-experimental study

Topic 1: Risks

Gandhi, T. K., Weingart, S. N., Borus, J., Seger, A. C., Peterson, J., & Burdick, E. et al. (2003). Patient safety: Adverse drug events in ambulatory care. *New England Journal of Medicine*, 348(16), 1556-1564.

Journal Article, Research, Tables/Charts

BACKGROUND: Adverse events related to drugs occur frequently among inpatients, and many of these events are preventable. However, few data are available on adverse drug events among outpatients. We conducted a study to determine the rates, types, severity, and preventability of such events among outpatients and to identify preventive strategies. METHODS: We performed a prospective cohort study, including a survey of patients and a chart review, at four adult primary care practices in Boston (two hospital-based and two community-based), involving a total of 1202 outpatients who received at least one prescription during a four-week period. Prescriptions were computerized at two of the practices and handwritten at the other two. RESULTS: Of the 661 patients who responded to the survey (response rate, 55 percent), 162 had adverse drug events (25 percent; 95 percent confidence interval, 20 to 29 percent), with a total of 181 events (27 per 100 patients). Twenty-four of the events (13 percent) were serious, 51 (28 percent) were ameliorable, and 20 (11 percent) were preventable. Of the 51 ameliorable events, 32 (63 percent) were attributed to the physician's failure to respond to medication-related symptoms and 19 (37 percent) to the patient's failure to inform the physician of the symptoms. The medication classes most frequently involved in adverse drug events were selective serotonin-reuptake inhibitors (10 percent), beta-blockers (9 percent), angiotensin-converting-enzyme inhibitors (8 percent), and nonsteroidal antiinflammatory agents (8 percent). On multivariate analysis, only the number of medications taken was significantly associated with adverse events. CONCLUSIONS: Adverse events related to drugs are common in primary care, and many are preventable or ameliorable. Monitoring for and acting on symptoms are important. Improving communication between outpatients and providers may help prevent adverse events related to drugs. Copyright 2003 Massachusetts Medical Society

REF ID: 2892

Level IV: Non-experimental study

Topic 5: Evaluation/follow-up

Garcia Rodriguez, J. F., Trobo, A. R., Garcia, M. V. L., Martinez, M. J. C., Millan, C. P., & Vazquez, M. C. et al. (2006). The effect of performance feedback on wound infection rate in abdominal hysterectomy. *American Journal of Infection Control*, 34(4), 182-187.

Journal Article, Research, Tables/Charts

BACKGROUND: In many hospitals, infection of the surgical wound is the most common nosocomial infection. Its presence implies patient morbidity, a mortality risk, and an increase in procedure costs because of prolonged hospitalization. OBJECTIVES: Our objective was to ascertain the effect of an infection control program, using performance feedback, on wound infection (WI) rate in abdominal hysterectomy. METHODS: All patients undergoing abdominal hysterectomy in our center (Hospital A. Marcide, Ferrol, Spain) between 1999 and 2004 were prospectively followed up to determine the WI rate. A complete set of parameters, including age, underlying illnesses, cancer, diabetes mellitus, immunosuppressive therapy, albumin, American Society of Anesthesiologists preoperative assessment

score (ASA) risk, days in hospital presurgery, date of surgery, hygiene and perioperative antimicrobial prophylaxis, type of surgical operation, duration of surgery, surgeon, and WI, were collected in each case. After data collection for 1999 concluded, we communicated surgical WI rates to surgeons every year. A logistic regression analysis was performed to compare WI rates with those observed in 1999. RESULTS: A total of 980 females was enrolled in the prospective surveillance: mean age, 50.7 +/- 10.7 years. Cases included 25.8% cancer, 4.9% diabetes, 0.5% immunosuppressive therapy, 26.6% ASA 1, 58.4% ASA 2, 13.9% ASA 3. In 9 patients, emergency surgery was performed and, in 971 patients, surgery was scheduled: Total abdominal hysterectomy, 878; subtotal abdominal hysterectomy, 65; Wertheim-Meigs, 37. The factors associated with WI were albumin (OR, 0.97; 95% CI: 0.94-0.99) and antimicrobial prophylaxis (OR, 0.08; 95% CI: 0.02-0.32). The mean values for albumin and the number of patients with antimicrobial prophylaxis fluctuated from year to year. The WI rate improved from 10.7% (95% CI: 5.8-15.6) in 1999 to 6% (-43.9%) in 2004. CONCLUSION: Performance feedback of surgical wound infection rates to individual surgeons reduces these rates.

REF ID: 2869

Level II: Individual experimental study

Topic 5: Evaluation/follow-up

Gastmeier, P., Brauer, H., Forster, D., Dietz, E., Daschner, F., & Ruden, H. (2002). A quality management project in 8 selected hospitals to reduce nosocomial infections: A prospective, controlled study. *Infection Control & Hospital Epidemiology*, 23(2), 91-97.

Journal Article. Multicenter Study

OBJECTIVE: To reduce the number of nosocomial infections (NIs) in surgical patients by a quality management approach. DESIGN: Prospective, controlled study in 8 medium-sized hospitals during a 26-month period. SETTING: Four study hospitals and 4 control hospitals. METHODS: In two 10-month intervention periods, 4 external physicians introduced quality circles and ongoing surveillance in the 4 study hospitals. There were three 8-week observation periods in all 8 hospitals with the same physicians before, during, and after the intervention periods. RESULTS: During the first observation period, almost identical overall incidence densities were found for the study hospitals and the control hospitals. During the course of the study, the overall incidence density decreased significantly in the study hospitals (risk ratio [RR], 0.74; 95% confidence interval [CI 95], 0.59 to 0.94) and nonsignificantly in the control hospitals (RR, 0.90; CI 95 0.70 to 1.16). With the use of a Cox regression model to evaluate the impact of the intervention periods while taking into account the distribution of risk factors for NI in both groups, a significant risk reduction (RR, 0.75; CI 95, 0.58 to 0.97) was observed after the first intervention period when comparing study and control hospitals. At the end of the study (ie, after the second intervention period), the difference between the study hospitals and the control hospitals was not significant (RR, 0.78; CI 95, 0.60 to 1.01). This was due to no further improvement at the end of the study in the study hospitals and a decrease in the control hospitals. CONCLUSION: This study demonstrates that NI rates can be significantly reduced by appropriate intervention methods in hospitals that are interested in quality management activities. However, continuous intense efforts are necessary to maintain these improvements.

REF ID: 2792

Level IV: Non-experimental study

Topic 4.4: Management-Products

Gentry, H., & Cope, S. (2005-30). Using silver to reduce catheter-associated urinary tract infections. *Nursing Standard*, 19(50), 51-54.

Clinical Trial. Journal Article

Many thousands of urinary tract infections (UTIs) are linked to the insertion of an indwelling urethral catheter (Saint et al 2000). Catheterisation is often prolonged unnecessarily (Saint et al 2002), thereby increasing the infection risk. In this audit of 133 medical and surgical patients who were catheterised in an acute NHS hospital trust, the potential of a new silver alloy hydrogel-coated catheter to reduce the rate of infection was demonstrated. Benefits were indicated in terms of reducing clinical risk to the

patient and the financial costs associated with treating catheter-associated UTIs, representing a substantial cost saving for the NHS.

REF ID: 2814

Level IV: Non-experimental study

Topic 2: Prevention

Gnass, S. A., Barboza, L., Bilicich, D., Angeloro, P., Treiyer, W., & Grenovero, S. et al. (2004). Prevention of central venous catheter-related bloodstream infections using non-technologic strategies. *Infection Control & Hospital Epidemiology*, 25(8), 675-677.

Journal Article

OBJECTIVE: To evaluate the incidence of nosocomial bacteremias related to the use of non-impregnated central venous catheters (CVCs) when only non-technologic strategies were used to prevent them. **DESIGN:** This was a prospective study of infectious complications of CVCs placed in intensive care unit (ICU) patients from April 1997 to December 2001. **SETTING:** The medical-surgical ICU of a tertiary-care, university-affiliated hospital in Argentina. **METHODS:** We studied all patients admitted to the ICU using non-impregnated CVCs. Maximal sterile barrier precautions (ie, use of cap, mask, sterile gown, sterile gloves, and large sterile drape), strict handwashing, preparation of the patients' skin with antiseptic solutions, insertion and management of catheters by trained personnel, and continuing quality improvement programs aimed at appropriate insertion and maintenance of catheters were employed. **RESULTS:** During the study period, 2,525 patients were admitted to the ICU. Eight hundred sixty-eight patients had 1,037 CVCs inserted. The number of CVC-related bloodstream infections (BSIs), acquired in the ICU, was 2.7 per 1,000 CVC-days (13 nosocomial CVC-related BSIs during 4,770 days of CVC use). Microorganisms isolated included methicillin-susceptible *Staphylococcus aureus* (n = 6), methicillin-resistant *S. aureus* (n = 2), coagulase-negative methicillin-resistant *Staphylococcus* (n = 2), *Escherichia coli* (n = 1), *Klebsiella pneumoniae* (n = 1), and *Enterobacter cloacae* (n = 1). **CONCLUSIONS:** A low rate of catheter-related BSI was achieved without antimicrobial-impregnated catheters. The incidence of CVC-associated bacteremias corresponded to the 10th to 20th percentile range of the National Nosocomial Infections Surveillance System hospitals for the same type of ICU.

REF ID: 2874

Level IV: Non-experimental study

Topic 3: Assessment

Golliot, F., Astagneau, P., Cassou, B., Okra, N., Rothan-Tondeur, M., & Brucker, G. (2001). Nosocomial infections in geriatric long-term-care and rehabilitation facilities: Exploration in the development of a risk index for epidemiological surveillance. *Infection Control & Hospital Epidemiology*, 22(12), 746-753.

Journal Article

OBJECTIVE: To compute a risk index for nosocomial infection (NI) surveillance in geriatric long-term-care facilities (LTCFs) and rehabilitation facilities. **DESIGN:** Analysis of data collected during the French national prevalence survey on NIs conducted in 1996. Risk indices were constructed based on the patient case-mix defined according to risk factors for NIs identified in the elderly. **SETTING:** 248 geriatric units in 77 hospitals located in northern France. **PARTICIPANTS:** All hospital inpatients on the day of the survey were included. **RESULTS:** Data from 11,254 patients were recorded. The overall rate of infected patients was 9.9%. Urinary tract, respiratory tract, and skin were the most common infection sites in both rehabilitation facilities and LTCFs. Eleven risk indices, categorizing patients in 3 to 7 levels of increasing NI risk, ranging from 2.7% to 36.2%, were obtained. Indices offered risk adjustment according to NI rate stratification and clinical relevance of risk factors such as indwelling devices, open bedsores, swallowing disorders, sphincter incontinence, lack of mobility, immunodeficiency, or rehabilitation activity. **CONCLUSION:** The optimal index should be tailored to the strategy selected for NI surveillance in geriatric facilities in view of available financial and human resources.

REF ID: 2818**Level II: Individual experimental study****Topic 4: Management**

Grey, N. J., & Perdrizet, G. A. (2004-Apr). Reduction of nosocomial infections in the surgical intensive-care unit by strict glycemic control. *Endocrine Practice, 10*(Suppl 2), 46-52.

Clinical Trial. Journal Article. Randomized Controlled Trial

OBJECTIVE: To investigate whether hyperglycemia in glucose-intolerant patients without diabetes could lead to increased nosocomial infections in the surgical intensive-care unit (ICU). **METHODS:** A prospective, randomized, controlled clinical trial was conducted in the surgical ICU of a large teaching hospital in Hartford, Connecticut. Adult patients admitted to a 12-bed surgical ICU requiring treatment of hyperglycemia (glucose values \geq 140 mg/dL) were randomly assigned to receive standard insulin therapy (target glucose range, 180 to 220 mg/dL) or strict insulin therapy (target glucose range, 80 to 120 mg/dL) throughout their ICU stay. Demographic data, comorbidities, and confounding variables were analyzed. Outcome measures included mean daily serum glucose values, mean daily insulin doses, and number of nosocomial infections during the ICU stay. **RESULTS:** The study was completed by 61 critically ill surgical patients (27 in the standard glucose control group and 34 in the strict glucose control group). A significant reduction ($P < 0.001$) in mean daily glucose level was achieved in the strict glycemic control group (125 \pm 36 mg/dL) in comparison with the standard glycemic control group (179 \pm 61 mg/dL). Furthermore, a significant reduction ($P < 0.05$) in the incidence of total nosocomial infections, including intravascular device, bloodstream, intravascular device-related bloodstream, and surgical site infections, was observed in the strict glucose control group in comparison with the standard glucose control group. The incidence of hypoglycemia (glucose levels < 60 mg/dL) was significantly increased ($P < 0.001$) in the strict glycemic control group in comparison with the standard glycemic control group (32% versus 7.4% of patients or 0.8% versus 0.1% of total serum glucose values, respectively). **CONCLUSION:** Strict glycemic control is a safe and effective method for reducing the incidence of nosocomial infections in a predominantly nondiabetic, general surgical ICU patient population.

REF ID: 2870**Level IV: Non-experimental study****Topic 1: Risks**

Hafner, J. W., Jr, Belknap, S. M., Squillante, M. D., & Bucheit, K. A. (2002). Adverse drug events in emergency department patients. *Annals of Emergency Medicine, 39*(3), 258-267.

Journal Article

STUDY OBJECTIVE: Adverse drug events (ADEs) have been studied in hospitalized patients. Less is known about this common type of injury in emergency department patients. This study seeks to measure the risks, incidence, severity, and costs of ADEs in an ED population. **METHODS:** ED charts of visits to a university-affiliated tertiary-care ED occurring between March 1 and May 31, 1997, were retrospectively reviewed. The main outcome measures were ADE incidence, severity, and total cost. Visits identified by investigators as containing a suspected ADE were further assessed by using the Naranjo Adverse Drug Reaction (ADR) probability scale. Events judged as probable ADEs (Naranjo ADR probability scale score of > 4) were compared with ED control visits best matched by age for disposition, survival, severity, payer, sex, race, age, number of drugs, and total cost. **RESULTS:** Of 13,602 visits, 13,004 records were available. Three hundred twenty-one had suspected and 217 had probable ADEs (1.7% of evaluable encounters); these were compared with visits by 217 age-matched control patients. Insulin and warfarin were the most commonly responsible drugs. Patients with ADEs were older (mean age 45.1 versus 36.8 years; mean difference 8.3; 95% confidence interval [CI] 3.7 to 12.9), were more often women (odds ratio [OR] 1.48; 95% CI 1.01 to 2.16), took more drugs (mean number of drugs 4.1 versus 1.9; mean difference 2.2; 95% CI 1.7 to 2.8), and were hospitalized more frequently (OR 2.29; 95% CI 1.33 to 3.94) than control patients. **CONCLUSION:** ADEs encompassed an important segment of ED encounters and annual health care costs. ED screening may provide useful information about the epidemiology of outpatient ADEs.

Level IV: Non-experimental study

Topic 1: Risks

Haidukewych, G. J., Scaduto, J., Herscovici, D., Jr, Sanders, R. W., & DiPasquale, T. (2002). Iatrogenic nerve injury in acetabular fracture surgery: A comparison of monitored and unmonitored procedures. *Journal of Orthopaedic Trauma, 16(5), 297-301.*

Journal Article

OBJECTIVES: To review our experience with iatrogenic nerve injuries and to evaluate the efficacy of intraoperative monitoring in a large consecutive series of operatively treated acetabular fractures. **DESIGN:** Retrospective, nonrandomized. **SETTING:** Level I Trauma Center, January 1, 1992 through December 31, 1998. **PATIENTS/PARTICIPANTS:** A total of 256 consecutive acetabular fractures were operatively treated at our institution; 140 unmonitored procedures and 112 monitored procedures were available for review. The decision to use monitoring was at the discretion of the treating surgeon. **INTERVENTION:** Open reduction and internal fixation of the acetabular fracture. **MAIN OUTCOME MEASUREMENT:** Preoperative and postoperative neurologic examinations, fracture type, use of traction, dislocation, operative approach, and complications were analyzed. Motor strength, sensation, the need for gait aids, orthoses, and extent of recovery were evaluated. **RESULTS:** Traumatic nerve palsies were present in eleven of 140 (7.9 percent) unmonitored and thirteen of 112 (11.6 percent) monitored fractures ($p = 0.314$). There were fourteen iatrogenic sciatic nerve palsies in 252 cases (5.6 percent). There were four iatrogenic sciatic palsies (2.9 percent) in the unmonitored group and ten iatrogenic palsies (8.9 percent) in the monitored group ($p = 0.037$). In the unmonitored group one of eighty-one Kocher-Langenbeck approaches (1.2 percent), two of fifty-two ilioinguinal (3.9 percent), and one of three extended iliofemoral approaches developed a sciatic palsy. In the monitored group six of seventy-seven Kocher-Langenbeck approaches (7.8 percent), three of twenty-five ilioinguinal (12 percent), and one of six combined approaches (16.7 percent) developed a sciatic palsy. In seven of the ten iatrogenic palsies in the monitored group, the intraoperative monitoring was normal. Seventy-six patients were monitored with somatosensory evoked potential alone, and nine had iatrogenic injuries (11.8 percent). Thirty-six patients were monitored with somatosensory evoked potential and electromyography, and one had an iatrogenic injury (2.8 percent) ($p = 0.164$). Clinical follow-up was available for three of the four patients with iatrogenic injuries in the unmonitored group, with a mean follow-up of twenty-seven months (range 8 to 60 months). Two patients had full motor recovery at a mean of six months, and one had no recovery at fourteen months. **CONCLUSIONS:** The use of intraoperative monitoring did not decrease the rate of iatrogenic sciatic palsy. Further study involving larger prospective, randomized methodology appears warranted. Sciatic nerve injury was more common in ilioinguinal approaches in both groups, likely due to reduction techniques for the posterior column performed with the hip flexed, placing the sciatic nerve under tension.

Level IV: Non-experimental study

Topic 1: Risks

Halwani, M., Solaymani-Dodaran, M., Grundmann, H., Coupland, C., & Slack, R. (2006). Cross-transmission of nosocomial pathogens in an adult intensive care unit: Incidence and risk factors. *Journal of Hospital Infection, 63(1), 39-46.*

Journal Article

The incidence and determinants of cross-transmission in an adult intensive care unit (ICU) were examined under normal conditions. Four hundred and thirty patients were followed for 3947 patient-days. Cross-transmitted pathogens were identified by genetic typing. A cross-transmission episode was defined as when two or more patients had indistinguishable isolates and had been treated in the ICU during intervals up to seven days apart. The direction of cross-transmission was confirmed if the incriminated pathogen was isolated from the donor before admission of the recipient; otherwise, both patients could potentially be a donor or a recipient. These patients were excluded from the risk factor analysis. Recipients of pathogens were compared with those who were not involved in cross-

transmission. Out of 22 056 examined specimens, 275 isolates were typed and 40 episodes of cross-transmission were detected. The overall incidence of cross-transmission was 10.7 [95% confidence intervals (CI) 7.6-14.5] per 1000 patient-days. In multivariate analysis, those who were nursed in an understaffed environment [odds ratio (OR) = 3.3, 95% CI 1.4-7.8], had a nasogastric tube (OR = 2.9, 95% CI 1.1-7.8) and were ventilated (OR = 2.5, 95% CI 1.1-6.0) for all of their stay, compared with none or part of their stay, showed an increase in the risk of cross-transmission. Repeated bronchoscopy (OR = 5.1, 95% CI 1.04-25) compared with no bronchoscopy and immunosuppression (OR = 3.9, 95% CI 1.2-12.5) also increased the risk. This study showed that cross-transmission of nosocomial pathogens in the ICU is associated with understaffing, immunosuppression and factors that result in multiple staff/patient contacts, thus emphasizing the importance of hand hygiene.

REF ID: 2914

Level IV: Non-experimental study

Topic 1: Risks

Hamel, M. B., Henderson, W. G., Khuri, S. F., & Daley, J. (2005). Surgical outcomes for patients aged 80 and older: Morbidity and mortality from major noncardiac surgery. *Journal of the American Geriatrics Society*, 53(3), 424-429.

Journal Article, Research, Tables/Charts

OBJECTIVES: To gather information about surgical outcomes for patients in their 80s and 90s.

DESIGN: Prospective cohort study. **SETTING:** Veterans Affairs Medical Centers. **PARTICIPANTS:**

Patients (26,648 aged \geq 80; 568,263 aged $<$ 80) enrolled in the Veterans Affairs National Surgical Quality Improvement Project (NSQIP) who had noncardiac surgery between 1991 and 1999.

METHODS: Data were collected prospectively from medical records and healthcare providers. Detailed information was collected about patients' preoperative status, intraoperative experience, and postoperative outcomes. Postoperative outcomes were survival status at 30 days (deaths from any cause occurring during hospitalization and after hospital discharge were captured) and the occurrence of 21 selected surgical complications within 30 days postoperatively: wound complications (3 types), respiratory complications (4), urinary tract complications (3), nervous system complications (3), cardiac complications (3), and other complications (5). **MEASUREMENTS:** Mortality and the occurrence of 21 surgical complications within 30 days of surgery. **RESULTS:** Thirty-day all-cause mortality rates varied widely across operations and were higher for patients aged 80 and older than for younger patients (8% vs 3%, $P < .001$). Mortality rates for those aged 80 and older were less than 2% for many commonly performed operations (e.g., transurethral prostatectomy, hernia repair, knee replacement, carotid endarterectomy). Of patients aged 80 and older, 20% had one or more postoperative complications, and patients who suffered complications had higher 30-day mortality than those who did not (26% vs 4%, $P < .001$). For 11 of the 21 complications, mortality for patients aged 80 and older was greater than 33%. The risk factors for poor outcomes were the same for older and younger patients, and the NSQIP Mortality Risk model performed well on patients aged 80 and older (C statistic=0.83). **CONCLUSION:** A substantial minority of patients aged 80 and older died or suffered a complication within 30 days of surgery, but for many operations mortality rates were extremely low. Postoperative complications were associated with high 30-day mortality in patients aged 80 and older.

REF ID: 2943

Level V: Case report

Topic 6: Comprehensive

Hart, B. D., Birkas, J., Lachmann, M., & Saunders, L. (2002). Promoting positive outcomes for elderly persons in the hospital: Prevention and risk factor modification. *AACN Clinical Issues: Advanced Practice in Acute and Critical Care*, 13(1), 22-33.

Journal Article, Case Study, Tables/Charts

The hospitalized elderly are at an increased risk for poor outcomes such as increased length of stay, readmissions, functional decline, and iatrogenic complications, as compared with other age groups.

Research related to the hospitalized elderly has identified factors associated with poor outcomes. Nurses and other healthcare team members may be able to identify elderly patients at risk for poor outcomes

and target modifiable factors to minimize their negative impact. Clinical experience and research validate the conclusion that multidimensional, preventive risk factor modification balanced with acute illness treatment can result in positive outcomes for elderly patients.

REF ID: 2793

Level IV: Non-experimental study

Topic 4: Management

Hasan, S., Jilaihawi, A. N., & Prakash, D. (2005). Conservative management of iatrogenic oesophageal perforations--a viable option. *European Journal of Cardio-Thoracic Surgery*, 28(1), 7-10.

Evaluation Studies. Journal Article

OBJECTIVE: Iatrogenic Oesophageal perforations are a dreaded complication and there is no consensus as to their best management. The aim of our study was to assess the results of conservative management in these cases. **METHODS:** Twenty-six patients with iatrogenic perforations of the oesophagus treated over a 10-year period were reviewed retrospectively. They were managed conservatively by keeping them nil by mouth on intravenous fluids and intravenous antibiotics. Out of these 26, nine were patients of carcinoma of the oesophagus while the remaining 17 had benign pathologies. Twenty-two were diagnosed within 6h, while the remaining four were diagnosed over 24h after perforation. Twenty-three of the 26 were caused by oesophageal dilatations. **RESULTS:** Twenty-two (84.6%) of the 26 survived on this regimen. Out of the four that died, two had advanced carcinomas and died of chest complications, one died of a myocardial infarction and the fourth was an old debilitated man who died of renal failure. All four who died had extension of the leak into the pleural cavity. Early diagnosis and treatment is of critical importance and is only possible by maintaining a high index of suspicion. **CONCLUSIONS:** Conservative management when applied to cases of iatrogenic oesophageal perforations gives results comparable to or better than those reported in series where early surgical intervention was practised. Extension of the leak into the pleura carries a worse prognosis.

REF ID: 2762

Level V: Case report

Topic 1: Risks

Hoye, A., & Clark, A. (2003). Iatrogenic hyperkalaemia. *Lancet*, 361(9375), 2124.
Journal Article, Case Study, Pictorial

REF ID: 2862

Level V: Case Reports

Topic 1: Risks

Hunsaker, D. M., & Hunsaker, J. C.,3rd. (2002). Therapy-related cafe coronary deaths: Two case reports of rare asphyxial deaths in patients under supervised care. *American Journal of Forensic Medicine & Pathology*, 23(2), 149-154.

Case Reports. Journal Article

Cafe coronary deaths, as initially characterized, denote fatal occlusion of the upper airway by food substances. Such fatalities typically occur in individuals who either are clinically inebriated or have clinically significant neuromuscular dysfunction. Both conditions impair mastication and deglutition. The authors review the accidental deaths of two neurologically compromised patients under supervised care. Both subjects underwent complete medicolegal autopsy. In one case, ingestion of a prescribed emollient laxative precipitated death; in the other, death was attributable to aspiration of a contrast medium during a diagnostic radiographic procedure. These therapy-related deaths, which are regarded as a variation of the traditionally described cafe coronary fatalities summarized in the discussion, represent adverse events occurring during medical care. The adverse outcomes reviewed here are potentially avoidable and require special attentiveness by the clinicians directed to the particular condition of each patient. Such true aspiration-related deaths are confirmed on autopsy examination and are to be differentiated from the findings of agonal aspiration of gastric contents commonly encountered by the autopsy pathologist investigating deaths due to a great variety of natural and traumatic causes.

REF ID: 2813**Level V: Case report****Topic 1: Risks**

Imai, S., Tamada, T., Gyoten, M., Yamashita, T., & Kajihara, Y. (2004-Aug). Iatrogenic venous air embolism caused by CT injector--from a risk management point of view. *Radiation Medicine*, 22(4), 269-271.

Case Reports. Journal Article. Review

An iatrogenic venous air embolism caused by computed tomography (CT) injector occurred in a 74-year-old man undergoing abdominal-pelvic CT for evaluation of an abdominal aortic aneurysm (AAA). During the initial inspection scan of the thoracic part, a large amount of air was detected in the right ventricle, but no contrast medium was noted in the aorta. Surface oxygen was given immediately, and the patient was placed in the left lateral decubitus position on the CT bed. During that time he had no symptoms except coughing. CT revealed no air in the brain or pulmonary vein, and he was returned to his room 55 minutes after the incident. There were no complications during a six-month follow-up period. The importance of daily risk management and immediate proper after care to prevent such accidents was reconfirmed. [References: 9]

REF ID: 2934**Level IV: Non-experimental study****Topic 5: Evaluation/follow-up**

Iwata, K., Smith, Santos, E., Polsky, B., & Sordillo, E. M. (2002). Failure to implement respiratory isolation: Why does it happen? *Infection Control and Hospital Epidemiology*, 23(10), 595-599.

Journal Article, Research, Tables/Charts

BACKGROUND: Respiratory isolation for 90% of individuals with acid-fast bacillus (AFB)-smear-positive tuberculosis (TB) is a recommended performance indicator in recent Infectious Diseases Society of America and Centers for Disease Control and Prevention guidelines. However, compliance with respiratory isolation reported from multiple centers in the United States and Europe falls short of that goal. **OBJECTIVE:** To identify missed clues in TB patients who are not appropriately isolated. **DESIGN:** Retrospective survey. **SETTING:** A 900-bed voluntary hospital. **PATIENTS:** All patients with AFB-smear-positive TB admitted between January 1995 and December 1999 who were not appropriately isolated. **RESULTS:** There were 173 TB cases admitted, including 106 with pulmonary TB. AFB smears were positive in 82 cases; 24 (29%) of these were not appropriately isolated. During the study period, the number of TB cases declined, but the proportion of appropriately isolated patients did not change. Most isolation failure cases were men (median age, 45.5 years); 21 of these patients were black, 2 were Hispanic white, and 1 was Asian, but none was non-Hispanic white. All isolation failure cases had at least one characteristic predictive of TB that could have been elicited at admission (eg, abnormal chest radiograph findings consistent with TB, fever, weight loss, a history of TB, a positive result on tuberculin skin test, hemoptysis, and human immunodeficiency virus infection). **CONCLUSION:** Consistent with experiences at other hospitals, we found that the rate of isolation failure remained unchanged despite an overall decline in TB cases. In our experience, almost all isolation failures could be avoided by careful review of the history, physical examination, and chest radiograph for characteristics classically considered predictive of TB.

REF ID: 2757**Level V: Literature review****Topic 1: Risks**

Jacobs, L. G. (2003). Prophylactic anticoagulation for venous thromboembolic disease in geriatric patients. *Journal of the American Geriatrics Society*, 51(10), 1472-1478.

Journal Article, Research, Tables/Charts

Venous thromboembolic disease (VTED) occurs commonly in geriatric medical patients, causing significant morbidity and mortality. Although VTED is preventable, prophylactic anticoagulation is underused. Awareness of the clinical risk factors that contribute to VTED in the elderly is essential for identifying candidates for prophylaxis. Iatrogenic risk factors include venous catheterization,

transvenous pacemaker placement, hormone replacement therapy, and immobilization or prolonged bed rest. Medical conditions associated with increased risk include a previous episode of VTED, myocardial infarction, heart failure, severe lung disease, cancer, and neurological conditions associated with paresis. Obstacles to the widespread usage of VTED prophylaxis in geriatric medical patients include the clinically silent nature of VTED, underestimation of the risk and clinical effect of VTED in this population, and concerns about the cost and safety of anticoagulant therapy in this population. Clinical practice guidelines devised specifically for geriatric medical patients facilitate rational use of thromboprophylaxis in this population. The safety, efficacy, cost-effectiveness, and convenience of low-molecular-weight heparins for thromboprophylaxis are reflected in their increasing prominence in clinical practice guidelines and clinical use.

REF ID: 2896

Level V: Literature Review

Topic 2: Prevention

Jaffer, A. K., & Brotman, D. J. (2006). Prevention of venous thromboembolism in the geriatric patient. *Clinics in Geriatric Medicine*, 22(1), 93-111.

Journal Article, Review, Tables/Charts

Elderly patients immobilized because of an acute medical illness or surgery have a very high risk of developing venous thromboembolism (VTE). Aggressive pharmacologic prophylaxis is necessary and should be initiated either at admission for a medical condition or shortly after surgery. Aggressive prophylaxis may result in fewer patients developing VTE in the hospital and ultimately lead to fewer patients requiring full-dose anticoagulation for VTE. Mechanical prophylaxis can be used as an adjunct to an anticoagulant-based regimen but should only be used as primary prophylaxis when there is a contraindication, such as active bleeding. It is recommended that the clinician carefully evaluate the elderly patient's creatinine clearance and weight before prescribing anticoagulants, particularly when using fixed dosing regimens. Copyright (C) 2006 by Elsevier Science (USA).

REF ID: 2915

Level IV: Non-experimental study

Topic 3: Assessment

Johnson, M., Griffiths, R., Piper, M., & Langdon, R. (2005). Risk factors for an untoward medication event among elders in community-based nursing caseloads in australia. *Public Health Nursing*, 22(1), 36-44.

Journal Article, Research, Tables/Charts

This study sought to develop and test a set of criteria to distinguish elders at high risk of an untoward medication event within community nursing caseloads. A descriptive correlational design was used to identify relevant risk factors for elders. Data on medication knowledge, regime, management abilities, and adherence were obtained from 111 elders receiving community nursing care. Four predictors-12 or more doses of medications per day, more than one prescriber, caregiver available, and sometimes forgetting to take medications-of complexity (R(2) explaining 39% of the variance) and adherence (R(2) explaining 49% of the variance) were identified as potential factors that subsequently confirmed a discrete group of high risk elders. The use of these four risk factors or screening criteria is recommended for older people within community nursing caseloads.

REF ID: 2855

Level V: Literature review

Topic 4: Management

Kane, R. L. (2002). Clinical challenges in the care of frail older persons. *Aging-Clinical & Experimental Research*, 14(4), 300-306.

Journal Article. Review

The clinical challenges of meeting the needs of frail older persons are essentially those encompassed by chronic disease multiplied by the special problems presented by aging, namely the presentation and management of disease and the special syndromes associated with geriatrics. The need to develop an approach to the care of frail older persons reflects a more general need to address system reform for

chronic disease. The steps include new roles for patients and their families, the use of information technology to monitor changes in patients' status more continuously and to intervene in a more timely way, and a re-evaluation of the use of personnel at all levels. At present, we know more about how to deliver effective chronic care than we practice. The barriers to implementation include both a general reluctance to change and negative financial incentives to implement what has been shown to be effective. [References: 61]

REF ID: 2839

Level V: Case report

Topic 1: Risks

Kawaguchi, M., Mitsuhashi, Y., & Kondo, S. (2003). Iatrogenic hypercalcemia due to vitamin D3 ointment (1,24(OH)2D3) combined with thiazide diuretics in a case of psoriasis. *Journal of Dermatology*, 30(11), 801-804.

Case Reports. Journal Article

Tacalcitol is a synthetic vitamin D3 analogue developed for topical treatment of inflammatory skin diseases such as psoriasis. Hypercalcemia has not been previously reported during treatment with topical tacalcitol. We experienced a male patient with psoriasis and hypertension whose conditions were treated with tacalcitol ointment and thiazide, respectively, resulting in hypercalciuria and hypercalcemia. After initiation of topical vitamin D3 ointment (20 micro g/g of tacalcitol) 10 g/day for the skin lesions, both the serum level of calcium and urinary excretion of calcium increased gradually. On day 28 of the treatment, his serum calcium levels had reached 3.55 mmol/l, and his urinary calcium excretion had also increased from 0.008 g/day to 0.475 g/day. The tacalcitol treatment was terminated, seven days later, the serum calcium level had returned to the reference range without any specific treatment. The present case is the first report of hypercalcemia induced by vitamin D3 ointment and thiazide simultaneously.

REF ID: 2930

Level III: Quasi-experimental study

Topic 2: Prevention

Kelly, K. E., Phillips, C. L., Cain, K. C., Polissar, N. L., & Kelly, P. B. (2002). Evaluation of a noninvasive monitor to reduce falls in nursing home patients. *Journal of the American Medical Directors Association*, 3(6), 377-382.

Journal Article, Clinical Trial, Pictorial, Research, Tables/Charts

Objective: A clinical study was conducted to measure the effectiveness and operational characteristics of a new device intended to reduce the incidence of falls in elderly patients at high risk of falling. The NOC[for symbol see text]WATCH device consists of a credit-card size device contained within an adhesive "patch" and worn on the thigh continuously for many days. The patch is small, wireless, disposable, waterproof, shockproof, and unobtrusive. When a patient's leg becomes weight-bearing (such as when a patient gets out of bed or stands up unassisted), the receiver emits an audible signal which both alerts the patient to sit down and also summons a caregiver. Design: A crossover design was used to compare the fall rate of patients while wearing the NOC[for symbol see text]WATCH device with the fall rate while not wearing it. Patients (n = 47) wore the device for one week, and were monitored for fall activity before, during, and after this week. The three time periods were referred to as the "Pre," "During," and "Post" periods, respectively. Participants: The study was conducted between November 1, 2000, and April 1, 2001, in the Medicare unit of a skilled nursing facility in northern California. Forty-seven patients admitted to the unit with a fall risk assessment (FRA) score of at least 6 were entered into the study, with a mean FRA of 11.4. Measurements: The main outcome measure was fall rate per 100 patient days. Qualitative observations of adverse effects on skin integrity, degree of staff and patient acceptance of the system, and lack of false alarms are also reported. Poisson regression with generalized estimating equations was used for analysis of fall rates. Results: Forty-seven patients wore the device. Total number of patient-days of observation were 273, 299, and 497 in the Pre, During, and Post periods, respectively, for a total of 1,069 days of observation. These patients had 11 falls in the Pre period (4.0 falls per 100 days), 1 fall in the During period (0.3 falls per 100 days) and 17 falls in the

Post period (3.4 falls per 100 days). This 91% reduction in fall rate while wearing the NOC[for symbol see text]WATCH is statistically significant with $P = 0.02$. False alarms were qualitatively reported to be low or nonexistent, and patient and caregiver acceptance of the device was reported to be high. No adverse effects on skin integrity were noted. Cognitively impaired patients, who have difficulty remembering to call for assistance, appeared to respond particularly well to the device alarm. Conclusions: The prototype NOC[for symbol see text]WATCH device appears to have a large impact on reducing fall risk in nursing home patients, with minimal adverse effects. However, due to the lack of an equivalent control group, these results should be confirmed with a larger, randomized, controlled study to better estimate the true magnitude of the effect of the NOC[for symbol see text]WATCH device on fall rates.

REF ID: 2848

Level V: literature review

Topic 2: Prevention

Kiledjian, E., Baumgartner-Bonnevay, C., Derharoutunian, C., & Garreau, I. (2003-Apr). [Preventing iatrogenic drug induced diseases in the elderly]. *Soins, Gerontologie*(40), 19-23. Journal Article. Review

REF ID: 2765

Level V: Literature review

Topic 3: Assessment

Klein, J. (2002). Iatrogenesis within long term care facilities. *Occupational Therapy in Health Care, 16*(2/3), 91-104.

Journal Article, Review

Seniors living within long term care facilities have higher incidences of frailness, chronic disease, and deterioration as compared with seniors living in the community. There is increasing evidence within the literature that some of this deterioration is caused by the very facilities they are living in. This article discusses the iatrogenic factors associated with living in long term care facilities and the consequences of such factors on older adults. Following this, an exploration of the relevancy of this issue for occupational therapists will take place. Occupational therapists must be particularly alert to the dangers of iatrogenic effects and be concerned with making changes within the long term care system to prevent further harm to older adults and work on promoting an environment that promotes optimal health.

REF ID: 2808

Level V: Case series

Topic 4: Management

Komurcu, F., Zwolak, P., Benditte-Klepetchko, H., & Deutinger, M. (2005). Management strategies for peripheral iatrogenic nerve lesions. *Annals of Plastic Surgery, 54*(2), 135-139.

Journal Article

For diagnostic or therapeutic reasons, various medical procedures may cause iatrogenic injury of peripheral nerves. The authors treated 82 patients for iatrogenic nerve injury between 1990 and 2000. The main reasons for iatrogenic nerve injury were surgical failure, traction or pressure lesions, hematoma, or inadequate positioning of the patient. The authors performed neurolysis in 67 cases, which included reconstruction by nerve graft in 26 patients and direct coaptation of the nerve in 3 patients. Their postoperative results emphasize the importance of early diagnosis and adequate treatment of iatrogenic peripheral nerve damage for optimal functional recovery. The authors highlight the different causes for iatrogenic injury in this study to alert surgeons as well as other medical specialists to simple strategies for avoiding nerve injury. They also indicate the need for physicians to make themselves familiar with early diagnostic steps for detecting iatrogenic injuries, like electroneurographic studies, and to document physical examinations well, to deal with this problem most effectively.

REF ID: 2816

Level II: Individual experimental study

Topic 4: Management

Krinsley, J. S. (2004). Effect of an intensive glucose management protocol on the mortality of

critically ill adult patients.[see comment][erratum appears in mayo clin proc. 2005 aug;80(8):1101]. *Mayo Clinic Proceedings*, 79(8), 992-1000.

Clinical Trial. Controlled Clinical Trial. Journal Article

OBJECTIVE: To assess the effect of an intensive glucose management protocol in a heterogeneous population of critically ill adult patients. **PATIENTS AND METHODS:** This study consisted of 800 consecutive patients admitted after institution of the protocol (treatment group, between February 1, 2003, and January 10, 2004) and 800 patients admitted immediately preceding institution of the protocol (baseline group, between February 23, 2002, and January 31, 2003). The setting was a 14-bed medical-surgical intensive care unit (ICU) in a university-affiliated community teaching hospital. The protocol involved intensive monitoring and treatment to maintain plasma glucose values lower than 140 mg/dL. Continuous intravenous insulin was used if glucose values exceeded 200 mg/dL on 2 successive occasions. **RESULTS:** The 2 groups of patients were well matched, with similar age, sex, race, prevalence of diabetes mellitus, Acute Physiology and Chronic Health Evaluation II scores, and distribution of diagnoses. After institution of the protocol, the mean glucose value decreased from 152.3 to 130.7 mg/dL ($P<.001$), marked by a 56.3% reduction in the percentage of glucose values of 200 mg/dL or higher, without a significant change in hypoglycemia. The development of new renal insufficiency decreased 75% ($P=.03$), and the number of patients undergoing transfusion of packed red blood cells decreased 18.7% ($P=.04$). Hospital mortality decreased 29.3% ($P=.002$), and length of stay in the ICU decreased 10.8% ($P=.01$). **CONCLUSION:** The protocol resulted in significantly improved glycemic control and was associated with decreased mortality, organ dysfunction, and length of stay in the ICU in a heterogeneous population of critically ill adult patients. These results support the adoption of this low-cost intervention as a standard of care for critically ill patients.

REF ID: 2804

Level V: Literature Review

Topic 1: Risks

Kuzuhara, S. (2005). [Iatrogenic neurological disorders in old people: A review]. *Nippon Ronen Igakkai Zasshi - Japanese Journal of Geriatrics*, 42(1), 21-24.

Journal Article. Review

Aged people are frequently the victims of iatrogenic diseases, especially adverse effects of drugs since they are affected by many age-related diseases and are given many drugs. Geriatric medicine in Japan has a bitter history of having produced many victims by adverse effects of cerebral vasodilators and cerebral stimulants; they included parkinsonism and depression induced by flunarizine and cinnarizine, and Reye-like encephalopathy induced by calcium hopantenate. Parkinsonism induced by sulpiride, tiapride, metoclopramide or atypical anti-psychotics, dyskinesia induced by anti-parkinsonian drugs or anti-psychotics, and psychotic symptoms induced by anti-parkinsonian drugs, anti-cholinergic drugs, anti-depressants or histamine H₂ antagonists are still very common. Wernicke encephalopathy caused by intravenous glucose infusion without thiamine, central pontine myelinolysis by too rapid correction of hyponatremia are important though infrequent. Iatrogenic Creutzfeldt-Jakob disease by dura grafts is a warning against the easy use of medical materials produced with human organs or blood. Iatrogenic diseases are preventable, and geriatricians have to pay attention to the information on adverse effects of drugs and medical materials and carefully observe the early signs of iatrogenic diseases. [References: 10]

REF ID: 2856

Level IV: Non-experimental study

Topic 1: Risks

Kyne, L., Sougioultzis, S., McFarland, L. V., & Kelly, C. P. (2002). Underlying disease severity as a major risk factor for nosocomial *Clostridium difficile* diarrhea. *Infection Control & Hospital Epidemiology*, 23(11), 653-659.

Journal Article

OBJECTIVE: To determine the diagnostic accuracy of an index of underlying disease severity (Horn's index) in identifying patients with a high probability of having nosocomial *Clostridium difficile* diarrhea

as a complication of antimicrobial therapy. DESIGN: A prospective cohort study of 252 adult patients admitted to the hospital and receiving antibiotics. Risk factors for *C. difficile* diarrhea were first determined retrospectively in a different cohort of 300 hospitalized patients (primary cohort) and then prospectively in this cohort of 252 hospitalized patients receiving antibiotics (secondary cohort). At the time of hospital admission, disease was rated by clinicians as mild (1), moderate (2), severe (3), or extremely severe (4) using a modified Horn's index. Multivariable logistic regression analysis was used to determine the odds ratio (OR) for *C. difficile* diarrhea associated with increasing levels of disease severity. SETTING: An urban teaching hospital affiliated with a medical school in Boston, Massachusetts. RESULTS: The incidence of nosocomial *C. difficile* diarrhea was 8.7% in the primary cohort and 11% in the secondary cohort. In the prospective cohort study (secondary cohort), the OR for *C. difficile* diarrhea associated with extremely severe disease was 17.6 (95% confidence interval, 5.8 to 53.5). The sensitivity, specificity, and positive and negative predictive values of a Horn's index score of 3 or more (severe to extremely severe disease) as a predictor of nosocomial *C. difficile* diarrhea were 79%, 73%, 27%, and 96%, respectively. CONCLUSIONS: These findings provide a means of early stratification of hospitalized patients receiving antibiotics according to their risk for nosocomial *C. difficile* diarrhea. Patients with severe to extremely severe disease at the time of admission may benefit from careful monitoring of antibiotic prescribing and early attention to infection control issues. In the future, these "high-risk" patients may benefit from prophylaxis studies of novel agents being developed to prevent *C. difficile* diarrhea.

REF ID: 2857

Level IV: Non-experimental study

Topic 1: Risks

Laupland, K. B., Zygun, D. A., Davies, H. D., Church, D. L., Louie, T. J., & Doig, C. J. (2002). Population-based assessment of intensive care unit-acquired bloodstream infections in adults: Incidence, risk factors, and associated mortality rate. *Critical Care Medicine*, 30(11), 2462-2467. Journal Article. Multicenter Study

OBJECTIVE: Nosocomial bloodstream infections have been extensively investigated, but relatively few studies have specifically evaluated the epidemiology of intensive care unit-acquired bloodstream infections. The study objective was to define the incidence, risk factors, microbiology, and clinical outcomes of intensive care unit-acquired bloodstream infections. DESIGN: Population-based prospective cohort. SETTING: Multidisciplinary intensive care units. PATIENTS: All Calgary Health Region (population 930,000) adult patients admitted to multidisciplinary intensive care units (≥ 48 hrs) from May 1, 1999, to April 30, 2000. INTERVENTIONS: Blood sample analysis. MEASUREMENTS AND RESULTS: There were 1,158 admission episodes in 1,017 patients; 37% involved females, and mean \pm sd age and Acute Physiology and Chronic Health Evaluation II scores were 59.6 \pm 18.7 yrs and 23.4 \pm 7.7, respectively. Fifty-one patients developed intensive care unit-acquired bloodstream infections (first positive blood culture ≥ 48 hrs after intensive care unit admission) for an incidence of 4.4% and an incidence density of 5.2 per 1000 intensive care unit days. Younger age (adjusted odds ratio, 0.98; 95% confidence interval, 0.96-1.00, $p = .01$), longer intensive care unit length of stay (adjusted odds ratio, 4.74; 95% CI, 3.26-6.90, $p < .001$), and lower hematocrit (adjusted odds ratio, 0.95; 95% confidence interval, 0.90-1.00, $p = .04$) were significant independent predictors of intensive care unit-acquired bloodstream infections, and these infections were associated with an increased intensive care unit length of stay of 2.86 days (95% confidence interval, 2.29-3.57, $p < .001$). *Staphylococcus aureus* (27%), coagulase-negative staphylococci (14%), and *Enterococcus faecium* (12%) were most commonly isolated. Four (8%) bloodstream infections involved antibiotic-resistant organisms, and ten (20%) were polymicrobial. In multivariate analysis, intensive care unit-acquired bloodstream infection was associated with an increased intensive care unit mortality rate (adjusted odds ratio, 2.03; 95% confidence interval, 1.03-4.00, $p = 0.04$) but not overall hospital mortality rate. CONCLUSIONS: One patient in 20 admitted to Calgary Health Region intensive care units acquires bloodstream infection and suffers longer intensive care unit stay and increased mortality rates. In our region, multiple antibiotic-

resistant organisms are uncommon causes of bloodstream infections, suggesting that it may be safe to use narrower spectrum empirical treatment regimens than current guidelines recommend.

REF ID: 2843

Level IV: Non-experimental study

Topic 1: Risks

Leone, M., Albanese, J., Garnier, F., Sapin, C., Barrau, K., & Bimar, M. C. et al. (2003). Risk factors of nosocomial catheter-associated urinary tract infection in a polyvalent intensive care unit.[see comment]. *Intensive Care Medicine*, 29(7), 1077-1080.

Duplicate Publication. Journal Article

OBJECTIVE: To determine the risk factors for catheter-associated urinary tract infection in a polyvalent intensive care unit (ICU). **DESIGN:** Prospective cohort study. **SETTING:** Sixteen-bed polyvalent ICU in a French university hospital. **INTERVENTIONS:** Prospective patient surveillance of patients included in two successive studies of two urine drainage systems. **MAIN OUTCOME MEASURES:** Bacteriuria occurrence in 553 ICU patients requiring a bladder catheter for longer than 48 h. The following variables were analyzed as possible risk factors: age, sex, severity score at admission, diagnosis on admission, duration of bladder catheterization, length of ICU stay, prior exposure to antibiotics, and system of urine drainage. **RESULTS:** The frequency of catheter-associated bacteriuria was 9.6%. From the multivariate analysis, five independent risk factors were determined: female sex, length of ICU stay, use of an antimicrobial therapy, severity score at admission, and duration of catheterization. **CONCLUSION:** In our study, the drainage system did not influence the occurrence of bacteriuria. To decrease the rate of catheter-associated bacteriuria in polyvalent ICU patients, removal of the bladder catheter must be performed as soon as possible.

REF ID: 2824

Level IV: Non-experimental study

Topic 3: Assessment

Leroy, O., Meybeck, A., d'Escrivan, T., Devos, P., Kipnis, E., & Gonin, X. et al. (2004). Hospital-acquired pneumonia in critically ill patients: Mortality risk stratification upon onset. *Treatments in Respiratory Medicine*, 3(2), 123-131.

Journal Article

STUDY OBJECTIVES: To identify, in patients experiencing hospital-acquired pneumonia (HAP), prognostic factors present at disease onset and build an algorithm capable of stratifying mortality risk upon HAP onset. **DESIGN:** Observational cohort from January 1994 to December 2001. **SETTING:** One intensive care unit (ICU) from a university-affiliated, urban teaching hospital. **PATIENTS:** All consecutive patients exhibiting bacteriologically documented HAP either on ICU admission or during ICU stay. **INTERVENTIONS:** Data collection and multivariate analysis using Chi-Square Automatic Interaction and Detection technique. **RESULTS:** 168 patients were studied. The overall mean mortality rate was 49.4%. Upon onset of HAP, five independent variables allowed binary stratification of mortality risk. These consisted of underlying diseases (nonfatal versus ultimately and rapidly fatal diseases), Simplified Acute Physiology Score II (less than versus ≥ 37), platelet count (less than versus $\geq 150,000/\text{mm}^3$), chest x-ray involvement (1 versus >1 lobe), and $\text{PaO}_2/\text{FiO}_2$ (less than versus ≥ 167 mm Hg). A branching algorithm consisting of these five variables identified patients with HAP at both low (75%) risk of mortality. **CONCLUSION:** Mortality in ICU patients with HAP may be predicted early, upon onset of HAP, by the cumulative use of prognostic factors in an algorithm.

REF ID: 2944

QM: Quality measures

Topic 5: Evaluation/follow-up

Ley, S. J. (2001). Quality care outcomes in cardiac surgery: The role of evidence-based practice. *AACN Clinical Issues: Advanced Practice in Acute and Critical Care*, 12(4), 606-617.

Journal Article, Practice Guidelines, Research, Tables/Charts

An internal database and research methods were used to evaluate the impact of clopidogrel on cardiac surgical bleeding. This quality improvement initiative, led by the clinical nurse specialist, showed that

preoperative exposure to clopidogrel was associated with significant increases in chest tube output, blood product use, and reoperation for bleeding rates that were 10-fold higher than for control patients (0.85% versus 8.3%, $P = 0.027$). Acute care costs averaged \$2,680 more for patients who received clopidogrel ($P = 0.1936$). After implementation of an interdepartmental clinical practice guideline, preoperative exposure to clopidogrel dropped from 39% to 6.3% ($P = 0.0000$). This drop was accompanied by reductions in chest tube output, blood product use, and bleeding complications, with improved achievement of clinical benchmarks. The availability of internal evidence to support achievement of best practices was an essential factor in the implementation of this interdepartmental change. Comprehensive database systems and advanced practice nurses are highlighted as essential components of evidence-based programs.

REF ID: 2938

Level IV: Non-experimental study

Topic 3: Assessment

Liu, L. L., Dzankic, C., & Leung, J. M. (2002). Preoperative electrocardiogram abnormalities do not predict postoperative cardiac complications in geriatric surgical patients. *Journal of the American Geriatrics Society*, 50(7), 1186-1191.

Journal Article, Research, Tables/Charts

OBJECTIVES: Preoperative electrocardiograms (ECGs) are routinely performed on older patients before surgery. Whether patients with abnormalities on preoperative ECGs have an increased likelihood of developing postoperative cardiac complications is unknown. This study was designed to determine whether abnormalities on preoperative ECGs were predictive of postoperative cardiac complications. **DESIGN:** Prospective observational study. **SETTING:** One of the teaching hospitals of the University of California, San Francisco, Medical Center. **PARTICIPANTS:** Five hundred thirteen patients aged 70 and older undergoing noncardiac surgery. **MEASUREMENTS:** Preoperative ECGs were analyzed using the Minnesota Codes. Predefined preoperative risk factors and in-hospital postoperative cardiac complications were measured. The association between ECG abnormalities and postoperative cardiac complications was determined by multivariate logistic regression after controlling for clinical covariates. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported. **RESULTS:** Three hundred eighty-six of 513 patients (75.2%) had at least one abnormality on their preoperative ECGs. On multivariate analysis, the predictors of postoperative cardiac complications included American Society of Anesthesiologists physical status classification of 3 or greater ($OR = 2.5$, 95% $CI = 1.28-4.89$, $P = .007$) and a history of congestive heart failure ($OR = 2.1$, 95% $CI = 1.1-5.1$, $P = .034$). The presence of abnormalities on preoperative ECGs was not associated with an increased risk of postoperative cardiac complications ($OR = 0.63$, 95% $CI = 0.28-1.40$, $P = .26$). **CONCLUSION:** Abnormalities on preoperative ECGs are common but are of limited value in predicting postoperative cardiac complications in older patients undergoing noncardiac surgery. These results suggest that obtaining preoperative ECGs based on an age cutoff alone may not be indicated, because ECG abnormalities in older people are prevalent but nonspecific and less useful than the presence and severity of comorbidities in predicting postoperative cardiac complications.

REF ID: 2927

Level IV: Non-experimental study

Topic 5: Evaluation/follow-up

Loan, L. A., Jennings, B. M., Brosch, L. R., DePaul, D., & Hildreth, P. (2003). Indicators of nursing care quality: Findings from a pilot study. *Outcomes Management*, 7(2), 51-60.

Journal Article, CEU, Equations & Formulas, Exam Questions, Research, Tables/Charts

Staffing data (staff mix and nursing care hours) and patient outcome indicator data (falls, skin integrity, nosocomial infections, and satisfaction) from a pilot study are presented. These data provide a compelling case for developing databases and collection systems that capture standardized indicator and staffing data to address issues about the quality of nursing care. They also underscore the need for establishing benchmarks that represent targets of excellence as well as determining what constitutes adequate staffing.

REF ID: 2841

Level II: Individual experimental study

Topic 2: Prevention

Lorente, L., Lecuona, M., Malaga, J., Revert, C., Mora, M. L., & Sierra, A. (2003). Bacterial filters in respiratory circuits: An unnecessary cost? *Critical Care Medicine, 31*(8), 2126-2130.

Clinical Trial. Journal Article. Randomized Controlled Trial

OBJECTIVE: To evaluate the efficacy of bacterial filters (BF) to decrease pneumonia associated with mechanical ventilation (MV). DESIGN: Prospective, randomized study. SETTING: A 24-bed medicosurgical intensive care unit in a 650-bed tertiary hospital. PATIENTS: A total of 230 patients who needed MV for >24 hrs. INTERVENTIONS: A total of 114 patients were ventilated with BF and 116 without BF. MEASUREMENTS: Throat swab and tracheal aspirate were taken at the moment of admission and twice a week until discharge. We considered the following infectious events: pneumonia, respiratory infection, which comprises pneumonia or tracheobronchitis, and respiratory colonization-infection complex, which comprises respiratory infection or colonization. All infectious events were classified as endogenous or exogenous based on throat flora. MAIN RESULTS: Both groups of patients (ventilated with and without filters) were similar in age, sex, Acute Physiology and Chronic Health Evaluation II score, diagnostic group, days of MV, and mortality. There was no difference in the percentage of patients who developed pneumonia (24.56% with BF and 21.55% without BF), respiratory infection (33.33% vs. 28.44%), or colonization-infection (42.10% vs. 43.96%). The number of infectious events per 1000 days of MV were also similar in both groups: pneumonia (17.41 with BF and 16.26 without BF), respiratory infection (24.62 vs. 21.48), and colonization-infection (36.63 vs. 36). There were also no differences in incidence of infectious events by MV duration. Likewise, we did not find any differences in the number of exogenous events per 1000 days of MV: pneumonia, 2.40 with BF vs. 1.74 without BF; colonization-infection, 4.20 vs. 4.05. CONCLUSIONS: Bacterial filters in ventilation circuits neither reduce the prevalence of respiratory infections associated with MV nor decrease exogenous infectious events; thus, their usage is not necessary.

REF ID: 2806

Level V: Case report

Topic 1: Risks

Lu, R., & Katta, R. (2005-Feb). Iatrogenic contact dermatitis due to propylene glycol. *Journal of Drugs in Dermatology: JDD, 4*(1), 98-101.

Case Reports. Journal Article

REF ID: 2772

Level V: Literature Review

Topic 4: Management

Lyons, W. L., & Landefeld, C. S. (2001). Improving care for hospitalized elders... this article was adapted from a session at the 2000 american geriatrics society annual meeting. *Annals of Long-Term Care, 9*(4), 35-40.

Journal Article, Review, Tables/Charts

A systematic approach by the individual clinician to his or her hospitalized older patients will identify many problems that affect both outcomes and costs. Such an approach will also provide an opportunity for the clinician to take steps to prevent iatrogenic injury. In addition, reengineering overall hospital systems of care-by constructing specialized Acute Care of Elders units for these vulnerable patients or by implementing nurse-based systems for discharge planning and follow-up--has the potential to improve outcomes and costs.

REF ID: 2545

Level V: Case report

Topic 4: Management

MacDonald, F. (2004). Iatrogenic prescribing in acute care: Learning from our mistakes. *Journal of Gerontological Nursing, 30*(3), 20-25.

Case Reports. Journal Article

1. The pharmacokinetics of medications (i.e., absorption, distribution, metabolism, elimination) are altered in older adults because of age-related changes in body composition, diminished vascularity, and atrophy of end-organs. 2. The result of altered pharmacokinetics is often a stronger drug effect than seen in younger adults, a longer duration of drug action, and higher risk of adverse drug effects and drug-drug interactions. 3. Nurses working with older adults should be aware of measures to prevent potential adverse drug effects, including being aware of adverse effects of drugs and that the effects of drugs in older adults are atypical; being aware that changing more than one medication or dosage at a time may make interpretation of the response more difficult; being aware that many drugs with narrow therapeutic windows can and should be monitored via serum levels, and that renal insufficiency will increase the chance of adverse drug effects for renally excreted drugs.

REF ID: 2840

Level I: Systematic Review

Topic 4: Management

Madigan, E., & Neff, D. F. (2003). Care of patients with long-term indwelling urinary catheters. *Online Journal of Issues in Nursing, 8(3), 7.*

Journal Article. Review

The complications and management of long-term indwelling catheters used for urinary retention and incontinence were reviewed. Research evidence from 1992 - 2002 was located through searches of CINAHL (38 articles), and Medline (89 articles). Fifty studies were critiqued for this review. The most common complications of long-term indwelling catheters are bacteriuria, encrustation, and blockage. Less common is the prevalence of bacteremia and renal disease. Risk factors for bacteriuria include female gender, older age, and long-term indwelling catheter use. Urinary white blood cells are the best indicator of urinary tract infection. For drainable catheter systems used by community dwelling adults, daily bag cleaning with a diluted bleach solution (1:10) is effective in reducing bacterial counts to negligible numbers. Application of topical antibiotic cream to the meatus around the catheter does not reduce bacteriuria. Silicone catheters and larger lumen size catheters are more resistant to encrustation than other catheter types and smaller lumen size catheters. Acidifying the urine without removing the urease-producing bacteria does not reduce encrustation. Removal of catheter blockage is preventive for renal disease. Because of the complications of long-term indwelling catheter usage, periodic assessment and voiding trials should be used to determine the continued need for a catheter. Evidence-based recommendations for managing indwelling urinary catheters include screening for risk factors and evaluating urinary white blood cell count for infection, and assessment of the continued need for a catheter. Interventions include consideration of closed versus open drainage systems, type of catheter, and size of catheter lumen. [References: 50]

REF ID: 2871

Level IV: Non-experimental study

Topic 1: Risks

Malone, D. L., Genuit, T., Tracy, J. K., Gannon, C., & Napolitano, L. M. (2002). Surgical site infections: Reanalysis of risk factors. *Journal of Surgical Research, 103(1), 89-95.*

Journal Article

BACKGROUND: Surgical site infections (SSI) are the most common nosocomial infection in surgical patients, accounting for 38% of all such infections, and are a significant source of postoperative morbidity resulting in increased hospital length of stay and increased cost. During 1986-1996 the Center for Disease Control and Prevention's National Nosocomial Infections Surveillance system reported 15,523 SSI following 593,344 operations (2.6%). Previous studies have documented patient characteristics associated with an increased risk of SSI, including diabetes, tobacco or steroid use, obesity, malnutrition, and perioperative blood transfusion. In this study we sought to reevaluate risk factors for SSI in a large cohort of noncardiac surgical patients. **METHODS:** Prospective data (NSQIP) were collected on 5031 noncardiac surgical patients at the Veteran's Administration Maryland Healthcare System from 1995 to 2000. All preoperative risk factors were evaluated as independent predictors of surgical site infection. **RESULTS:** The mean age of the study cohort was 61 plus minus 13.

SSI occurred in 162 patients, comprising 3.2% of the study cohort. Gram-positive organisms were the most common bacterial etiology. Multiple logistic regression analysis documented that diabetes (insulin- and non-insulin-dependent), low postoperative hematocrit, weight loss (within 6 months), and ascites were significantly associated with increased SSI. Tobacco use, steroid use, and chronic obstructive pulmonary disease (COPD) were not predictors for SSI. CONCLUSION: This study confirms that diabetes and malnutrition (defined as significant weight loss 6 months prior to surgery) are significant preoperative risk factors for SSI. Postoperative anemia is a significant risk factor for SSI. In contrast to prior analyses, this study has documented that tobacco use, steroid use, and COPD are not independent predictors of SSI. Future SSI studies should target early preoperative intervention and optimization of patients with diabetes and malnutrition.

REF ID: 2753

Level V: Case report

Topic 4: Management

Malone, M. L., & DantoNocton, E. S. (2004). Improving the hospital care of nursing facility residents. *Annals of Long-Term Care*, 12(5), 42-49.

Journal Article, Case Study, Pictorial, Tables/Charts

Nursing home residents are at high risk for developing complications when they require hospitalization. Little research exists to help determine the best way to manage these patients to lower the risk of further functional decline when they are hospitalized. Models using an interdisciplinary team seem to be the most promising, with careful communication between the nursing facility and the hospital a must. This article examines reasons for transfer and common problems encountered, and provides recommendations for improving transition of care between these two settings.

REF ID: 2884

Level V: Case report

Topic 1: Risks

Mana, F., De Vogelaere, K., & Urban, D. (2001). Iatrogenic perforation of the colon during diagnostic colonoscopy: Endoscopic treatment with clips.[see comment]. *Gastrointestinal Endoscopy*, 54(2), 258-259.

Case Reports. Journal Article

REF ID: 2920

Level IV: Non-experimental study

Topic 3: Assessment

Mathew, J. P., Fontes, M. L., Tudor, I. C., Ramsay, J., Duke, P., & Mazer, C. D. et al. (2004). A multicenter risk index for atrial fibrillation after cardiac surgery. *JAMA: Journal of the American Medical Association*, 291(14), 1720-1729.

Journal Article, Research, Tables/Charts

CONTEXT: Atrial fibrillation is a common, but potentially preventable, complication following coronary artery bypass graft (CABG) surgery. OBJECTIVES: To assess the nature and consequences of atrial fibrillation after CABG surgery and to develop a comprehensive risk index that can better identify patients at risk for atrial fibrillation. DESIGN, SETTING, AND PARTICIPANTS: Prospective observational study of 4657 patients undergoing CABG surgery between November 1996 and June 2000 at 70 centers located within 17 countries, selected using a systematic sampling technique. From a derivation cohort of 3093 patients, associations between predictor variables and postoperative atrial fibrillation were identified to develop a risk model, which was assessed in a validation cohort of 1564 patients. MAIN OUTCOME MEASURE: New-onset atrial fibrillation after CABG surgery. RESULTS: A total of 1503 patients (32.3%) developed atrial fibrillation after CABG surgery. Postoperative atrial fibrillation was associated with subsequent greater resource use as well as with cognitive changes, renal dysfunction, and infection. Among patients in the derivation cohort, risk factors associated with atrial fibrillation were advanced age (odds ratio [OR] for 10-year increase, 1.75; 95% confidence interval [CI], 1.59-1.93); history of atrial fibrillation (OR, 2.11; 95% CI, 1.57-2.85) or chronic obstructive pulmonary disease (OR, 1.43; 95% CI, 1.09-1.87); valve surgery (OR, 1.74; 95% CI, 1.31-2.32); and

postoperative withdrawal of a beta-blocker (OR, 1.91; 95% CI, 1.52-2.40) or an angiotensin-converting enzyme (ACE) inhibitor (OR 1.69; 95% CI, 1.38-2.08). Conversely, reduced risk was associated with postoperative administration of beta-blockers (OR, 0.32; 95% CI, 0.22-0.46), ACE inhibitors (OR, 0.62; 95% CI, 0.48-0.79), potassium supplementation (OR, 0.53; 95% CI, 0.42-0.68), and nonsteroidal anti-inflammatory drugs (OR, 0.49; 95% CI, 0.40-0.60). The resulting multivariable risk index had adequate discriminative power with an area under the receiver operating characteristic (ROC) curve of 0.77 in the validation sample. Forty-three percent (640/1503) of patients who had atrial fibrillation after CABG surgery experienced more than 1 episode of atrial fibrillation. Predictors of recurrent atrial fibrillation included older age, history of congestive heart failure, left ventricular hypertrophy, aortic atherosclerosis, bicaval venous cannulation, withdrawal of ACE inhibitor or beta-blocker therapy, and use of amiodarone or digoxin (area under the ROC curve of 0.66). Patients with recurrent atrial fibrillation had longer hospital stays and experienced greater infectious, renal, and neurological complications than those with a single episode. **CONCLUSIONS:** We have developed and validated models predicting the occurrence of atrial fibrillation after CABG surgery based on an analysis of a large multicenter international cohort. Our findings suggest that treatment with beta-blockers, ACE inhibitors, and/or nonsteroidal anti-inflammatory drugs may offer protection. Atrial fibrillation after CABG surgery is associated with important complications.

REF ID: 2781

Level IV: Non-experimental study

Topic 1: Risks

Mattner, F., Sohr, D., Heim, A., Gastmeier, P., Vennema, H., & Koopmans, M. (2006). Risk groups for clinical complications of norovirus infections: An outbreak investigation. *Clinical Microbiology & Infection*, 12(1), 69-74.

Journal Article

Norovirus infections have been described as self-limiting diseases of short duration. An investigation of a norovirus outbreak in a university hospital provided evidence for severe clinical features in patients with several underlying diseases. Clinical outcomes of norovirus infection were defined. Risk-factor analysis targeting underlying diseases and medication was performed using multivariate analyses. In five outbreak wards, 84 patients and 60 nurses were infected (an overall attack rate of 32% in patients, and 76% in nurses). The causative agent was the new variant Grimsby virus. Severe clinical features, including acute renal failure, arrhythmia and signs of acute graft organ rejection in renal transplant patients, were observed in seven (8.3%) patients. In multivariate analyses, cardiovascular disease (OR 17.1, 95% CI 2.17-403) and renal transplant (OR 13.0, 95% CI 1.63-281) were risk-factors for a potassium decrease of >20%. Age >65 years (OR 11.6, 95% CI 1.89-224) was a risk-factor for diarrhoea lasting >2 days. Immunosuppression (OR 5.7, 95% CI 1.78-20.1) was a risk-factor for a creatinine increase of >10%. Norovirus infections in patients with underlying conditions such as cardiovascular disease, renal transplant and immunosuppressive therapy may lead to severe consequences typified by decreased potassium levels, increased levels of C-reactive protein and creatine phosphokinase. In the elderly, norovirus infection may lead to an increased duration of diarrhoea. Therefore patients at risk should be hospitalised early and monitored frequently. Strict preventional measures should be implemented as early as possible to minimise the risk of nosocomial outbreaks.

REF ID: 2940

Level IV: Non-experimental study

Topic 1: Risks

Maurer, M. S., Luchsinger, J. A., Wellner, R., Kukuy, E., & Edwards, N. M. (2002). The effect of body mass index on complications from cardiac surgery in the oldest old. *Journal of the American Geriatrics Society*, 50(6), 988-994.

Journal Article, Research, Tables/Charts

OBJECTIVES: Overweight (body mass index (BMI)>25) and obesity (BMI>30) are associated with adverse outcomes in the general population. In older people, an increased risk of adverse events was observed in leaner and overweight older subjects. We evaluated the association between BMI and

cardiac surgery complications in subjects aged 75 and older. DESIGN: Retrospective review of complication rates compiled as part of the New York State Department of Health Adult Cardiac Surgery Report. SETTING: Academic tertiary care medical center. PARTICIPANTS: One thousand four hundred forty-eight subjects aged 75 and older who underwent cardiac surgery in an academic hospital between 1991 and 1999. MEASUREMENTS: Subjects were divided into tertiles based on their BMI. Logistic regression was used in multivariate analyses examining the association between tertiles of BMI (26) and complications from cardiac surgery, adjusting for age and gender or using a full model adjusting for history of diabetes mellitus, hypertension, myocardial infarction (MI), congestive heart failure, smoking, chronic obstructive pulmonary disease, peripheral vascular disease, renal disease, surgical priority, age, and gender. RESULTS: Mean age was 79 (range 75-94); 58% of the subjects were male. The incidence of any postoperative complication, respiratory failure, or death was U-shaped, with higher incidence in the first tertile of BMI, followed by the last tertile and then the middle tertile. Subjects in the lowest tertile of BMI in the full model had a higher adjusted risk of stroke (odds ratio (OR) = 1.58, 95% confidence interval (CI) = 0.96-2.59), bleeding (OR = 1.71, 95% CI = 0.79-3.67), respiratory failure (OR = 1.65, 95% CI = 0.95-2.87), cardiovascular complications (stroke, MI, arrhythmia) (OR = 1.59, 95% CI = 0.93-2.73), and all complications (OR = 1.45, 95% CI = 1.05-2.00) than subjects in the middle tertile. The risk of most complications in subjects in the highest tertile of BMI was similar to that of subjects in the middle tertile except for wound infections (OR = 3.51, 95% CI = 0.92-13.33). The risk of death was higher in subjects in the lower tertile of BMI (OR = 1.97, 95% CI = 1.12-3.44) than in subjects in the middle tertile. The association between BMI and adverse cardiac surgical outcomes was stronger in men than women and decreased with advancing age. CONCLUSIONS: In the geriatric population, subjects with lower BMI have a higher risk of complications and death from cardiovascular surgery than subjects with higher BMI. An increased BMI does not increase the risk of complications from cardiovascular surgery, with the exception of wound infections.

REF ID: 2865

Level IV: Non-experimental study

Topic 1: Risks

McCusker, M. E., Perisse, A. R., & Roghmann, M. C. (2002). Severity-of-illness markers as predictors of nosocomial infection in adult intensive care unit patients. *American Journal of Infection Control*, 30(3), 139-144.

Journal Article

BACKGROUND: Patients admitted to intensive care units (ICUs) are at high risk for acquiring nosocomial infections. We examined the association between markers of severity of illness at ICU admission and the development of ICU-attributable nosocomial infections. METHODS: Retrospective cohort study of 851 patients admitted to the medical or surgical ICU in an urban teaching hospital from January 1997 to January 1998. Logistic regression analysis was used to identify predictors of nosocomial infection, including the Acute Physiology, Age, Chronic Health Evaluation III severity-of-illness scoring system. RESULTS: Patients receiving mechanical ventilation on day 1 of ICU admission (OR, 1.99; 95% CI, 1.29-3.06) and patients transferred to the ICU from another unit within the same hospital (OR, 2.04; 95% CI, 1.24-3.34) were twice as likely to acquire an ICU-attributable nosocomial infection compared with patients admitted from other sources. The day-1 Acute Physiology, Age, Chronic Health Evaluation III score was not a significant predictor of nosocomial infection. CONCLUSION: The need for mechanical ventilation on ICU day 1 and transfer to the ICU from another unit are independent predictors of ICU-attributable nosocomial infections. Up to 50% of ICU patients who develop nosocomial infections could be easily identified at ICU admission, allowing for targeted use of preventive strategies to reduce the risk of nosocomial infections.

REF ID: 2748

Level IV: Non-experimental study

Topic 1: Risks

McDonald, J. R., Friedman, N. D., Stout, J. E., Sexton, D. J., & Kaye, K. S. (2005). Risk factors for

ineffective therapy in patients with bloodstream infection. *Archives of Internal Medicine*, 165(3), 308-313.

Journal Article, Research, Tables/Charts

BACKGROUND: Infections occurring among outpatients having recent contact with the health care system have been termed health care-associated infections. The objective of this study was to analyze the impact of health care-associated status on effectiveness of initial therapy in hospitalized patients with bloodstream infections. **METHODS:** Prospective cohort study of adults with bloodstream infections at 3 North Carolina hospitals. Bloodstream infection was defined as health care-associated if it occurred within the first 48 hours after hospitalization and if patients had 1 of the following characteristics: had received home health services, outpatient intravenous therapy, or outpatient renal dialysis in the 30 days prior to hospital admission; had been hospitalized within 90 days prior to admission; or lived in a long-term care facility. **RESULTS:** Of 466 bloodstream infections, 132 (28%) were community-acquired, 178 (38%) were health care-associated, and 156 (33%) were nosocomial. Multivariable logistic regression using community-acquired status as a reference identified health care-associated status (odds ratio, 3.1; 95% confidence interval, 1.6-6.1) and nosocomial status (odds ratio, 4.3; 95% confidence interval, 2.2-8.3) as independent predictors of ineffective initial antibiotic therapy. Among health care-associated characteristics, hospitalization in the 90 days prior to admission was independently associated with ineffective initial therapy (odds ratio, 2.4; 95% confidence interval, 1.4-4.2). **CONCLUSIONS:** Among patients treated in the hospital for bloodstream infection, health care-associated status was an independent predictor of ineffective initial antibiotic therapy. Hospitalization within 90 days prior to hospital admission was the component of health care-associated status most strongly associated with ineffective initial therapy.

REF ID: 2942

Level IV: Non-experimental study

Topic 1: Risks

Mentec, H., Dupont, H., Bocchetti, M., Cani, P., Ponche, F., & Bleichner, G. (2001). Upper digestive intolerance during enteral nutrition in critically ill patients: Frequency, risk factors, and complications. *Critical Care Medicine*, 29(10), 1955-1961.

Journal Article, Research, Tables/Charts

OBJECTIVE: To study the frequency of and risk factors for increased gastric aspirate volume (GAV) and upper digestive intolerance and their complications during enteral nutrition (EN) in critically ill patients. **DESIGN:** Prospective observational study. **SETTING:** Intensive care unit (ICU) in a general hospital. **PATIENTS:** A total of 153 patients with nasogastric tube feeding. **INTERVENTIONS:** None. **MEASUREMENTS AND MAIN RESULTS:** Upper digestive intolerance was considered when GAV was between 150 and 500 mL at two consecutive measurements, when it was >500 mL, or when vomiting occurred. Forty-nine patients (32%; 95% confidence interval [CI], 25%-42%) presented increased GAV after a median EN duration of 2 days (range, 1-16 days), and 70 patients (46%; 95% CI, 38%-54%) presented upper digestive intolerance. Independent risk factors for high GAV were GAV >20 mL before the start of EN (odds ratio [OR], 2.16; 95% CI, 1.11-4.18; p =.02), GAV >100 mL during EN (OR, 1.49; 95% CI, 1.01-2.19; p <.05), sedation during EN (OR, 1.78; 95% CI, 1.17-2.71; p =.007), use of catecholamines during EN (OR, 1.81; 95% CI, 1.21-2.70; p =.004). Complications related to high GAV were a lower feed intake (15 +/- 7 vs. 19 +/- 8 kcal/kg/day; p =.0004) and vomiting (53% vs. 23%; p =.0002). Complications related to upper digestive intolerance were the development of pneumonia (43% vs. 24%; p =.01), a longer ICU stay (23 +/- 21 vs. 15 +/- 16 days; p =.007), and a higher ICU mortality (41% vs. 25%; p =.03), even after adjustment for Simplified Acute Physiology Score II (OR, 1.48; 95% CI, 1.04-2.10; p =.028). **CONCLUSION:** In ICU patients receiving nasogastric tube feeding, high gastric aspirate volume was frequent, occurred early, and was more frequent in patients with sedation or catecholamines. High gastric aspirate volume was an early marker of upper digestive intolerance, which was associated with a higher incidence of nosocomial pneumonia, a longer ICU stay, and a higher ICU mortality.

REF ID: 2941**Level IV: Non-experimental study****Topic 5: Evaluation/follow-up**

Meraviglia, M., Becker, H., Grobe, S. J., & King, M. (2002). Maintenance of skin integrity as a clinical indicator of nursing care. *Advances in Skin & Wound Care*, 15(1), 24-29.

Journal Article, Research, Tables/Charts

OBJECTIVE: To assess maintenance of skin integrity in hospitalized patients as a clinical indicator of quality nursing care. **DESIGN:** Descriptive correlational study. **SETTING:** 17 acute care urban and rural hospitals in Texas. **PARTICIPANTS:** 723 hospitalized patients from 33 medical-surgical units. **MAIN OUTCOME MEASURES:** Pressure ulcers since admission and nursing care practices per unit. **MAIN RESULTS:** Overall prevalence of pressure ulcers since admission (4.7%) was lower than previously reported for acute care settings. Prevalence of pressure ulcers in hospitalized patients (10%) was higher than found in the Texas Nurses Association feasibility study (3.7%). The skin integrity ratio was strongly correlated for several unit variables, including number of beds per unit ($r = 0.623$) and average daily census per unit ($r = 0.909$). Benchmarking data across units showed that units with subjects that maintained skin integrity had a lower percentage of patients assessed on admission and performed daily assessments less frequently than did the units with subjects that did not maintain skin integrity. In addition, the units with subjects that maintained skin integrity classified fewer patients as at risk for pressure ulcer development and did not implement a skin care protocol for these patients.

CONCLUSION: Patients who developed a pressure ulcer after admission were older and had more risk for pressure ulcers than those who maintained skin integrity. Benchmarking data detected various differences in nursing care. Significant relationships between study variables demonstrate the importance of assessing clinical indicators to monitor nursing care. Outcomes such as skin integrity, pressure ulcer since admission, and nosocomial ratio represent the quality of nursing care.

REF ID: 2784**Level IV: Non-experimental study****Topic 3: Assessment**

Mercado, M. A., Chan, C., Orozco, H., Podgaetz, E., Porrás-Aguilar, D. E., & De la Medina, A. R. et al. (2005-Sep). Low serum albumin is not a contraindication for early iatrogenic bile duct injury repair. *Annals of Hepatology*, 4(3), 184-187.

Journal Article

Most iatrogenic bile duct injuries are recognized in the early postoperative period (first 48 hours). These patients usually have additional complications such as a suboptimal hydroelectrolytic status, subhepatic collections, external biliary fistula and malnutrition. In these circumstances, besides the elevation of bilirubin and transaminases associated with the injury, hypoalbuminemia is frequently encountered. The timing for repair is decided according to the condition of each patient. We report the impact of preoperative abnormal low serum albumin levels on the results of biliary tract reconstruction after a iatrogenic biliary lesion. **METHOD:** Patients who underwent biliary reconstruction in our center from 1998 to 2002 were analyzed. Only patients with complex injuries (Strasberg E, Bismuth III-IV, Stewart-Way III) were included. Major postoperative complications were recorded and correlated with preoperative liver function tests. **RESULTS:** Seventy seven patients were analyzed. In 41 cases, the injury was a consequence of a laparoscopic operation. All patients were treated by a Roux-en-Y hepatojejunostomy. No operative mortality was recorded. The most frequent postoperative complications were postoperative biliary fistula (8/77-9%, $p < 0.017$) and subhepatic collections (9/77-9%, $p < 0.39$). All fistulae closed spontaneously and the subhepatic collections were drained. Overall, complications were more common in the group with hypoalbuminemia ($p < 0.002$). **CONCLUSION:** Early repair is indicated if there is no systemic contraindication (sepsis, multiple organ failure, electrolytic imbalance). Abnormalities in the liver function tests, particularly a low serum albumin, should not delay the operation. Although significantly more postoperative complications are observed in an early repair, long-term results are comparable to those of an elective repair.

REF ID: 2861

Level IV: Non-experimental study

Topic 3: Assessment

Merle, V., Germain, J. M., Bugel, H., Nouvellon, M., Lemeland, J. F., & Czernichow, P. et al. (2002). Nosocomial urinary tract infections in urologic patients: Assessment of a prospective surveillance program including 10,000 patients. *European Urology*, 41(5), 483-489.

Journal Article

OBJECTIVE: Hospital-acquired urinary tract infections (HUTI) represent a significant impairment in the quality of health care. Incidence in catheterized patients has been estimated at approximately 20%, however few data are available in urologic patients. We report a prospective surveillance program over 6 years in our urologic department and evaluate its evolution.**METHODS:** Population consists of all patients admitted to the urology ward for 48 hours or more over a 6-year period from 1994. Data recorded: age, gender, duration of stay, insertion and removal of catheters, diagnosis of HUTI. Analysis: calculation of incidence, and incidence density for HUTI and for catheter-related HUTI, analysis of trends by chi(2) trend test.**RESULTS:** A total of 10,054 consecutive patients were included, 52% were catheterized. The median incidence of catheter-related HUTI in catheterized patients was 13.0%, the incidence density was 25.1 HUTI/1000 patient-days of catheterization. The proportion of HUTI and specific catheter-related HUTI patients decreased, respectively from 8.4% and 14.2% to 6.5% and 12.3% during the study period ($p < 0.05$).**CONCLUSION:** The rate of HUTI was not as high as previously reported, perhaps due to a controlled catheter policy. Surveillance was associated with a significant decrease in infection rates, suggesting a beneficial feedback effect. Evaluation of diagnoses and surgical procedures would ensure an optimal quality control program.

REF ID: 2872

QM: Quality Measures

Topic 5: Evaluation/follow-up

Miller, M. R., Elixhauser, A., Zhan, C., & Meyer, G. S. (2001). Patient safety indicators: Using administrative data to identify potential patient safety concerns. *Health Services Research*, 36(6 Pt 2), 110-132.

Journal Article

OBJECTIVE: To develop Patient Safety Indicators (PSI) to identify potential in-hospital patient safety problems for the purpose of quality improvement. **DATA SOURCE/STUDY DESIGN:** The data source was 2,400,000 discharge records in the 1997 New York State Inpatient Database. PSI algorithms were developed using systematic literature reviews of indicators and hand searches of the ICD-9-CM code book. The prevalence of PSI events and associations between PSI events and patient-level and hospital-level characteristics, length of stay, in-hospital mortality, and hospital charges were examined. **PRINCIPAL FINDINGS:** PSIs were developed for 12 distinct clinical situations and an overall summary measure. The 1997 event rates per 10,000 discharges varied from 1.1 for foreign bodies left during procedure to 84.7 for birth traumas. Discharge records with PSI events had twofold to threefold longer hospital stays, twofold to 20-fold higher rates of in-hospital mortality, and twofold to eightfold higher total charges than records without PSI events. Multivariate logistic regression revealed that PSI events were primarily associated with increasing age ($p < .001$), hospitals performing more inpatient surgery ($p < .001$), and hospitals with higher percentage of beds in intensive care units ($p < .001$). **CONCLUSIONS:** The PSIs provide an efficient and user-friendly tool to identify potential in-hospital patient safety problems for targeted institution-level quality improvement efforts. Until better error-reporting systems are developed the PSIs can serve to shed light on the problem of medical errors not limited solely to mortality because of errors.

REF ID: 2899

Level I: Systematic Review

Topic 4: Management

Milne, A. C., Potter, J., & Avenell, A. (2006). Protein and energy supplementation in elderly people at risk from malnutrition. *The Cochrane Library*, (1)

Journal Article, Research, Systematic Review

A substantive amendment to this systematic review was last made on 14 October 2004. Cochrane reviews are regularly checked and updated if necessary. Background: Evidence for the effectiveness of nutritional supplements containing protein and energy, which are often prescribed for older people, is limited. Furthermore malnutrition is more common in this age group and deterioration of nutritional status can occur during illness. It is important to establish whether supplementing the diet is an effective way of improving outcomes for older people at risk from malnutrition. Objectives: This review examined the evidence from trials for improvement in nutritional status and clinical outcomes when extra protein and energy were provided, usually in the form of commercial 'sip-feeds'. Search strategy: We searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, Healthstar, CINAHL, BIOSIS, CAB abstracts. We also hand searched nutrition journals and reference lists and contacted 'sip-feed' manufacturers. Date of most recent search: March 2004. Selection criteria: Randomised controlled trials and quasi-randomised controlled trials of oral protein and energy supplementation in older people with the exception of groups recovering from cancer treatment or in critical care. Data collection and analysis: Two reviewers independently assessed trials prior to inclusion and independently extracted data and assessed trial quality. Authors of trials were contacted for further information as necessary. Main results: Forty-nine trials with 4790 randomised participants have been included in the review. Most included trials had poor study quality. The pooled weighted mean difference [WMD] for percentage weight change showed a benefit of supplementation of 2.3% (95% confidence interval (CI) 1.9 to 2.7) from 34 trials. There was a reduced mortality in the supplemented compared with control groups (relative risk (RR) 0.74, CI 0.59 to 0.92) from 32 trials. The risk of complications from 14 trials showed no significant difference (RR 0.95, 95% CI 0.81 to 1.11). Few trials were able to suggest any functional benefit from supplementation. The pooled weighted mean difference (WMD) for length of stay from 10 trials also showed no statistically significant effect (WMD -1.98 days, 95% CI -5.20 to 1.24). Authors' conclusions: Supplementation produces a small but consistent weight gain in older people. There may also be a beneficial effect on mortality. However, there was no evidence of improvement in clinical outcome, functional benefit or reduction in length of hospital stay with supplements. Additional data from large-scale multi-centre trials are still required. [CINAHL Note: The Cochrane Collaboration systematic reviews contain interactive software that allows various calculations in the MetaView.]

REF ID: 2898

Level IV: Non-experimental study

Topic 1: Risks

Minatti, W. R., Flavio, B., Pablo, C., Raul, R., Guillermo, P., & Miguel, S. (2006). Postdischarge unplanned admission in ambulatory surgery -- a prospective study. *Ambulatory Surgery, 12*(3), 107-112.

Journal Article, Research, Tables/Charts

Background Postdischarge recovery continues at home and some patients will need admission if complications occur. Objective To analyze the postdischarge unplanned admission rate in a hospital-based ambulatory surgery unit. Method Prospective non-comparative study. Patients admitted in the first 30 days postdischarge were included. Univariate analysis was performed to identify independent predictive factors for these admissions. Results The postdischarge unplanned admission rate was 1%. Urology, gynaecology and general surgery, patients 90 years or older and epidural anaesthesia were significant risk factors for postdischarge unplanned admission. Conclusion The postdischarge unplanned admission rate was very low.

REF ID: 2820

Level III: Quasi-experimental study

Topic 1: Risks

Minnema, B., Vearncombe, M., Augustin, A., Gollish, J., & Simor, A. E. (2004). Risk factors for surgical-site infection following primary total knee arthroplasty. *Infection Control & Hospital Epidemiology, 25*(6), 477-480.

Journal Article

OBJECTIVE: To identify risk factors associated with the development of surgical-site infection (SSI) following total knee arthroplasty (TKA). **DESIGN:** A case-control study. **SETTING:** A 1,100-bed, university-affiliated, tertiary-care teaching hospital. **METHODS:** Case-patients with SSI occurring up to 1 year following primary TKA performed between January 1999 and December 2001 were identified prospectively by infection control practitioners using National Nosocomial Infections Surveillance (NNIS) System methods. Three control-patients were selected for each case-patient, matched by date of surgery. Stepwise logistic regression analysis was used to determine the relation of potential risk factors to the development of infection. **RESULTS:** Twenty-two patients with infections (6 superficial and 16 deep) were identified. Infection rates per year were 0.95%, 1.07%, and 1.19% in 1999, 2000, and 2001, respectively. Logistic regression analysis identified two variables independently associated with the development of infection: the use of closed suction drainage (odds ratio [OR], 7.0; 95% confidence interval [CI95], 2.1-25.0; P = .0015) and increased international normalized ratio (INR) (OR, 2.4; CI95, 1.1-5.7; P = .035). Factors not statistically associated with the development of infection included age, NNIS System risk index score, presence of various comorbidities, surgeon, duration of procedure or tourniquet time, type of bone cement or prosthesis used, or receipt of blood product transfusions. **CONCLUSIONS:** The use of closed suction drainage and a high postoperative INR were associated with the development of SSI following TKA. Avoiding the use of surgical drains and careful monitoring of anticoagulant prophylaxis in patients undergoing TKA should reduce the risk of infection.

REF ID: 2802

Level IV: Non-experimental study

Topic 1: Risks

Mnatzaganian, G., Galai, N., Sprung, C. L., Zitser-Gurevich, Y., Mandel, M., & Ben-Hur, D. et al. (2005). Increased risk of bloodstream and urinary infections in intensive care unit (ICU) patients compared with patients fitting ICU admission criteria treated in regular wards. *Journal of Hospital Infection*, 59(4), 331-342.

Journal Article. Multicenter Study

Critically ill patients, eligible for admission into intensive care units (ICUs), are often hospitalized in other wards due to a lack of ICU beds. Differences in morbidity between patients managed in ICUs and elsewhere are unknown, specifically the morbidity related to hospital-acquired infection. Patients fitting ICU admission criteria were identified by screening five entire hospitals on four separate days. Hospital infections within a 30-day follow-up period were compared in ICU patients and in patients on other wards using Kaplan-Meier curves. Residual differences in the patients' case mix between ICUs and other wards were adjusted for utilizing multivariate Cox models. Of 13415 patients screened, 668 were critically ill. The overall infection rates (per 100 patient-days) were 1.2 for bloodstream infection (BSI) and 1.9 for urinary tract infection (UTI). The adjusted hazard ratios in ICU patients compared with patients on regular wards were 3.1 (P<0.001) for BSI and 2.5 (P<0.001) for UTI. This increased risk persisted even after adjusting for the disparity in the number of cultures sent from ICUs compared with ordinary wards. No interdepartmental differences were found in the rates of pneumonia, surgical wound infections and other infections. Minimizing the differences between characteristics of patients hospitalized in ICUs and in other wards, and controlling for the higher frequency of cultures sent from ICUs did not eliminate the increased risk of BSI and UTI associated with admission into ICUs.

REF ID: 2776

Level IV: Non-experimental study

Topic 1: Risks

Muilwijk, J., Walenkamp, G. H., Voss, A., Wille, J. C., & van den Hof, S. (2006). Random effect modelling of patient-related risk factors in orthopaedic procedures: Results from the dutch nosocomial infection surveillance network 'PREZIES'. *Journal of Hospital Infection*, 62(3), 319-326.

Journal Article. Multicenter Study

In the Dutch surveillance for surgical site infections (SSIs), data from 70277 orthopaedic procedures

with 1895 SSIs were collected between 1996 and 2003. The aims of this study were: (1) to analyse the trends in SSIs associated with Gram-positive and Gram-negative bacteria; (2) to estimate patient-related risk factors for deep and superficial SSIs after all orthopaedic procedures, with special attention to primary total hip arthroplasty (THA); and (3) to analyse inherent differences in infection risk between hospitals. A random effect model was used to estimate the odds ratios of patient-related risk factors for developing an SSI, and to describe the distribution of the most widespread bacterial species responsible for SSIs among hospitals. Gram-positive organisms, mainly staphylococci, were the main cause of both deep (84.0%) and superficial SSIs (69.1%) after orthopaedic procedures. The percentage of SSIs after THA caused by coagulase-negative staphylococci decreased over the surveillance period, while the contribution of *Staphylococcus aureus* increased. Temporary elevations in the incidence of the most widespread pathogen species were observed within hospitals. Patient-related factors such as the National Nosocomial Infections Surveillance System risk index or age had little effect on the predictive power of the random effect models. This study underlines the usefulness of a random effect model, which adjusts risk estimates for random variation between hospitals, in a multicentre study on risk factors for SSIs.

REF ID: 2931

Level I: Systematic Review

Topic 4: Management

O'Grady, N. P., Alexander, M., Dellinger, E. P., Gerberding, J. L., Heard, S. O., & Maki, D. G. et al. (2002). Guidelines for the prevention of intravascular catheter-related infections. *American Journal of Infection Control*, 30(8), 476-489.

Journal Article, Practice Guidelines, Review

BACKGROUND: Although many catheter-related bloodstream infections (CR-BSIs) are preventable, measures to reduce these infections are not uniformly implemented. **OBJECTIVE:** To update an existing evidenced-based guideline that promotes strategies to prevent CR-BSIs. **Data Sources:** The MEDLINE database, conference proceedings, and bibliographies of review articles and book chapters were searched for relevant articles. **Studies Included:** Laboratory-based studies, controlled clinical trials, prospective interventional trials, and epidemiological investigations. **Outcome Measures:** Reduction in CR-BSI, catheter colonization, or catheter-related infection. **SYNTHESIS:** The recommended preventive strategies with the strongest supportive evidence are education and training of healthcare providers who insert and maintain catheters; maximal sterile barrier precautions during central venous catheter insertion; use of a 2% chlorhexidine preparation for skin antisepsis; no routine replacement of central venous catheters for prevention of infection; and use of antiseptic/antibiotic impregnated short-term central venous catheters if the rate of infection is high despite adherence to other strategies (i.e. education and training, maximal sterile barrier precautions and 2% chlorhexidine for skin antisepsis). **CONCLUSION:** Successful implementation of these evidence-based interventions can reduce the risk for serious catheter-related infection.

REF ID: 2763

Level V: Case report

Topic 3: Assessment

Olenek, K., Skowronski, T., & Schmaltz, D. (2003). Assessment. *geriatric nursing assessment. Journal of Gerontological Nursing*, 29(8), 5-9.

Journal Article, Case Study, Tables/Charts

Gerontological nursing is a unique area of nursing. The cornerstone of the gerontological nursing process is assessment. In some traditional education models, nurses are taught assessments in general areas, such as cardiology, neurology, urology, and orthopedics. Little emphasis is placed on integrating these systems. A one-day workshop was developed with the objective to further develop the assessment skills of the registered nurse (RN) in continuing care by demonstrating a holistic approach to assessment and care planning. For this workshop, the "giants of geriatric medicine," namely falls, incontinence, confusion, iatrogenic illness, and impaired homeostasis (Cape, 1978) were further developed into a geriatric nursing model to include the psychosocial issues. This model demonstrates a way of assessing and integrating the information known about the resident. To ensure the workshop content was practical

for the nurse, existing resident care documentation within the sponsoring organization, The Capital Care Group, was used. Through the education provided in the workshop, the RNs recognized that individualized care is based on full assessment of the resident, integration of the information gathered, and complete documentation.

REF ID: 2766

O'Mahony, D., O'Leary, P., & Quigley, E. M. M. (2002). Aging and intestinal motility: A review of factors that affect intestinal motility in the aged. *Drugs & Aging, 19(7), 515-527.*

Journal Article, Review, Tables/Charts

Normal aging is associated with significant changes in the function of most organs and tissues. In this regard, the gastrointestinal tract is no exception. The purpose of this review is to detail the important age-related changes in motor function of the various parts of the gastrointestinal tract and to highlight some of the important motility changes that may occur, either in relation to common age-related disorders, or as a result of certain drugs commonly prescribed in the aged. A major confounding factor in the interpretation of motor phenomena throughout the gastrointestinal tract in this age group is the frequent coexistence of neurological, endocrinological and other disease states, which may be independently associated with dysmotility. Overall, current data are insufficient to implicate normal aging as a cause of dysmotility in the elderly. Normal aging is associated with various changes in gastrointestinal motility, but the clinical significance of such changes remains unclear. More important is the impact of various age-related diseases on gastrointestinal motility in the elderly: for example, long-standing diabetes mellitus may reduce gastric emptying in up to 50% of patients; depression significantly prolongs whole-gut transit time; hypothyroidism may prolong oro-caecal transit time; and chronic renal failure is associated with impaired gastric emptying. In addition, various, frequently used drugs in the elderly cause disordered gastrointestinal motility. These drugs include anticholinergics, especially antidepressants with an anticholinergic effect, opioid analgesics and calcium antagonists.

REF ID: 2798

Level IV: Non-experimental study

Topic 1: Risks

Ozden, I., Tekant, Y., Bilge, O., Acarli, K., Alper, A., & Emre, A. et al. (2005). Endoscopic and radiologic interventions as the leading causes of severe cholangitis in a tertiary referral center. *American Journal of Surgery, 189(6), 702-706.*

Journal Article

BACKGROUND: Iatrogenic factors became the leading mechanisms of severe cholangitis in a referral center. **PATIENTS AND METHODS:** The records of the 58 patients treated for severe cholangitis between 1996 and May 2004 (inclusive) were evaluated. **RESULTS:** The most frequent underlying diseases were periampullary tumors and mid-bile duct carcinomas (22), followed by proximal cholangiocarcinomas (14). The triggering mechanism was an incomplete endoscopic retrograde cholangiopancreatography (ERCP) in 32 patients, incomplete or inappropriate percutaneous transhepatic biliary drainage (PTBD) in 6, apparently successful ERCP and stenting in 1, and percutaneous transhepatic cholangiography in 1. PTBD was the treatment of choice (38). Mortality was 29% (17/58); the major causes were refractory sepsis (8) and incomplete biliary drainage (advanced tumor, technical failure, or hemobilia) (8). **CONCLUSIONS:** In this series composed predominantly of patients referred after development of sepsis, ERCP and PTBD complications were the leading mechanisms of severe cholangitis. Nonoperative biliary manipulations are invasive procedures with potentially fatal complications. The decisions to perform such procedures and periprocedural management are responsibilities of an experienced multidisciplinary team.

REF ID: 2778

Level IV: Non-experimental study

Topic 1: Risks

Oztoprak, N., Cevik, M. A., Akinci, E., Korkmaz, M., Erbay, A., & Eren, S. S. et al. (2006). Risk factors for ICU-acquired methicillin-resistant staphylococcus aureus infections. *American Journal of Infection Control, 34(1), 1-5.*

Journal Article

BACKGROUND: Methicillin-resistant *Staphylococcus aureus* (MRSA) is a major nosocomial pathogen that causes severe morbidity and mortality in many hospitals worldwide, and MRSA infections are frequent in intensive care units (ICUs). **OBJECTIVE:** A prospective study was implemented to investigate the risk factors for ICU-acquired MRSA infections. **METHODS:** This study was conducted in surgical and neurologic ICUs from May to November 2003. The patients staying in ICUs more than 48 hours were included in the study. All of the patients were visited daily, and data were recorded on individual forms for each patient until discharge or death. Nasal swab cultures were done within 48 hours of ICU admission and repeated every week until the patients colonized with MRSA or were discharged from ICUs. ICU-acquired MRSA infection was diagnosed when MRSA was isolated from the infected site. **RESULTS:** Overall, 249 patients were followed during the study. MRSA infection was detected in 21 (8.4%) of these patients. The most frequent infection was primary bloodstream infection (10/21, 47%). It was followed by pneumonia (8/21, 38%) and surgical site infection (3/21, 14%). Nasal MRSA colonization was detected in 59 (23.7%) patients, and 12 of them (20.3%) developed MRSA infection. In univariate analysis, hospitalization period in an ICU, intraabdominal and orthopedic pathologies, mechanical ventilation, central venous catheter insertion, total parenteral nutrition, previous antibiotic use, surgical ICU stay, nasal MRSA colonization, and presence of more than 2 patients having nasal colonization in the same ICU at the same time were found significant for MRSA infections. In multivariate analysis; hospitalization period in an ICU (OR, 1.090; 95% CI: 1.038-1.144, P = .001), central venous catheter insertion (OR, 1.822; 95% CI: 1.095-3.033, P = .021), previous antibiotic use (OR, 2.337; 95% CI: 1.326-4.119, P = .003) and presence of more than 2 patients having nasal colonization in the same ICU at the same time (OR, 1.398; 95% CI: 1.020-1.917, P = .037) were independently associated with MRSA infections. **CONCLUSION:** According to the our results, hospitalization period in an ICU, presence of patients colonized with MRSA in the same ICU at the same time, previous antibiotic use, and central venous catheter insertion are independent risk factors for ICU-acquired MRSA infections. Detection of these factors helps to decrease the rate of MRSA infections in the ICUs.

REF ID: 2858

Level IV: Non-experimental study

Topic 1: Risks

Palmer, M. H., Baumgarten, M., Langenberg, P., & Carson, J. L. (2002). Risk factors for hospital-acquired incontinence in elderly female hip fracture patients. *Journals of Gerontology Series A-Biological Sciences & Medical Sciences*, 57(10), M672-7.

Journal Article

BACKGROUND: The objective of this study was to estimate the incidence of, and identify risk factors for, incontinence in female hip fracture patients. The study was a secondary analysis of data abstracted from medical records in hospitals in Pennsylvania, Texas, New Jersey, and Virginia. **METHODS:** The study included women aged 60 years and older who were admitted to one of the study hospitals with hip fracture. Measurements included incontinence at discharge as recorded in the medical records, demographic information, cognitive and functional status, and two measures of severity of illness (Charlson Comorbidity Index and Sickness at Admission Scale score). **RESULTS:** Data from 6516 women were analyzed. Twenty-one percent (n = 1365) became incontinent during hospitalization. After adjusting for confounders (i.e., age, race, malnutrition, comorbidity, and severity of illness), admission from a nursing home or other long-term care facility (odds ratio [OR] 1.68, 95% confidence interval [CI] 1.29-2.19), confusion (OR 3.44, 95% CI 2.79-4.24), use of a wheelchair or device for walking (OR 1.53, 95% CI 1.29-1.83), and prefracture dependence on others for ambulation (OR 2.51, 95% CI 1.64-3.85) significantly increased the odds of developing incontinence during hospitalization.

CONCLUSION: Hospital-acquired incontinence affects 21% of female hip fracture patients. Certain easily identifiable patient characteristics place female hip fracture patients at high risk. Interventions to increase staff awareness of this vulnerable population need to be tested to minimize the incidence of hospital-acquired incontinence.

REF ID: 2921**Level IV: Non-experimental study****Topic 3: Assessment**

Patino, F. G., Olivieri, J., Allison, J. J., Mikuls, T. R., Moreland, L., & Kovac, S. H. et al. (2003). Nonsteroidal antiinflammatory drug toxicity monitoring and safety practices. *Journal of Rheumatology*, 30(12), 2680-2688.

Journal Article, Research, Tables/Charts

OBJECTIVE: Nonsteroidal antiinflammatory drug (NSAID) related gastrointestinal (GI) and renal adverse events are commonly reported. Although published guidelines recommend periodic laboratory monitoring, NSAID safety practices of physicians have not been investigated at a population level. We examined the associations of physician specialty and patient characteristics with NSAID safety practices. **METHODS:** Using administrative data and medical record review from a regional managed care organization, we studied a retrospective cohort of 373 frequent NSAID users (> or = 3 consecutive NSAID prescriptions and > or = 1 month of continuous NSAID use and followup). NSAID safety measures included: complete blood count (CBC) testing, creatinine testing, use of GI cytoprotective agents, and lack of simultaneous prescriptions for different NSAID (NSAID overlap). **RESULTS:** The mean duration of cumulative NSAID use was 14.4 +/- 7.7 months/patient, patient age was 62.0 +/- 11.4 years, and 63% were women. About two-thirds of patients received CBC (238, 63.8%) and creatinine monitoring (263, 70.5%), one-third (120, 32.2%) were prescribed cytoprotective agents, and one-fourth (97, 26%) had at least one NSAID overlap. After multivariable adjustments, concomitant use of disease-modifying antirheumatic drugs (OR 2.5, 95% CI 1.1-5.8), longer NSAID exposure (OR 1.3, 95% CI 1.1-1.4), and a greater number of physician visits/year (OR 1.1, 95% CI 1.0-1.2) were significantly associated with receipt of a CBC. A history of hypertension (OR 2.0, 95% CI 1.2-3.2), longer NSAID exposure (OR 1.3, 95% CI 1.2-1.4), and more physician visits/year (OR 1.1, 95% CI 1.0-1.2) were significantly associated with serum creatinine testing. Rheumatologists, and to a lesser extent internists, trended toward more NSAID toxicity monitoring than family/general practitioners. However, family/general practitioners and internists were more likely to monitor creatinine than rheumatologists among patients with renal risk factors. **CONCLUSION:** While rheumatologists and internists trended toward more CBC and creatinine testing, visit frequency, duration of NSAID use, and comorbidities were the factors most consistently associated with safety monitoring.

REF ID: 2744**Level V: Case report****Topic 1: Risks**

Periard. (2003). Adverse effects and complications related to the use of barium sulphate contrast media for radiological examinations of the gastrointestinal tract -- a literature review. *Canadian Journal of Medical Radiation Technology*, 34(3), 3-9.

Journal Article, Case Study, Diagnostic Images, Pictorial, Review, Tables/Charts

Barium sulphate is considered a safe and efficacious contrast medium that is routinely used for radiologic examinations of the gastrointestinal tract. Although the examinations rarely result in complications, the technique is moderately invasive and not entirely innocuous. Complications resulting from the procedures, and adverse reactions from the barium itself, have ranged from mild to severe and in rare instances have led to patient death. This paper reviews the clinical application, biological requirements and clinical properties of barium sulphate contrast media used in diagnostic x-ray imaging. It also outlines the risk factors and associated adverse reactions and complications involved with the use of barium sulphate, and presents documented cases where iatrogenic injuries have resulted.

REF ID: 2911**Level IV: Non-experimental study****Topic 1: Risks**

Pessaux, P., Atallah, D., Lermite, E., Msika, S., Hay, J., & Flamant, Y. et al. (2005). Risk factors for prediction of surgical site infections in "clean surgery". *American Journal of Infection Control*, 33(5), 292-298.

Journal Article, Research, Tables/Charts

BACKGROUND: The aim of this study was to determine the risk factors of surgical site infections (SSI) in clean surgery and to identify high- and low-risk patients from whom efficacy of the antibiotic prophylaxis was analyzed. **METHODS:** From June 1982 to September 1996, a database was established from 3 prospective multicenter randomized studies, containing information of 5798 patients who underwent abdominal noncolorectal surgery. Multivariate analysis was performed using nonconditional logistic regression expressed as an odds ratio (OR). **RESULTS:** A total of 2374 patients underwent a clean surgery. An antibiotic prophylaxis was administered to 1943 patients (81.8%). A multivariate analysis was performed including only preoperative factors and disclosed 3 independent factors: cirrhosis (OR, 2.8; 95% CI: 1.6-12.8), other disease (OR, 2.7; 95% CI: 1.3-5.8), and preoperative urinary catheter (OR, 2.1; 95% CI: 1.1-4.6). A risk score for SSI was constructed: $-4.9 + (1.5 \times \text{cirrhosis}++) + (\text{other disease}++) + (0.8 \times \text{preoperative urinary catheter}++)$ ($++ = 0$ if absent or 1 if present). The study included 1 group of patients having no risk factors for SSI with a score below -4.5 (S1R-) and 1 group of patients having 1 or more risk factors for SSI with a score over -4.5 (S1R+). Antibiotic prophylaxis did not reduce the infectious complication rate in the S1R- group, whereas, in the S1R+ group, it reduced significantly the rate of SSI and of parietal infectious complications by 58% and 69%, respectively. **CONCLUSIONS:** Antibiotic prophylaxis in clean abdominal surgery was effective in high-risk patients. Urinary catheter must be avoided.

REF ID: 2810

Level III: Quasi-experimental study

Topic 2: Prevention

Piarroux, R., Grenouillet, F., Balvay, P., Tran, V., Blasco, G., & Millon, L. et al. (2004). Assessment of preemptive treatment to prevent severe candidiasis in critically ill surgical patients.[see comment]. *Critical Care Medicine*, 32(12), 2443-2449.

Evaluation Studies. Journal Article

OBJECTIVE: To assess the efficacy of a preemptive antifungal therapy in preventing proven candidiasis in critically ill surgical patients. **DESIGN:** Before/after intervention study, with 2-yr prospective and 2-yr historical control cohorts. **SETTING:** Surgical intensive care unit (SICU) in a university-affiliated hospital. **PATIENTS:** Nine hundred and thirty-three patients, 478 in the prospective group and 455 in the control group, with SICU stay $>$ or $=5$ days. **INTERVENTIONS:** During the prospective period, systematic mycological screening was performed on all patients admitted to the SICU, immediately at admittance and then weekly until discharge. A corrected colonization index was used to assess intensity of *Candida* mucosal colonization. Patients with corrected colonization index $>$ or $=0.4$ received early preemptive antifungal therapy (fluconazole intravenously: loading dose 800 mg, then 400 mg/day for 2 wks). **MEASUREMENTS AND MAIN RESULTS:** End points of this study were the frequency of proven candidiasis, especially SICU-acquired candidiasis. During the retrospective period, 32 patients of 455 (7%) presented with proven candidiasis: 22 (4.8%) were imported and 10 (2.2%) were SICU-acquired cases. During the prospective period, 96 patients with corrected colonization index $>$ or $=0.4$ of 478 received preemptive antifungal treatment and only 18 cases (3.8%) of proven candidiasis were diagnosed; all were imported infections. *Candida* infections occurred more frequently in the control cohort (7% vs. 3.8%; $p = .03$). Incidence of SICU-acquired proven candidiasis significantly decreased from 2.2% to 0% ($p < .001$, Fisher test). Incidence of proven imported candidiasis remained unchanged (4.8% vs. 3.8%; $p = .42$). No emergence of azole-resistant *Candida* species (especially *Candida glabrata*, *Candida krusei*) was noted during the prospective period. **CONCLUSIONS:** Targeted preemptive strategy may efficiently prevent acquisition of proven candidiasis in SICU patients. Further studies are being performed to assess cost-effectiveness of this strategy and its impact on selection of azole-resistant *Candida* strains on a long-term basis.

REF ID: 2922

Level IV: Non-experimental study

Topic 3: Assessment

Pirret, A. M. (2003). A preoperative scoring system to identify patients requiring postoperative

high dependency care. *Intensive & Critical Care Nursing*, 19(5), 267-275.

Journal Article, Research, Tables/Charts

INTRODUCTION: The incidence of postoperative complications is reduced with early identification of at risk patients and improved postoperative monitoring. OBJECTIVE: A nursing preoperative assessment tool was developed to identify patients at risk of postoperative complications and to reduce the number of acute admissions to ICU/HDU. METHOD: All surgical patients admitted to a surgical ward for an elective surgical procedure (n=7832) over a 23-month period were concurrently scored on admission using the preoperative assessment tool. RESULTS: During the time period studied, acute admissions to ICU/HDU reduced from 40.37 to 19.11%. DISCUSSION: Only 24.04% of patients who had a PAS >4 were identified by the surgeon and/or anesthetist as being at risk of a postoperative complication, or if identified, no provision was made for improved postoperative monitoring. This supports the need for nurses to be involved in identifying preoperatively patients at risk of a postoperative complication and in need of improved postoperative monitoring. The postoperative monitoring requirements for the PAS >4 patients were relatively low technology interventions. CONCLUSION: The preoperative assessment tool is a simple and effective tool for nurses to identify patients at risk of postoperative complications and reduces the number of acute admissions to ICU/HDU.

REF ID: 2850

Level VI: Opinion

Topic 2: Prevention

Potter, J. (2003-Feb). Bowel care in older people. *Clinical Medicine*, 3(1), 48-51.

Journal Article

Bowel dysfunction not only causes considerable hardship for many older people and their carers, it is also financially costly to the health service and to the individuals affected. Despite the prevalence of constipation and faecal incontinence amongst, for example, older people in institutionalised settings, both conditions are often iatrogenic and entirely preventable. One reason why these conditions are generally not well managed is that the research base is poor: there are few robust data because of methodological weaknesses in existing studies, so clinicians and care staff are left to rely on anecdote and personal experience. Secondly, the costs to the NHS involved in providing proper bowel care for the elderly would be considerable, although recent government documents have set out a specific commitment to improve standards of care in this area. In order to address some of these issues, the College has recently published a book which gathers together and assesses research on faecal incontinence and constipation, and provides informed guidance on current best practice. The contents of the publication, including comments from older people suffering from bowel dysfunction, are outlined in this article.

REF ID: 2910

Level IV: Non-experimental study

Topic 3: Assessment

Putwatana, P., Reodecha, P., Sirapongam, Y., Lertsithichai, P., & Sumboonnanonda, K. (2005). Nutrition screening tools and the prediction of postoperative infectious and wound complications: Comparison of methods in presence of risk adjustment. *Nutrition*, 21(6), 691-697.

Journal Article, Research, Tables/Charts

OBJECTIVE: We compared four nutritional screening tools, the Nutrition Risk Classification, the Mini-Nutrition Assessment-Short Form, the Malnutrition Screening Tool, and the Nutrition Risk Score in terms of their ability to predict postoperative wound and infectious complications when adjusted for the effects of other risk factors for postoperative infection. METHODS: The 8-mo study was performed on 430 patients undergoing abdominal surgery. Data on the Nutrition Risk Classification, Mini-Nutrition Assessment-Short Form, Malnutrition Screening Tool, Nutrition Risk Score, and risk factors for postoperative complications were collected for all patients. Patients were followed until 30 d after surgery. Nutritional screening tools were compared for their ability to predict postoperative complications by using the area under the receiver operating characteristic curve. Multivariable

adjustment for other risk factors was done with multiple logistic regression analysis. RESULTS: The Mini-Nutrition Assessment-Short Form, Nutrition Risk Score, and Nutrition Risk Classification had the larger receiver operating characteristic areas. Only the Nutrition Risk Classification was significantly related to the occurrence of postoperative complications (odds ratio 2.92, 95% confidence interval 1.62 to 5.26) after adjusting for other risk factors of postoperative infection. The other remaining risk factors were serum albumin level and operative time. CONCLUSIONS: The Nutrition Risk Classification seems to be the best nutritional screening tool for use in predicting postoperative infectious and wound complications.

REF ID: 2747

Level V: Literature review

Topic 1: Risks

Quiceno, G. A., & Cush, J. J. (2005). Iatrogenic rheumatic syndromes in the elderly. *Clinics in Geriatric Medicine*, 21(3), 577-588.

Journal Article, Review, Tables/Charts

Rheumatic complaints are common in the geriatric population. However, uncommonly autoimmune or musculoskeletal complaints and disorders may arise as a consequence of pharmacotherapy. These rare events include statin myopathy, drug-induced lupus, arthralgias, vasculitis, or tight skin syndromes. This article will discuss the possible iatrogenic causes of rheumatic conditions, potential inciting agents, and the various types of rheumatic manifestations seen in the elderly. Copyright (C) 2005 by Elsevier Science (USA).

REF ID: 2812

Level IV: Non-experimental study

Topic 3: Assessment

Ragozzino, A., De Ritis, R., Mosca, A., Iaccarino, V., & Imbriaco, M. (2004). Value of MR cholangiography in patients with iatrogenic bile duct injury after cholecystectomy. *AJR.American Journal of Roentgenology*, 183(6), 1567-1572.

Journal Article

OBJECTIVE: Our aim was to determine the diagnostic role of MR cholangiography in the evaluation of iatrogenic bile duct injuries after cholecystectomy. SUBJECTS AND METHODS: Nineteen patients (14 women and five men; mean age, 47 years; age range, 24-75 years) with suspected bile duct injury as a result of laparoscopic cholecystectomy (17 patients) and open cholecystectomy (two patients) underwent MR cholangiography. MR images were evaluated for bile duct discontinuity, presence or absence of biliary dilation, stricture, excision injury, free fluid, and collections. Bile duct excision and stricture were classified according to the Bismuth classification. Final diagnosis was made on the basis of findings at surgery in 15 patients, on percutaneous transhepatic cholangiography (PTC) in one patient, and on endoscopic retrograde cholangiography (ERC) and at clinical follow-up until hospital discharge in the remaining three patients. RESULTS: In 16 patients, injury of the bile duct was observed. Two patients had Bismuth type I injury; one patient, type II injury; 11 patients, type III injury; and one patient each, type IV and V injuries. Three patients showed findings suggestive of leakage from the cystic duct remnant, which were confirmed on ERC. CONCLUSION: MR cholangiography is an accurate diagnostic technique in the identification of postoperative bile duct injuries. This technique allows exploration above and below the level of obstruction, a resource provided by neither ERC nor PTC, and allows the accurate classification of these injuries, which is essential for treatment planning.

REF ID: 2833

Level IV: Non-experimental study

Topic 2: Prevention

Rossello-Urgell, J., Vaque-Rafart, J., Hermosilla-Perez, E., Allepuz-Palau, A., & EPINE Working, G. (2004). An approach to the study of potentially preventable nosocomial infections. *Infection Control & Hospital Epidemiology*, 25(1), 41-46.

Journal Article

OBJECTIVE: To analyze a method that identifies potentially preventable nosocomial infections, as a

tool to evaluate the performance of infection control programs through quantification of their potential for reducing nosocomial infections. **METHODS:** The database of the Study of the Prevalence of Nosocomial Infections in Spain (EPINE) was reanalyzed. The method was based on the use of false negatives of the classification table obtained from application of a fixed multiple logistic regression model, as an estimator of the number of potentially preventable nosocomial infections. **RESULTS:** The calculated number of patients with preventable infections was 7,493, which constituted 21.6% of the infected patients. Among hospital areas, intensive care had the lowest preventability rate (4.6%), whereas gynecology and obstetrics had the highest (40.6%). There was a significant inverse exposure-effect relationship between the proportion of preventable infections and the National Nosocomial Infections Surveillance (NNIS) System risk index. No correlation was observed between the prevalence of patients with nosocomial infection and the percentage of preventable infections. **CONCLUSION:** This analysis suggests that fewer nosocomial infections may be preventable in Spanish hospitals than previously assumed.

REF ID: 2945

Level IV: Non-experimental study

Topic 1: risks

Roth, E. J., Lovell, L., Harvey, R. L., Heinemann, A. W., Semik, P., & Diaz, S. (2001). Incidence of and risk factors for medical complications during stroke rehabilitation. *Stroke*, 32(2), 523-529.

Journal Article, Research, Tables/Charts

BACKGROUND AND PURPOSE: The aims of this study were to examine the frequency, types, and clinical factors associated with medical complications that occur during inpatient rehabilitation and to identify risk factors for complications that require a transfer to an acute care facility. **METHODS:** A cohort of 1029 patients consecutively admitted for inpatient stroke rehabilitation was studied. Demographic and stroke information, impairment, preexisting medical conditions, and admission laboratory abnormalities were recorded. Medical complications, defined as new or exacerbated medical problems, were documented for each patient. Complications that required transfer off rehabilitation were noted. Univariate and multiple logistic regression analyses were used to determine factors that were associated with risk of medical complications and risk of transfer off rehabilitation. **RESULTS:** Seventy-five percent of patients experienced ≥ 1 medical complication during rehabilitation. Significant factors for the development of any medical complication included greater neurological deficit (odds ratio [OR], 4.10; confidence interval [CI], 1.88 to 8.91), hypoalbuminemia (OR, 1.71; 95% CI, 1.15 to 2.52), and history of hypertension (OR, 1.81; 95% CI, 1.27 to 2.59). Nineteen percent of patients had a medical complication that required transfer to an acute care facility. Significant factors for transfers were elevated admission white blood cell counts (OR, 1.92; 95% CI, 1.32 to 2.79), low admission hemoglobin levels (OR, 1.89; 95% CI, 1.32 to 2.68), greater neurological deficit (OR, 2.46; 95% CI, 1.37 to 4.39), and a history of cardiac arrhythmia (OR, 1.79; 95% CI, 1.18 to 2.67). **CONCLUSIONS:** Medical complications are common among patients undergoing stroke rehabilitation. A significant number of these medical complications may require a transfer to an acute facility.

REF ID: 2845

Level IV: Non-experimental study

Topic 1: Risks

Rothan-Tondeur, M., Meaume, S., Girard, L., Weill-Engerer, S., Lancien, E., & Abdelmalak, S. et al. (2003). Risk factors for nosocomial pneumonia in a geriatric hospital: A control-case one-center study. *Journal of the American Geriatrics Society*, 51(7), 997-1001.

Journal Article

OBJECTIVES: To determine the risk factors (RFs) and the incidence of nosocomial pneumonia (NP). **DESIGN:** Control/case study conducted from January 1 to April 15, 1999. Prospective enrollment. **SETTING:** Geriatric university hospital with long-, intermediate-, and short-term care facilities. **PARTICIPANTS:** Inpatients aged 65 and older with NP. **MEASUREMENTS:** NP diagnosis relied on at least two clinical signs of respiratory infection and on chest radiography. Each NP case was randomly paired with two controls and followed up for 30 days to determine complication and mortality rates. RFs

between cases and controls were compared (chi-square test, odds ratio (OR), 95% confidence interval, significance level $P = .05$). RFs that were significant in univariate analysis were tested using multivariate analysis and logistic regression. RESULTS: Seventy-five cases of NP were diagnosed in 2,142 patients. The average incidence rate was 3.5% (short-term facilities = 0.5%; intermediate-term facilities = 8.3%; long-term care facilities = 5.3%). The complication rate was 58.1%. The most frequent complications were recurrent NP, heart and respiratory failure, phlebitis, and pressure ulcers. The NP mortality rate was 12.2%. The independent RFs of NP were a history of NP during the previous 6 months (OR = 4.50) and oxygen therapy (OR = 16.15), $P < .001$. Additional RFs were severe malnutrition, heart failure, prescription of antibiotics during the month preceding the emerging NP, eating dependency, and feeding by nasogastric tube. CONCLUSION: The main RF for NP is a history of pneumonia. NP prevention in geriatrics should rely on early management of respiratory infections and malnutrition, surveillance of oxygen therapy and enteral feeding, rational use of antibiotics, and adaptation to the patient's dependency.

REF ID: 2745

Level IV: Non-experimental study

Topic 1: Risks

Rothschild, J. M., Langrigan, C. P., Cronin, J. W., Kaushal, R., Lockley, S. W., & Burdick, E. et al. (2005). The critical care safety study: The incidence and nature of adverse events and serious medical errors in intensive care. *Critical Care Medicine*, 33(8), 1694-1700.

Journal Article, Research, Tables/Charts

OBJECTIVE: Critically ill patients require high-intensity care and may be at especially high risk of iatrogenic injury because they are severely ill. We sought to study the incidence and nature of adverse events and serious errors in the critical care setting. DESIGN: We conducted a prospective 1-year observational study. Incidents were collected with use of a multifaceted approach including direct continuous observation. Two physicians independently assessed incident type, severity, and preventability as well as systems-related and individual performance failures. SETTING: Academic, tertiary-care urban hospital. PATIENTS: Medical intensive care unit and coronary care unit patients. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: The primary outcomes of interest were the incidence and rates of adverse events and serious errors per 1000 patient-days. A total of 391 patients with 420 unit admissions were studied during 1490 patient-days. We found 120 adverse events in 79 patients (20.2%), including 66 (55%) nonpreventable and 54 (45%) preventable adverse events as well as 223 serious errors. The rates per 1000 patient-days for all adverse events, preventable adverse events, and serious errors were 80.5, 36.2, and 149.7, respectively. Among adverse events, 13% (16/120) were life-threatening or fatal; and among serious errors, 11% (24/223) were potentially life-threatening. Most serious medical errors occurred during the ordering or execution of treatments, especially medications (61%; 170/277). Performance level failures were most commonly slips and lapses (53%; 148/277), rather than rule-based or knowledge-based mistakes. CONCLUSIONS: Adverse events and serious errors involving critically ill patients were common and often potentially life-threatening. Although many types of errors were identified, failure to carry out intended treatment correctly was the leading category.

REF ID: 2937

Level V: Literature Review

Topic 1: Risks

Rubenstein, L. Z., & Josephson, K. R. (2002). The epidemiology of falls and syncope. *Clinics in Geriatric Medicine*, 18(2), 141-158.

Journal Article, Review, Tables/Charts

Falls, syncope, and the associated complications are among the most serious problems that face the elderly population. The most common underlying causes and risk factors for falls include muscle weakness, gait and balance problems, visual impairment, cognitive impairment, depression, functional decline, and particular medications (especially in the presence of environmental hazards). Studies have identified the relative risks for these factors that enable a fairly accurate prediction of who is at high risk

for falls and what areas to target for falls-prevention activity. Causes and risk factors for syncope have not been studied as well in the older population. The most serious types of syncope have underlying cardiac etiologies but they cause less than 25% of the reported cases. The largest category of syncope (approximately 40%) is syncope of unknown etiology, which defies careful diagnostic evaluation but seems to be fairly benign. The epidemiology of these syndromes can provide extremely helpful insights for developing falls-prevention strategies. Copyright (C) 2002 by Elsevier Science (USA).

REF ID: 2860

Level IV: Non-experimental study

Topic 3: Assessment

Russo, P. L., & Spelman, D. W. (2002). A new surgical-site infection risk index using risk factors identified by multivariate analysis for patients undergoing coronary artery bypass graft surgery.[see comment]. *Infection Control & Hospital Epidemiology*, 23(7), 372-376.

Journal Article

OBJECTIVES: To develop a new, simple, and practical risk index for patients undergoing coronary artery bypass graft (CABG) surgery, to develop a preoperative risk index that is predictive of surgical-site infection (SSI), and to compare the new risk indices with the National Nosocomial Infections Surveillance (NNIS) System risk index. **DESIGN:** Potential risk factor and infection data were collected prospectively and analyzed by multivariate analysis. Two new risk indices were constructed and then compared with the NNIS System risk index for predictive power for SSI. **SETTING:** Alfred Hospital is a 350-bed, university-affiliated, tertiary-care referral center. The cardiothoracic unit performs approximately 650 CABG procedures per year. **PATIENTS:** All patients undergoing CABG surgery within the cardiothoracic unit at Alfred Hospital between December 1, 1996, and September 29, 2000, were included. **RESULTS:** Potential risk factor data were complete for 2,345 patients. There were 199 SSIs. Obesity (odds ratio [OR], 1.78; 95% confidence interval [CI95], 1.24 to 2.55), peripheral or cerebrovascular disease (OR, 1.64; CI95, 1.16 to 2.33), insulin-dependent diabetes mellitus (OR, 2.29; CI95, 1.15 to 4.54), and a procedure lasting longer than 5 hours (OR, 1.75; CI95, 1.18 to 2.58) were identified as independent risk factors for SSI. With the use of a different combination of these risk factors, two risk indices were constructed and compared using the Goodman-Kruskal nonparametric correlation coefficient (G). Risk index B had the highest G value (0.3405; CI95, 0.2245 to 0.4565), compared with the NNIS System risk index G value (0.3142; CI95, 0.1462 to 0.4822). The G value for risk index A, constructed from preoperative variables only, was 0.3299 (CI95, 0.2039 to 0.4559). **CONCLUSION:** Two new risk indices have been developed. Both indices are as predictive as the NNIS System risk index. One of the new risk indices can also be applied preoperatively.

REF ID: 2829

Level III: Quasi-experimental study

Topic 4: Management

Rypkema, G., Adang, E., Dicke, H., Naber, T., de Swart, B., & Disselhorst, L. et al. (2004). Cost-effectiveness of an interdisciplinary intervention in geriatric inpatients to prevent malnutrition. *Journal of Nutrition, Health & Aging*, 8(2), 122-127.

Clinical Trial. Controlled Clinical Trial. Journal Article

BACKGROUND: In order to reduce protein-energy malnutrition in older people during hospitalisation an early interdisciplinary intervention is needed. We developed a protocol which includes screening for malnutrition, dysphagia and dehydration on admission, followed by immediate interventions. **OBJECTIVE:** To assess effectiveness of the protocol on nutritional status, hospital-acquired infections and pressure sores, and to evaluate the protocol's economical feasibility. **DESIGN:** Prospective, controlled study. **SETTING:** The inpatient geriatric service of a university hospital (UMC Nijmegen) and a geriatric ward of a non-academic teaching hospital (Rijnstate Hospital, Arnhem). **SUBJECTS:** 298 older patients (>60 years). **Methods:** One of the geriatric wards applied the protocol (N=140) while the other provided standard care (N=158). All non-terminally ill patients admitted for more than two days were included. Body mass was measured on admittance and discharge and hospital-acquired infections and pressure sores were scored and costs related to nutrition, infections and length of hospital stay were

assessed. RESULTS: There was a 0.8 kg loss (SEM 0.3 kg) in average weight in the standard care group and a 0.9 kg gain (SEM 0.2 kg) in the intervention group ($p < 0.001$). The number of hospital acquired infections was significantly lower in the intervention group (33/140 versus 58/158, $p = 0.01$) but no significant difference in number of patients with pressure sores (23/140 versus 33/158) was found. Costs were not significantly different: 7516 versus 7908 Euro/patient for intervention versus controls, respectively. CONCLUSION: An early interdisciplinary intervention approach can be effective in reducing protein-energy malnutrition and related hospital-acquired infections and appears to be economically feasible.

REF ID: 2786

Level IV: Non-experimental study

Topic 1: Risks

Saloheimo, P., Ahonen, M., Juvela, S., Pyhtinen, J., Savolainen, E. R., & Hillbom, M. (2006). Regular aspirin-use preceding the onset of primary intracerebral hemorrhage is an independent predictor for death.[see comment]. *Stroke*, 37(1), 129-133.

Journal Article

BACKGROUND AND PURPOSE: Hematoma volume and impaired level of consciousness are the most potent predictors of outcome after spontaneous intracerebral hemorrhage (ICH). The effect of preceding aspirin-use on outcome after ICH is poorly investigated. We investigated short-term mortality and hematoma enlargement in subjects with ICH to find the predictors for these outcomes. METHODS: This population-based study included all subjects with ICH during a period of 33 months in the population of Northern Ostrobothnia, Finland. The subjects were identified, and their clinical characteristics and outcomes were checked from hospital records or death records. RESULTS: Three-month mortality of the 208 identified subjects with ICH was 33%. The independent risk factors for death were regular aspirin-use at the onset of ICH (relative risks [RR], 2.5; 95% CI, 1.3 to 4.6; $P = 0.004$), warfarin-use at the onset of ICH (RR, 3.2; 95% CI, 1.6 to 6.1; $P = 0.001$), and ICH score higher than 2 on admission (RR, 13.8; 95% CI, 6.0 to 31.4; $P < 0.001$). Regular aspirin-use preceding the onset of ICH associated significantly with hematoma enlargement during the first week after ICH ($P = 0.006$). CONCLUSIONS: We observed poor short-term outcomes and increased mortality, probably attributable to rapid enlargement of hematomas, in the subjects with ICH who had been taking regularly moderate doses of aspirin (median 250 mg) immediately before the onset of the stroke.

REF ID: 2799

Level IV: Non-experimental study

Topic 3: Assessment

Sartor, C., Delchambre, A., Pascal, L., Drancourt, M., De Micco, P., & Sambuc, R. (2005). Assessment of the value of repeated point-prevalence surveys for analyzing the trend in nosocomial infections. *Infection Control & Hospital Epidemiology*, 26(4), 369-373.

Journal Article. Multicenter Study

OBJECTIVE: To assess the value of repeated point-prevalence surveys in measuring the trend in nosocomial infections after adjustment for case mix. SETTING: A 3,500-bed teaching facility composed of 4 acute care hospitals. METHODS: From May 1992 to June 1996, eight point-prevalence surveys of nosocomial infections were performed in the hospitals using a sampling process. The trend of adjusted nosocomial infection rates was studied for the four surveys that collected data on indwelling catheters. Adjusted rates were calculated using a logistic regression model and a direct standardization method. RESULTS: From 1992 to 1996, a total of 20,238 patients were included in the 8 point-prevalence surveys. The nosocomial infection rate decreased from 8.6% in 1992 to 5% in 1996 ($P < .001$). The analysis of adjusted nosocomial infection rates included 9,600 patients. Four independent risk factors were identified: length of stay greater than 12 days, hospitalization in an intensive care unit, presence of an indwelling urinary catheter, and history of a surgical procedure. After adjustment for case mix, the nosocomial infection rate still showed a downward trend (from 7.2% in 1993 to 5.1% in 1996; $P = .02$). CONCLUSION: Adjusted prevalence rates of nosocomial infections showed a significant downward trend during the period of this study.

REF ID: 2929

Level IV: Non-experimental study

Topic 1: Risks

Schuermans, M. J., Duursma, S. A., ShortridgeBaggett, L. M., Clevers, G., & PelLittel, R. (2003). Elderly patients with a hip fracture: The risk for delirium. *Applied Nursing Research, 16(2), 75-84.*

Journal Article, Research, Tables/Charts

This prospective study investigated risk factors for delirium in elderly hip fracture patients that could be recognized by nurses. Data were collected on predisposing and precipitating factors for delirium from 92 elderly patients with a hip fracture. Predisposing factors included age, gender, sensory impairments, functional impairment before the hip fracture, residency before admission, pre-existing cognitive impairment, comorbidities, and medication use. Precipitating factors included factors related to surgery and to the postoperative period. Factors related to surgery included time between admission and surgery, type of surgery, type of anesthesia, duration of surgery and anesthesia, and complications during surgery. Factors studied in the postoperative period were slow recovery, malnutrition, dehydration, addition of three or more medications, introduction of bladder catheter, infections, complications and falls, and use of morphine. Eighteen patients developed delirium, as diagnosed by a geriatrician by using the Diagnostic Statistical Manual-IV criteria. Data on delirious patients were compared with the data on non-delirious patients. The findings confirm that elderly hip fracture patients with premorbid ADL dependency, psychiatric comorbidities (including dementia), and a high number of other comorbid problems are at risk for the development of delirium. Based on these findings, it is recommended that nurses should assess patients' pre-fracture functional and cognitive capacities in an early stage of the hospital stay. Nurses should also be alert to postoperative delirium in "healthy elderly" patients. Monitoring of symptoms postoperatively in all elderly patients is advised. Copyright 2003 Elsevier Inc. All rights reserved.

REF ID: 2933

Level VI: Opinion

Topic 1: Risks

Segatore, M., & Adams, D. (2001). Managing delirium and agitation in elderly hospitalized orthopaedic patients: Part I -- theoretical aspects. *Orthopaedic Nursing, 20(1), 31-46.*

Journal Article, CEU, Exam Questions, Tables/Charts

Managing behavioral disorders such as delirium and agitation while simultaneously attending to the acute needs of elderly patients is a challenge that confronts orthopaedic nurses on a daily basis. This will only increase in frequency and complexity as the new century dawns. Delirium and agitation affect morbidity, mortality, length of stay, and costs--in short, outcomes. To manage and care for these patients, orthopaedic nurses must first update their knowledge of acute disorders that can disrupt mental status and behavior, and the effects of systemic events on brain function. With the knowledge of the pathophysiology of delirium and agitation, nurses then need to refine their assessment and intervention skills. This article describes the phenomena of agitation and delirium in the elderly acute orthopaedic patient, outlines current perceptions regarding pathophysiology, and offers guidelines for prevention and intervention. An algorithm has been developed that can assist with the identification of at-risk individuals, causes of delirium, and early assessments in the acute care setting.

REF ID: 2893

Level IV: Non-experimental study

Topic 1: Risks

Segers, P., de Jong, A. P., Kloek, J. J., Spanjaard, L., & de Mol, B. A. J. (2006). Risk control of surgical site infection after cardiothoracic surgery. *Journal of Hospital Infection, 62(4), 437-445.*

Journal Article, Research, Tables/Charts

The purpose of this prospective study was to investigate whether a risk control programme based on risk assessment, new treatment modalities and the presence of a surveillance programme reduces the incidence of surgical site infections (SSI). Between January 2001 and December 2003, 167 patients were treated for a total of 183 SSIs. Data were collected on pre-operative risk factors, intra-operative

data and postoperative recovery, including complications, infecting organisms, SSI treatment techniques and length of hospital stay. In this series, the total incidence of SSI was 5.6%. The mean age of affected patients was 65.1 years with a range of 20-87 years. Mean intensive care and hospital stay for SSI was 3.6 days and 18.8 days, respectively. Total mortality was 4.8%. Many risk factors were encountered, some of which were associated with a high morbidity. The majority of SSIs were treated by topical negative pressure therapy (N=81), which gave few side-effects and good clinical results. After starting the surveillance programme, a steady decline in prevalence was observed from 8.9% to 3.9%. This series adds to the evidence that SSI after cardiothoracic surgery is a major but mainly preventable cause of morbidity and mortality. Risk factor assessment, application of novel treatment modalities and an adequate surveillance system all increased patient safety. Copyright (C) 2006 The Hospital Infection Society

REF ID: 2750

Level VI: Opinion

Topic 1: Risks

Sherman, F. T. (2005). The 3 "hypo's" of hospitalization: Costly new forms of geriatric iatrogenesis prolong length of stay. *Geriatrics*, 60(5), 9-10.

Journal Article, Editorial

REF ID: 2881

Level V: Literature review

Topic 4: Management

Simor, A. E. (2001). The role of the laboratory in infection prevention and control programs in long-term-care facilities for the elderly. *Infection Control & Hospital Epidemiology*, 22(7), 459-463.

Journal Article. Review

Hospital infection prevention and control programs rely extensively on diagnostic microbiology laboratory testing. However, specimens for microbiological evaluation are less likely to be obtained from elderly residents of long-term-care facilities (LTCFs). In this article, issues regarding laboratory utilization and the potential role of the microbiology laboratory in infection prevention and control programs in LTCFs are reviewed. The role of the laboratory in infection surveillance, in the management of antimicrobial resistance, and in outbreak investigation are highlighted. [References: 61]

REF ID: 2939

Level IV: Non-experimental study

Topic 1: Risks

Sloane, P. D., Zimmerman, S., Brown, L. C., Ives, T. J., & Walsh, J. F. (2002). Inappropriate medication prescribing in residential care/assisted living facilities. *Journal of the American Geriatrics Society*, 50(6), 1001-1011.

Journal Article, Research, Tables/Charts

OBJECTIVES: To identify the extent to which inappropriately prescribed medications (IPMs) are administered to older patients in residential care/assisted living (RC/AL) facilities and to describe facility and resident factors associated with receipt of one or more IPMs. **DESIGN:** Cross-sectional study of a stratified, representative sample of 193 facilities in four states. **SETTING:** We identified representative geographic regions within Florida, New Jersey, North Carolina, and Maryland and drew from within them a stratified random sample of 193 RC/AL facilities. Three subtypes of facilities were included in the sample: small homes (<16 beds), larger "new-model" homes, and larger "traditional" homes. **PARTICIPANTS:** Within each larger home, a random sample of residents aged 65 and older was approached for consent; in smaller homes all residents were approached. The overall enrollment rate was 92%; 2,078 residents were enrolled. **MEASUREMENTS:** Questionnaires and on-site observations were used to gather data on facility administration and staffing and resident characteristics. All prescription and nonprescription medications taken at least 4 of the 7 days before data collection were taken from medication administration records and coded for analysis. IPM designation was based on modification of a list developed by Beers et al. and currently used by nursing home surveyors. **RESULTS:** The majority of RC/AL patients were taking five or more medications; 16.0% of these

patients were receiving IPMs. The most common IPMs were oxybutynin, propoxyphene, diphenhydramine, ticlopidine, doxepin, and dipyridamole. In multivariate analyses, using generalized estimating equations, IPM use was associated with the number of medications received, smaller facility bed size, moderate licensed practical nurse turnover, absence of dementia, low monthly fees, and absence of weekly physician visits. CONCLUSIONS: IPMs remain a problem in long-term care, but rates in these RC/AL settings compare favorably with those reported for other frail older populations, suggesting that use of medications with severe adverse effects may be waning. Regular physician facility visits may improve prescribing, as will attention to high-risk groups such as individuals on multiple medications.

REF ID: 2932

Level V: Literature review

Topic 3: Assessment

Smetana, G. W. (2003). Preoperative pulmonary assessment of the older adult. *Clinics in Geriatric Medicine, 19*(1), 35-55.

Journal Article, Review, Tables/Charts

Postoperative pulmonary complications are important contributors to surgical morbidity and increase mortality and length of stay. This article reviews the data supporting patient- and procedure-related risk factors for these complications and existing multifactorial risk indices. The controversy surrounding the proper use of preoperative spirometry in nonresective surgery is discussed. Finally, this review suggests an approach to risk reduction strategies in the perioperative period. Copyright (C) 2003 by Elsevier Science (USA).

REF ID: 2851

Level IV: Non-experimental study

Topic 1: Risks

Soletto, L., Pirard, M., Boelaert, M., Peredo, R., Vargas, R., & Gianella, A. et al. (2003). Incidence of surgical-site infections and the validity of the national nosocomial infections surveillance system risk index in a general surgical ward in Santa Cruz, Bolivia. *Infection Control & Hospital Epidemiology, 24*(1), 26-30.

Journal Article

OBJECTIVES: To estimate the frequency of and risk factors for surgical-site infections (SSIs) in Bolivia, and to study the performance of the National Nosocomial Infections Surveillance (NNIS) System risk index in a developing country. DESIGN: A prospective study with patient follow-up until the 30th postoperative day. SETTING: A general surgical ward of a public hospital in Santa Cruz, Bolivia. PATIENTS: Patients admitted to the ward between July 1998 and June 1999 on whom surgical procedures were performed. RESULTS: Follow-up was complete for 91.5% of 376 surgical procedures. The overall SSI rate was 12%. Thirty-four (75.6%) of the 45 SSIs were culture positive. A logistic regression model retained an American Society of Anesthesiologists score of more than 1 (odds ratio [OR], 1.87), a not-clean wound class (OR, 2.28), a procedure duration of more than 1 hour (OR, 1.81), and drain (OR, 1.98) as independent risk factors for SSI. There was no significant association between the NNIS System risk index and SSI rates. However, a "local" risk index constructed with the above cutoff points showed a linear trend with SSI ($P < .001$) and a relative risk of 3.18 for risk class 3 versus a class of less than 3. CONCLUSIONS: SSIs cause considerable morbidity in Santa Cruz. Appropriate nosocomial infection surveillance and control should be introduced. The NNIS System risk index did not discriminate between patients at low and high risk for SSI in this hospital setting, but a risk score based on local cutoff points performed substantially better.

REF ID: 2902

Level IV: Non-experimental study

Topic 1: Risks

Sorensen, L., Stokes, J. A., Purdie, D. M., Woodward, M., & Roberts. (2005). Medication management at home: Medication-related risk factors associated with poor health outcomes. *Age and Ageing, 34*(6), 626-632.

Journal Article, Research, Tables/Charts

Background: some patients may have medication-related risk factors only identified by home visits, but the extent to which those risk factors are associated with poor health outcomes remains unclear.

Objective: to determine the association between medication-related risk factors and poor patient health outcomes from observations in the patients' homes. Design: cross-sectional study. Setting: patients' homes. Subjects: 204 general practice patients living in their own homes and at risk of medication-related poor health outcomes. Methods: medications and medication-related risk factors were identified in the patients' homes by community pharmacists and general practitioners (GPs). The medication-related risk factors were examined as determinants of patients' self-reported health related quality of life (SF-36) and their medication use, as well as physicians' impression of patient adverse drug events and health status. Results: key medication-related risk factors associated with poor health outcomes included: Lack of any medication administration routine, therapeutic duplication, hoarding, confusion between generic and trade names, multiple prescribers, discontinued medication repeats retained and multiple storage locations. Older age and female gender were associated with some poorer health outcomes. In addition, expired medication and poor adherence were also associated with poor health outcomes, however, not independently. Conclusion: the findings support the theory that polypharmacy and medication-related risk factors as a result of polypharmacy are correlated to poor health outcomes.

REF ID: 2755

Level IV: Non-experimental study

Topic 1: Risks

Steel, K., Gertman, P. M., Crescenzi, C., & Anderson, J. (2004). Iatrogenic illness on a general medical service at a university hospital. *Quality & Safety in Health Care, 13*(1), 76-80.

Journal Article, Research, Tables/Charts

We found that 36% of 815 consecutive patients on a general medical service of a university hospital had an iatrogenic illness. In 9% of all persons admitted, the incident was considered major in that it threatened life or produced considerable disability. In 2% of the 815 patients, the iatrogenic illness was believed to contribute to the death of the patient. Exposure to drugs was a particularly important factor in determining which patients had complications. Given the increasing number and complexity of diagnostic procedures and therapeutic agents, monitoring of untoward events is essential, and attention should be paid to educational efforts to reduce the risks of iatrogenic illness.

REF ID: 2880

Level IV: Non-experimental study

Topic 1: Risks

Stevens, P. E., Tamimi, N. A., Al-Hasani, M. K., Mikhail, A. I., Kearney, E., & Lapworth, R. et al. (2001). Non-specialist management of acute renal failure. *Qjm, 94*(10), 533-540.

Journal Article

In a 12-month prospective study of the initial management of patients with acute renal failure (ARF) in East Kent (population 593 000), we evaluated the initial management of ARF and assessed what proportion of ARF may have been preventable. Patients were seen and assessed on a daily basis, and were followed until discharge from hospital or death; survivors were subsequently followed for 3 years. Overall, 288 patients developed ARF (486 per million population/year). Mean age at presentation was 73 years (range 14-96). Initial assessment was often suboptimal, and key features in investigation and initial management were often lacking. In 108 cases, ARF was iatrogenic and/or potentially preventable (53 preventable, 99 iatrogenic, 44 both). Overall survival was 56% at discharge from hospital, 35% at 1-year follow-up, 31% at 2 years, and 28% at 3 years. In discharged patients, recovery of function was complete in 69%. A significant proportion of ARF is preventable. Clear guidelines, easily accessible at the point of care, could aid the diagnostic evaluation of the patient with ARF and indicate where referral for a specialist opinion is appropriate.

REF ID: 2822

Level IV: Non-experimental study

Topic 2: Prevention

Stewart, S., & Box-Panksepp, J. S. (2004). Preventing hospital-acquired pressure ulcers: A point prevalence study. *Ostomy Wound Management*, 50(3), 46-51.

Journal Article

The deleterious effects of mechanical forces on the development of pressure ulcers have been recognized for many years. A cross-sectional study was conducted to ascertain the effect of implementing a new support surface on the development of pressure ulcers in one acute care facility. Two pressure ulcer prevalence studies were conducted using the Pressure Ulcer Prevalence Audit Data Collection Tool. To ascertain whether ulcers were facility-acquired, a retrospective chart review was completed for all patients with pressure ulcers. Following completion of the first audit, only the support surface used for at-risk patients was changed. The second audit was conducted 3 months after the new support surface was implemented. Pressure ulcer prevalence was 8.3% in June 1999 and 7.8% in October 2000; whereas, the prevalence of nosocomial pressure ulcers was 5.5% in 1999 and 3.1% in October 2000. Despite the inherent limitations of this study design, the results suggest that use of the new support surfaces for at-risk patients has lowered the prevalence of nosocomial pressure ulcers in this facility.

REF ID: 2837

Level V: Literature review

Topic 4: Management

Stott, D. J., Kerr, G., & Carman, W. F. (2002). Nosocomial transmission of influenza. *Occupational Medicine (Oxford)*, 52(5), 249-253.

Journal Article. Review

Influenza is a common nosocomial infection. Serious outbreaks occur typically in elderly long-term patients, but have also been reported in renal, transplant and oncology units, neonatal intensive care and paediatrics. It is likely that staff-patient cross-infection is common. Prompt diagnosis of an outbreak lies at the heart of an effective influenza control programme. This requires effective virological surveillance. There are a variety of strategies that can help to prevent spread of influenza in health care settings. Basic infection control should include isolating infected residents, restricting circulation of nursing staff between patients, and restriction of visitors. Annual influenza immunization should be offered to elderly patients, subjects with chronic disease, and those in long-term residential or nursing home care. Vaccination of health care workers has been shown to be effective in protecting elderly patients in long-term care. Use of oral amantadine or rimantadine is an additional possible strategy for prophylaxis or treatment during an outbreak. [References: 37]

REF ID: 2754

Level IV: Non-experimental study

Topic 1: Risks

Sturkenboom, M. C. J., Romano, F., Simon, G., CorreaLeite, M. L., Villa, M., & Nicolosi, A. et al. (2002). The iatrogenic costs of NSAID therapy: A population study. *Arthritis & Rheumatism (Arthritis Care & Research)*, 47(2), 132-140.

Journal Article, Research, Tables/Charts

OBJECTIVE: To estimate the iatrogenic costs of nonsteroidal antiinflammatory drug (NSAID) treatment from the perspective of the Italian National Health Service. **METHODS:** We conducted a retrospective cohort study using the primary and secondary care claims data registered in the regional health service database in the Friuli-Venezia Giulia (Italy). The study cohort comprised all persons(265,114) who received at least one prescription for any NSAID between August 1996 and July 1998. The outcomes of interest were the costs of medical interventions for upper gastrointestinal disorders following NSAID treatment (i.e., prescriptions for gastroprotective drugs, hospitalizations, and outpatient diagnostic procedures). **RESULTS:** The study population received a total of 660,311 NSAID prescriptions for a cost of 6,587,533 Euros (0.53 euro per treatment day). The cost of medical interventions for gastrointestinal events added 58% to the cost of NSAID therapy (0.31 euro per NSAID treatment day, up to 64% directly attributable to NSAID use). The iatrogenic costs were generated by 12.4% of the patients, 77% of whom had a positive history of gastrointestinal disorders and 82% of

whom were older than 50 years. Co-prescriptions for gastroprotective drugs accounted for 78.6% of the overall iatrogenic costs. The iatrogenic costs did not differ between cyclooxygenase (COX) nonselective and COX-2 preferential drugs within strata of age and prior history of gastrointestinal disorders, but were significantly higher for the parenteral NSAIDs than the oral or rectal formulations.

CONCLUSIONS: In Italy, the iatrogenic costs of NSAID therapy add 58% to the cost of NSAID treatment; most of the cost is generated by co-prescriptions of gastroprotective drugs to elderly NSAID users or patients with a history of gastrointestinal disorders.

REF ID: 2887

Level IV: Non-experimental study

Topic 3: Assessment

Suka, M., Yoshida, K., & Takezawa, J. (2006). A practical tool to assess the incidence of nosocomial infection in Japanese intensive care units: The Japanese nosocomial infection surveillance system. *Journal of Hospital Infection*, 63(2), 179-184.

Journal Article, Research, Tables/Charts

SUMMARY: Infection control professionals have the means to calculate infection rates in their hospitals but not to assess them. They require a practical tool that enables them to compare observed infection rates with external standards. Based on the data obtained from the intensive care unit (ICU) component of the Japanese Nosocomial Infection Surveillance (JANIS) system, a spreadsheet was developed to calculate a standardized infection ratio (SIR) as a risk-adjusted indicator. Out of the factors associated with the development of nosocomial infections in a multi-variate analysis, the following three factors were selected for stratification: APACHE II score (0-10, 11-20, 21+), operation (yes, no) and ventilator use (user, non-user). Infection rates in 2001 were determined (per 1000 patient-days), stratified by the three factors, as a benchmark. The spreadsheet was designed to calculate SIRs on the basis of the Japanese benchmark infection rates using Microsoft Excel software. The user of the spreadsheet should input the number of observed nosocomial infections and patient-days by APACHE II score, operation and ventilator use. When applied to eight Japanese ICUs, the spreadsheet revealed relative differences and temporal changes in the incidence of nosocomial infections within these ICUs.

REF ID: 2771

Level V: Literature review

Topic 6: Assessment

Sullivan, J. R., & Shear, N. H. (2002). Drug eruptions and other adverse drug effects in aged skin. *Clinics in Geriatric Medicine*, 18(1), 21-42.

Journal Article, Review, Tables/Charts

The frequency of adverse reactions to drugs increases with age, making the hazards of drug therapy a major problem in the elderly. A cutaneous eruption, exacerbation of preexisting skin disease, and the onset of a new skin disorder all can be caused by drugs. It is crucial to consider a drug cause when assessing skin disease in the aged. If a severe reaction occurs, the aged are at higher risk for major morbidity and mortality compared with younger individuals. This article focuses on the hazards of drug therapy from a dermatologic and geriatric medicine perspective, covering clinical assessment, systemic associations, and approach to management. Copyright (C) 2002 by W.B. Saunders Company

REF ID: 2889

Level IV: Non-experimental study

Topic 1: Risks

Sung, V. W., Weitzen, S., Sokol, E. R., Rardin, C. R., & Myers, D. L. (2006). Effect of patient age on increasing morbidity and mortality following urogynecologic surgery. *American Journal of Obstetrics and Gynecology*, 194(5), 1411-1417.

Journal Article, Research, Tables/Charts

OBJECTIVE: The purpose of this study was to estimate the effect of age on the risk of in-hospital mortality and morbidity following urogynecologic surgery and to compare risks associated with obliterative versus reconstructive procedures for prolapse in elderly women. STUDY DESIGN: We conducted a retrospective cohort study utilizing data from 1998 to 2002 from the Nationwide Inpatient

Sample. Multivariable logistic regression was performed to obtain odds ratios estimating the effect of age on risk of death and complications, adjusting for comorbidities and demographic factors.

RESULTS: There were 264,340 women in our study population. Increasing age was associated with higher mortality risks per 1000 women (or = 80 years, 2.8; P or = 80 years, 2.8; P or = 80 years, 200; P or = 80 years, OR 13.6 [95% CI 5.9-31.4]), compared with women < 60 years. The risk of peri-operative complications was also higher in elderly women 80 years of age and older (OR 1.4 [95% CI 1.3-1.5]) compared with younger women. Elderly women 80 years and over who underwent obliterative procedures had a lower risk of complication compared with those who underwent reconstructive procedures for prolapse (17.0% vs 24.7%, P < .01). CONCLUSION: Although the absolute risk of death is low, elderly women have a higher risk of mortality and morbidity following urogynecologic surgery.

REF ID: 2859

Level IV: Non-experimental study

Topic 1: Risks

Tal, S., Gurevich, A., Guller, V., Gurevich, I., Berger, D., & Levi, S. (2002). Risk factors for recurrence of clostridium difficile-associated diarrhea in the elderly. *Scandinavian Journal of Infectious Diseases*, 34(8), 594-597.

Journal Article

Risk factors that influence the recurrence of nosocomial *Clostridium difficile*-associated diarrhea (CDAD) were determined in an 18-month follow-up study in a subacute geriatric department. A case-control study was conducted, comparing 43 patients with recurrent *C. difficile*-associated diarrhea (RCDAD) (case patients) with 38 patients who had only 1 episode of CDAD (control patients). The mean age of patients was 81.6 +/- 7.2 y (range 64-95 y). All cases with CDAD were receiving antibiotic therapy. RCDAD occurred in 53.1% of patients. Risk factors for RCDAD included fecal incontinence (p < or = 0.04), longer duration of fever from admission until first episode of CDAD (p < or = 0.02) and H2-antagonist treatment (p < or = 0.02). This study shows that RCDAD is a common clinical event in elderly hospitalized patients and may be predictable in some groups of patients.

REF ID: 2785

Level V: Case report

Topic 1: Risks

Thual, N., Penven, K., Chevallier, J. M., Dompmartin, A., & Leroy, D. (2005). [Fluvastatin-induced dermatomyositis]. *Annales De Dermatologie Et De Venereologie*, 132(12 Pt 1), 996-999.

Case Reports. Journal Article

BACKGROUND: Dermatomyositis is a rare inflammatory dermatosis for which an iatrogenic origin has been described in very few cases. We report a case of dermatomyositis occurring after fluvastatin intake. CASE REPORT: A 76-year-old male patient sought medical attention for a photodistributed rash and considerable muscular weakness present for one month. Two months earlier, fluvastatin had been introduced following the discovery of dyslipidemia. Serum creatine phosphokinase levels were elevated. Histological examination of a muscle biopsy was consistent with a diagnosis of dermatomyositis. Investigation for neoplasia and associated autoimmune disease proved negative. All clinical and laboratory abnormalities diminished spontaneously without recourse to corticosteroids within one month of the final intake of fluvastatin. After a follow-up period of three years, no recurrence was observed and no signs of neoplasia or connectivitis were found. DISCUSSION: Iatrogenic dermatomyositis has only been reported in rare cases. Certain drugs have been incriminated, notably D-penicillamine. Six cases of drug-induced dermatomyositis have been described with statins: simvastatin, atorvastatin, pravastatin and lovastatin. Of these cases, only one resolved spontaneously after withdrawal of the drug alone without use of corticosteroids. Our case concerns intake of fluvastatin, an HMG-CoA reductase inhibitor with rare though well-known muscular side effects: elevated serum CPK, myalgia and rhabdomyolysis. Six cases of polymyositis have also been reported. Ours is the first case of dermatomyositis described with this category of statins. It is also the second reported case showing improvement after withdrawal of the lipid-lowering agent and without corticosteroids. Thus in cases of dermatomyositis, this iatrogenic picture should be sought routinely.

REF ID: 2815

Level V: Case report

Topic 1: Risks

Todd, L. M., Godber, I. M., & Gunn, I. R. (2004). Iatrogenic copper deficiency causing anaemia and neutropenia. *Annals of Clinical Biochemistry*, 41(Pt 5), 414-416.

Case Reports. Journal Article

A 79-year-old woman presented with an obstructed femoral hernia and had a wedge resection of the small intestine. Post-operatively she developed wound dehiscence and spent 3 days in the adult critical care unit. Good recovery followed and she was allowed home after 2 months in hospital. Six months later she presented with anaemia, neutropenia and a very low serum copper concentration. Review of her notes revealed that she had been given oral zinc therapy while in the critical care unit and this treatment had been continued on discharge from hospital. Serum copper, haemoglobin and white cell count recovered after oral zinc was discontinued. Oral zinc treatment can lead to symptomatic copper deficiency in susceptible patients.

REF ID: 2795

Level IV: Non-experimental study

Topic 2: Prevention

Topal, J., Conklin, S., Camp, K., Morris, V., Balcezak, T., & Herbert, P. (2005-Jun). Prevention of nosocomial catheter-associated urinary tract infections through computerized feedback to physicians and a nurse-directed protocol. *American Journal of Medical Quality*, 20(3), 121-126.

Journal Article

Catheter-associated urinary tract infections (CAUTIs) represent the most common nosocomial infection. The authors' baseline rate of CAUTI for general medical service was elevated at 36 per 1000 catheter-days. The medical literature has consistently linked inappropriate catheter use with the development of CAUTI. The baseline data also revealed a high rate of inappropriate use of indwelling urinary catheters. Using the dual modalities of technology through prompts in the computerized order/entry system and handheld bladder scanners, as well as in combination with staff education and nurse empowerment, the authors were successful in reducing the use and duration of urinary catheters as well as the incidence of CAUTI. In subsequent data collection cycles over the following 2 years, 81% reduction in device use and a 73% reduction in the clinical end point of nosocomial CAUTI (36/1000 catheter-days to 11/1000 catheter-days; $P < .001$) was demonstrated.

REF ID: 2759

Level V: Literature review

Topic 6: Comprehensive

Travis, S. S., Menscer, D., Dixon, S. O., Turner, M. J., & Thornton, M. (2003). Assessing and managing iatrogenic disturbance pain for frail, dependent older adults in long-term care situations. *Annals of Long-Term Care*, 11(5), 33-40.

Journal Article, Forms, Review, Tables/Charts

More than a decade of reports about the presence of persistent pain among frail, older residents in long-term care settings have resulted in better documentation of pain assessments and more attention to the treatment of chronic pain conditions. Yet, this attention to pain management has done very little to change many of the patient care practices that occur at the bedside. New approaches to care and additions to the existing pain taxonomy are needed. This article provides an overview of a condition that the authors term "iatrogenic disturbance pain" (IDP), pain that is affected by all forms of direct patient contact. Included in this article are a discussion of the situations in which IDP can be exaggerated (eg, contractures, cognitive decline, end of life) and suggestions for changes in certain patient care practices that could reduce the severity and prevalence of IDP.

REF ID: 2905

Level IV: Non-experimental study

Topic 1: Risks

Triller, D. M., Clause, S. L., & Hamilton, R. A. (2005). Risk of adverse drug events by patient

destination after hospital discharge. *American Journal of Health-System Pharmacy, AJHP, 62(18), 1883-1889.*

Journal Article, Research, Tables/Charts

PURPOSE: The prevalence of risk factors for adverse drug events (ADEs) in patients discharged from the hospital to various care settings was studied. **METHODS:** Data on patient risk characteristics for ADEs were collected for hospital discharges for 2000. Differences in the prevalence of 10 risk characteristics among home health care (HHC), self-care (SC), and long-term-care (LTC) patients at the point of discharge were determined. **RESULTS:** Data for 4250 discharges were analyzed. The three groups differed significantly in the distribution of risk characteristics. HHC patients had the highest prevalence of heart failure, cardiovascular medication use, and polypharmacy, and LTC patients had the highest prevalence of hypoalbuminemia, cognitive impairment, and psychiatric drug use. **CONCLUSION:** The risk of ADEs in patients discharged to HHC appeared to be comparable to or higher than that in patients discharged to LTC.

REF ID: 2807

Level V: Case report

Topic 1: RIisks

Vandooren, B., Haenebalcke, C., & Bogaerts, Y. (2005). Two patients with the same type of iatrogenic disease.[see comment]. *European Respiratory Journal, 25(2), 389-391.*

Case Reports. Journal Article

REF ID: 2925

Level IV: Non-experimental study

Topic 3: Assessment

Vassallo, M., Sharma, J. C., Briggs, R. S. J., & Allen, S. C. (2003). Characteristics of early fallers on elderly patient rehabilitation wards. *Age and Ageing, 32(3), 338-342.*

Journal Article, Research, Tables/Charts

BACKGROUND: falls are one of the most frequent complications on rehabilitation wards for elderly patients. **OBJECTIVE:** to study the characteristics of early and late fallers. **DESIGN:** prospective observational study with blinded end-point evaluation. **SETTING:** a non-acute geriatric hospital. **SUBJECTS:** 1025 consecutive patients admitted for rehabilitation following treatment for an acute illness. **MAIN OUTCOME MEASURES:** early/late fallers and time to first fall from admission. **RESULTS:** we identified 824 non-fallers and 201 fallers. Seventy seven (38.3%) fell during the first week. The incidence decreased progressively in subsequent weeks. Early fallers were more likely to have a past history of falls ($P=0.0009$), an unsafe gait ($P=0.001$), confusion ($P<0.0001$) and be admitted from medical wards ($P=0.03$). Patients admitted from orthopaedic wards having sustained a lower limb fracture were significantly less likely to have an early fall compared to all other patients ($P=0.027$). When compared to later fallers, early fallers were more likely to have a past history of falls ($P=0.045$). They were less likely to be admitted from an orthopaedic ward ($P=0.01$) or to have sustained a fracture of the lower limbs ($P=0.002$). Logistic regression analysis showed that a past history of falls, confusion and an unsafe gait were independent risk factors predisposing to early falls. The Kaplan-Meier survival analysis showed a significantly higher cumulative risk of falling associated with these characteristics. **CONCLUSION:** the initial week of patients' rehabilitation is associated with the greatest risk of falling. Early fallers can be predicted by easily identifiable characteristics. This highlights the need for early fall risk assessment.

REF ID: 2853

Level IV: Non-experimental study

Topic 1: risks

Vazquez-Aragon, P., Lizan-Garcia, M., Cascales-Sanchez, P., Villar-Canovas, M. T., & Garcia-Olmo, D. (2003). Nosocomial infection and related risk factors in a general surgery service: A prospective study. *Journal of Infection, 46(1), 17-22.*

Journal Article

OBJECTIVES: The aim of this study was to quantify the frequency of nosocomial infection in the

general surgery service of a tertiary-care hospital and to identify associated risk factors. **METHODS:** A prospective, longitudinal, descriptive and analytical study was made from January 1995 to December 1998 of a clinical cohort of 2794 patients who underwent a surgical procedure with a post-surgery stay of more than 48 h. The criteria for infection were those defined by the Center for Disease Control and Prevention (CDC) of the USA. **RESULTS:** The most frequent nosocomial infection was surgical infection (SI), with a global cumulative incidence (CI) of 7.7%, ranging from 3.4% for clean surgery to 23.7% for dirty surgery. The next most frequent were urinary tract infection (UTI) and bacteremia (1.5%) and nosocomial pneumonia (NP) (0.5%). The global CI of SI decreased from 11.7% in 1995 to 4% in 1998. An ASA classification higher than 2 multiplied the risk of SI by 1.76; with respect to UTI multiplied the risk by 2.13; the risk of NP by 5.93 and multiplied the risk of B by 4.72. **CONCLUSIONS:** The most frequent nosocomial infection was surgical infection. An ASA higher than 2, the stay prior to surgery; the number of days with a urinary catheter, with a central venous catheter and with mechanical ventilation; as well as the improvement in the use of antimicrobial prophylaxis, were all factors that influenced the frequency of nosocomial infection.

REF ID: 2779

Level III: Quasi-experimental study

Topic 1: Risks

Vesta, K. S., Wells, P. G., Gentry, C. A., & Stipek, W. J. (2005). Specific risk factors for clostridium difficile-associated diarrhea: A prospective, multicenter, case control evaluation. *American Journal of Infection Control*, 33(8), 469-472.

Journal Article. Multicenter Study

BACKGROUND: Clostridium difficile is a toxin-producing bacterium that is responsible for toxicity to the colonic mucosa, causing inflammation, necrosis, and, in some extreme cases, intestinal dilation and perforation. C difficile-associated diarrhea (CDAD) occurs when patients have a reduction in their natural gastrointestinal flora that allows for the proliferation of and toxin production by C difficile. **METHODS:** Using a multicenter, prospective observational case control study, we assessed and quantified risk factors associated with the development of diarrhea caused by Clostridium difficile, with particular attention to antibiotic use. All hospitalized patients with diarrhea requiring a C difficile toxin test as part of their routine clinical workup were considered for study inclusion. Patients with a negative specimen (controls) were considered for enrollment if matched (by age, sex, length of stay, and institution) to a case. Variables associated with CDAD were identified using univariate analysis. Significant factors were then entered into multivariate logistic regression analysis to identify independent factors. **RESULTS:** There were no significant differences in antibiotic use between cases and controls. Patient severity, classified by Horn's Index, was significantly different between cases and controls ($P = .0022$). No other significant variables were identified. **CONCLUSION:** The severity of illness of the cases was classified as more severe than the controls, but no significant differences in antibiotic use were identified between the groups. The negative C difficile toxin studies on the well-matched control patients indicate a different etiology of diarrhea (such as antibiotic-associated diarrhea), which may have developed in the presence of similar antibiotic use as the cases.

REF ID: 2873

Level IV: Non-experimental study

Topic 1: Risks

Villanueva, E. V., & Anderson, J. N. (2001). Estimates of complications of medical care in the adult US population. *BMC Health Services Research*, 1(1), 2.

Journal Article

BACKGROUND: Total US population estimates of complications of medical care have relied on extrapolations of state-specific estimates. Generalizability is suspect because findings are limited by geographical location or time. We describe the relationship between the annual prevalence of complications of medical care (CM) and socio-demographic characteristics in the adult US population. **METHODS:** We used data from the National Health Interview Surveys, annual nationwide surveys of the resident, civilian, noninstitutionalized population of the United States. The main outcome of interest

was self-reported conditions from CMs (ICD-9 996-999) and activity limitations that arise from such events. Univariate estimates and multivariably adjusted models accounting for selected socio-demographic characteristics and health status were derived. RESULTS: A total of 618,167 reports of conditions from 313,438 subjects 18 years and older from 1987 to 1994 were examined. In 1987, 830,386 adults reported complications of medical care, increasing by about 40% to 1,174,089 adults in 1994. Based on an extrapolation to the US adult population, rates increased by 25% from 558 to 678 per 100,000 during the same period. One-third reported onset a year prior to the interview; two-thirds visited a doctor six months prior; half experienced limitation in major activities; a quarter reported limitation in personal care activities. In the two weeks preceding the interview, complications of medical care caused an average of 1.72 days of restricted activity, 0.79 days spent in bed, and 0.58 days of work lost. Race modified the age-specific risk of these complications. CONCLUSIONS: Complications of medical care impose heavier morbidity than previously considered with some indication that socio-demographic variables modify the risk for injuries.

REF ID: 2787

Level IV: Non-experimental study

Topic 1: Risks

von Baum, H., Ober, J. F., Wendt, C., Wenzel, R. P., & Edmond, M. B. (2005). Antibiotic-resistant bloodstream infections in hospitalized patients: Specific risk factors in a high-risk population? *Infection*, 33(5-6), 320-326.

Journal Article

BACKGROUND: The aim of this study was to explore characteristics that are associated with bloodstream infections due to specific multiresistant microorganisms (methicillinresistant *Staphylococcus aureus*, MRSA; vancomycin-resistant enterococci, VRE; third-generation cephalosporin-resistant Enterobacteriaceae) or *Candida* spp. in hospitalized patients. PATIENTS AND METHODS: All patients who experienced a bloodstream infection with one of the aforementioned pathogens between September 1999 and October 2001 were included into a statistical analysis of independent risk factors. The possible impact of previous antibiotic and antifungal therapies was evaluated. RESULTS: Of the study population, 22% had two or more episodes with different pathogens. In the 314 patients with a single bloodstream infection MRSA was isolated in 189 patients, VRE in 31, Enterobacteriaceae in 13, and *Candida* spp. in 80 patients. Crude mortality was high in the study population (overall 40%) and varied between 33% (MRSA bacteremia only) and 58% (VRE bacteremia only). Patients who yielded more than one of the pathogens under surveillance had crude mortalities ranging from 41% to 83% (all four pathogens). In this group of high-risk patients, the following factors were independently associated with the individual pathogen: prior chemotherapy (OR 4.88 CI(95) 1.50-15.87) and bronchoscopy (OR 3.17 CI(95) 1.05-9.52) for VRE patients; burns (OR 4.50 CI(95) 0.90-22.73), presence of a tracheostomy (OR 4.22 CI(95) 1.15-15.38) and acute dialysis (OR 3.62 CI(95) 0.99-13.16) for patients with Enterobacteriaceae; and an underlying malignant disease (OR 1.98 CI(95) 0.99-3.97), performance of a bowel endoscopy (OR 2.80 CI(95) 1.27-6.13) and presence of a central venous catheter (CVC) (OR 12.34 CI(95) 1.63-90.91) for patients with candidemia. CONCLUSION: Patients with bacteremia due to VRE, Enterobacteriaceae or *Candida* spp. had more severe risk factors associated with the respective pathogen than patients with MRSA bacteremia.

REF ID: 2947

Level VI: Opinion

Topic 3: Assessment

Walton, J. (2001). Helping high-risk surgical patients beat the odds. *Nursing*, 31(3), 54-60.

Journal Article, Algorithm, CEU, Exam Questions, Tables/Charts

Use this assessment tool to identify risks, plan preoperative interventions, and anticipate postoperative problems.

REF ID: 2895

Level III: Quasi-experimental study

Topic 1: Risks

Wang, P. S., Schneeweiss, S., Glynn, R. J., Mogun, H., & Avorn, J. (2004). Use of the case-crossover design to study prolonged drug exposures and insidious outcomes. *Annals of Epidemiology*, 14(4), 296-303.

Journal Article, Equations & Formulas, Research, Tables/Charts

PURPOSE: The case-crossover design was originally intended to study brief exposures with immediate and transient effects, and acute outcomes with abrupt onsets. We investigated whether case-crossover methods can be used to study prolonged exposures and insidious outcomes. **METHODS:** We conducted a case-crossover study of 8220 patients aged ≥ 65 years enrolled in several health benefits programs in New Jersey during the period between 1991 and 1995. All had episodes of central nervous system (CNS) adverse events (e.g., delirium). Drug exposures were assessed during case time periods and control time periods lasting 1, 2, 3, or 4 months. Exposures included 3 active regimens with established deleterious CNS effects (corticosteroids, digoxin, and opiates) and 2 inactive regimens without such effects (multivitamins and statins). **RESULTS:** In conditional logistic regression models, significantly elevated risks were observed for all three active drugs, regardless of which time windows were used. The magnitude of these risks generally increased with longer time windows. No significantly increased risks were observed for the 2 inactive drugs, regardless of the window duration. **CONCLUSIONS:** These results suggest that with lengthened exposure assessment windows, case-crossover methods may be useful for studying exposures with prolonged effects and outcomes with insidious onsets.

REF ID: 2919

Level IV: Non-experimental study

Topic 1: Risks

Wang, S., Lee, B., Goh, E., & Chon, K. (2004). Factors associated with postoperative delirium after major head and neck surgery. *Annals of Otolaryngology, Rhinology and Laryngology*, 113(1), 48-51.

Journal Article, Research, Tables/Charts

Postoperative delirium (POD) is an acute change in cognitive status characterized by fluctuating consciousness and is associated with high incidences of morbidity, high complication rates, and long hospitalizations. This study was performed to determine the incidence of POD and the perioperative risk factors in order to predict which patients have an increased risk and thus to prevent POD after major head and neck surgery. The authors retrospectively evaluated 341 patients who underwent laryngectomy or the Commando (combined operation of mouth, mandible, and neck dissection) procedure at Pusan National University Hospital from January 1986 through July 2001. Postoperative delirium developed in 13.8% of the patients who underwent laryngectomy (42 of 304) and 13.5% of the patients who underwent the Commando procedure (5 of 37). A multivariate analysis showed that older age, hypertension, low postoperative O₂ saturation, and decreased postoperative hemoglobin levels were risk factors for POD ($p < .05$). Postoperative delirium is preventable, and its incidence can be decreased by predicting these risk factors during the preoperative and postoperative periods.

REF ID: 2844

Level III: Quasi-experimental study

Topic 4: Management

Warren, D. K., Zack, J. E., Cox, M. J., Cohen, M. M., & Fraser, V. J. (2003). An educational intervention to prevent catheter-associated bloodstream infections in a nonteaching, community medical center.[see comment]. *Critical Care Medicine*, 31(7), 1959-1963.

Journal Article

OBJECTIVE: To evaluate the effectiveness of an evidence-based intervention to prevent catheter-associated bloodstream infections among intensive care unit patients at a nonteaching, community hospital. **DESIGN:** Nonrandomized pre/post observational trial. **SETTING:** Two intensive care units at Missouri Baptist Medical Center, Saint Louis, MO. **PARTICIPANTS:** Nurses and critical care physicians. **INTERVENTION:** A ten-page, self-study module on the prevention of catheter-associated bloodstream infections, lectures, and posters given between July and September 1999. **MEASUREMENTS:** The incidence of nosocomial catheter-associated bloodstream infection and patient demographics were measured for patients admitted between March 1998 and July 2000. **MAIN**

RESULTS: Thirty cases of catheter-associated bloodstream infections during 6110 catheter-days were noted in the preintervention period (4.9 cases/1000 catheter-days) vs. 11 cases during the 5210 catheter-days in the postintervention period (2.1 cases/1000 catheter-days). The relative risk for catheter-associated infection in the postintervention period was 0.43 (95% confidence interval, 0.22-0.84). Among catheterized patients, Acute Physiology and Chronic Health Evaluation II score (25.2 preintervention vs. 25.1 postintervention; $p = .86$), hemodialysis (91 of 647 [14%] patients vs. 69 of 541 [13%]; $p = .70$), and the mean number of catheter days per patient (9.1 vs. 9.6 days; $p = .46$) did not differ between the pre- and postintervention periods. CONCLUSIONS: A focused, educational intervention among nurses and physicians in a nonteaching community hospital resulted in a significant, sustained reduction in the incidence of catheter-associated bloodstream infection.

REF ID: 2863

Level IV: Non-experimental study

Topic 3: Assessment

Weingart, S. N., Davis, R. B., Palmer, R. H., Cahalane, M., Hamel, M. B., & Mukamal, K. et al. (2002). Discrepancies between explicit and implicit review: Physician and nurse assessments of complications and quality. *Health Services Research, 37*(2), 483-498.

Journal Article

OBJECTIVE: To identify and characterize discrepancies between explicit and implicit medical record review of complications and quality of care. SETTING: Forty-two acute-care hospitals in California and Connecticut in 1994. STUDY DESIGN: In a retrospective chart review of 1,025 Medicare beneficiaries age >65, we compared explicit (nurse) and implicit (physician) reviews of complications and quality in individual cases. To understand discrepancies, we calculated the kappa statistic and examined physicians' comments. DATA COLLECTION: With Medicare discharge abstracts, we used the Complications Screening Program to identify and then select a stratified random sample of cases flagged for 1 of 15 surgical complications, 5 medical complications, and unflagged controls. Peer Review Organization nurses and physicians performed chart reviews. PRINCIPAL FINDINGS: Agreement about complications was fair ($\text{kappa} = 0.36$) among surgical and was moderate ($\text{kappa} = 0.59$) among medical cases. In discordant cases, physicians said that complications were insignificant, attributable to a related diagnosis, or present on admission. Agreement about quality was poor among surgical and medical cases ($\text{kappa} = 0.00$ and 0.13 , respectively). In discordant cases, physicians said that quality problems were unavoidable, small lapses in otherwise satisfactory care, present on admission, or resulted in no adverse outcome. CONCLUSIONS: We identified many discrepancies between explicit and implicit review of complications and quality. Physician reviewers may not consider process problems that are ubiquitous in hospitals to represent substandard quality.

REF ID: 2767

Level IV: Non-experimental study

Topic 3: Assessment

Wendland, B. E., Greenwood, C. E., Weinberg, I., & Young, K. W. H. (2003). Malnutrition in institutionalized seniors: The iatrogenic component. *Journal of the American Geriatrics Society, 51*(1), 85-90.

Journal Article, Research, Tables/Charts

OBJECTIVES: To provide practitioners with benchmarks for micronutrient supplementation policies for older residents of long-term care (LTC) facilities, based upon residents' usual energy intake. DESIGN: Retrospective secondary analysis of nutrient intake and delivery data, obtained from 21 consecutive collection days. SETTING: A fully accredited geriatric teaching facility, affiliated with the University of Toronto's Medical School, that includes a chronic care hospital and a home for the aged, housing more than 800 senior residents. PARTICIPANTS: Twenty-three cognitively impaired residents who retained the ability to feed themselves. MEASUREMENTS: Average daily micronutrient (vitamin and mineral) content of two common diet types-unrestricted diet as tolerated and lactose-free-were evaluated based upon all foods served during a 28-day cycle of menus, providing an estimate of total possible micronutrient intake. Energy intake needed to meet recommended intakes for each of the

micronutrients was then determined and compared with actual dietary intakes. RESULTS: Even if entirely consumed, neither diet (providing approximately 2,000 kcal/d) supplied sufficient quantities of vitamins (vitamin E, pantothenic acid) and minerals (calcium, zinc, copper and manganese) to enable residents to meet recommended intakes, making these deficiencies iatrogenic in nature. As projected intake levels fell to reflect ranges more consistently observed in LTC residents (1,000-1,500 kcal/d), the number and severity of risk nutrients increased. Similar predictions, based upon actual intake measurements, were made and confirmed. CONCLUSIONS: The traditional approach of developing LTC menus using resources such as Canada's Food Guide or the Food Guide Pyramid of the United States results in iatrogenic malnutrition. New guidelines are needed that are targeted toward the special needs of older adults who have low food intakes. In the interim, all older LTC residents require full-spectrum vitamin and mineral supplements.

REF ID: 2790

Level IV: Non-experimental study

Topic 3: Assessment

Wernitz, M. H., Swidsinski, S., Weist, K., Sohr, D., Witte, W., & Franke, K. P. et al. (2005). Effectiveness of a hospital-wide selective screening programme for methicillin-resistant staphylococcus aureus (MRSA) carriers at hospital admission to prevent hospital-acquired MRSA infections. *Clinical Microbiology & Infection*, 11(6), 457-465.

Journal Article

Screening of potential MRSA-positive patients at hospital admission is recommended in German and international guidelines. This policy has been shown to be effective in reducing the frequency of nosocomial MRSA transmissions in the event of an outbreak, but the influence of screening on reducing hospital-acquired MRSA infections in a hospital setting where MRSA is endemic is not yet well-documented. This study describes the effect of hospital-wide screening of defined risk groups in a 700-bed acute care hospital during a period of 19 months. In a cohort study with a 19-month control period, the frequencies of hospital-acquired MRSA infections were compared with and without screening. In the control period, there were 119 MRSA-positive patients, of whom 48 had a hospital-acquired MRSA infection. On the basis of this frequency, a predicted total of 73.2 hospital-acquired MRSA infections was calculated for the screening period, but only 52% of the expected number (38 hospital-acquired MRSA infections) were observed, i.e., 48% of the predicted number of hospital-acquired MRSA infections were prevented by the screening programme. The screening programme was performed with minimal effort and can therefore be recommended as an effective measure to help prevent hospital-acquired MRSA infections.

REF ID: 2924

Level IV: Non-experimental study

Topic 1: Risks

Wisplinghoff, H., Cornely, O. A., Moser, S., Bethe, U., Stutzer, H., & Salzberger, B. et al. (2003). Outcomes of nosocomial bloodstream infections in adult neutropenic patients: A prospective cohort and matched case-control study. *Infection Control and Hospital Epidemiology*, 24(12), 905-911.

Journal Article, Research, Tables/Charts

OBJECTIVE: To examine the clinical and epidemiologic features, excess length of stay, extra costs, and mortality attributable to bloodstream infection (BSI) in neutropenic patients with hematologic malignancies. DESIGN: Prospective cohort and matched case-control study. PATIENTS: All adult neutropenic patients with hematologic malignancies admitted to Cologne University Hospital between May 1, 1997, and April 30, 1998, were prospectively observed. Case-patients were defined as patients with nosocomial BSI; control-patients were selected among patients without BSI. RESULTS: During the study period, the BSI rate in neutropenic patients was 14.3 per 100 neutropenic episodes. Eighty-four case-patients were included. Matching was successful for 96% of the cohort; 81 matched pairs were studied. The mean total length of stay was significantly longer for patients with BSI than for control-patients (37 vs 29 days; P = .002). Extra costs attributable to the infection averaged 3,200 dollars (U.S.)

per patient. The crude mortality rates of case-patients and control-patients were 16% and 4%, respectively ($P = .013$), with an attributable mortality of 12% (odds ratio, 11). Eighty-seven percent of patients met the criteria for sepsis according to the American College of Chest Physicians/Society of Critical Care Medicine. Severe sepsis or septic shock occurred in 13% of patients and was correlated with mortality (55% vs 10% in patients without severe sepsis or septic shock; $P = .01$).

CONCLUSIONS: Nosocomial BSI in neutropenic patients is significantly associated with an excess length of hospital stay, extra costs, and excess mortality. Severe sepsis and septic shock are closely correlated with an adverse outcome.

REF ID: 2877

Level IV: Non-experimental study

Topic 1: Risks

Yip, C., Loeb, M., Salama, S., Moss, L., & Olde, J. (2001). Quinolone use as a risk factor for nosocomial clostridium difficile-associated diarrhea.[see comment]. *Infection Control & Hospital Epidemiology*, 22(9), 572-575.

Journal Article

OBJECTIVE: To determine modifiable risk factors for nosocomial *Clostridium difficile*-associated diarrhea (CDAD). DESIGN: Case-control study. SETTING: 300-bed tertiary-care hospital. PARTICIPANTS: Hospital inpatients present during the 3-month study period. METHODS: Case-patients identified with nosocomial CDAD over the study period were compared to two sets of control patients: inpatients matched by age, gender, and date of admission; and inpatients matched by duration of hospital stay. Variables including demographic data, comorbid illnesses, antibiotic exposure, and use of gastrointestinal medications were assessed for case- and control-patients. Conditional logistic regression was performed to identify risk factors for nosocomial CDAD. RESULTS: 27 case-patients were identified and were compared to the two sets of controls (1:1 match for each comparison set). For the first set of controls, use of ciprofloxacin (odds ratio [OR], 5.5; 95% confidence interval [CI 95], 1.2-24.8; $P=.03$) was the only variable that remained significant in the multivariable model. For the second set of controls, prior exposure to cephalosporins (OR, 6.7; CI 95, 1.3-33.7; $P=.02$) and to ciprofloxacin (OR, 9.5; CI 95, 1.01-88.4; $P=.05$) were kept in the final model. CONCLUSIONS: Along with cephalosporins, prior quinolone use predisposed hospitalized patients to nosocomial CDAD. Quinolones should be used judiciously in acute-care hospitals, particularly in those where CDAD is endemic.

REF ID: 2854

QM: Quality measures

Topic 5: Evaluation/Follow-up

Zimmerman, S., Gruber-Baldini, A. L., Hebel, J. R., Sloane, P. D., & Magaziner, J. (2002). Nursing home facility risk factors for infection and hospitalization: Importance of registered nurse turnover, administration, and social factors. *Journal of the American Geriatrics Society*, 50(12), 1987-1995.

Clinical Trial. Journal Article. Randomized Controlled Trial

OBJECTIVES: Determine the relationship between a broad array of structure and process elements of nursing home care and (a) resident infection and (b) hospitalization for infection. DESIGN: Baseline data were collected from September 1992 through March 1995, and residents were followed for 2 years; facility data were collected at the midpoint of follow-up. SETTING: A stratified random sample of 59 nursing homes across Maryland. PARTICIPANTS: Two thousand fifteen new admissions aged 65 and older. MEASUREMENTS: Facility-level data were collected from interviews with facility administrators, directors of nursing, and activity directors; record abstraction; and direct observation. Main outcome measures included infection (written diagnosis, a course of antibiotic therapy, or radiographic confirmation of pneumonia) and hospitalization for infection (indicated on medical records). RESULTS: The 2-year rate of infection was 1.20 episodes per 100 resident days, and the hospitalization rate for infection was 0.17 admissions per 100 resident days. Except for registered nurse (RN) turnover, which related to both infection and hospitalization, different variables related to each outcome. High rates of incident infection were associated with more Medicare recipients, high levels of

physical/occupational therapist staffing, high licensed practical nurse staffing, low nurses' aide staffing, high intensity of medical and therapeutic services, dementia training, staff privacy, and low levels of psychotropic medication use. High rates of hospitalization for infection were associated with for-profit ownership, chain affiliation, poor environmental quality, lack of resident privacy, lack of administrative emphasis on staff satisfaction, and low family/friend visitation rates. Adjustment for resident sex, age, race, education, marital status, number of morbid diagnoses, functional status, and Resource Utilization Group, Version III score did not alter the relationship between the structure and process of care and outcomes. CONCLUSIONS: The association between RN turnover and both outcomes underscores the relationship between nursing leadership and quality of care in these settings. The relationship between hospitalization for infection and for-profit ownership and chain affiliation could reflect policies not to treat acute illnesses in house. The link between social factors of care (environmental quality, prioritizing staff satisfaction, resident privacy, and facility visitation) and hospitalization indicates that a nonmedical model of care may not jeopardize, and may in fact benefit, health-related outcomes. All of these facility characteristics may be modifiable, may affect healthcare costs, and may hold promise for other, less-medical, forms of residential long-term care.

REF ID: 2761

Level V: Case report

Topic 6: Comprehensive

Zwicker, C. D. (2003). The elderly patient at risk. *Journal of Infusion Nursing*, 26(3), 137-43, 178-82.

Journal Article, Case Study, CEU, Exam Questions, Tables/Charts

As the baby-boom generation turn age 65, it is important that nurses are informed about the unique problems of the elderly patient, particularly because the elderly represent the highest percentage of clients in hospitals, homecare, and long-term and subacute nursing facilities. Infusion nurses, particularly those in homecare, are in a pivotal position to proactively identify acute illness at an early stage and thereby improve outcomes in this vulnerable population. To do this, infusion nurses must understand the normal changes that come with aging, the profile of the elderly patient at greatest risk for poor outcomes, and the often-atypical presentation of illness. Additionally, infusion nurses must be informed about tools used to assess and monitor the patient's status. Finally, infusion nurses must understand the increased potential for iatrogenesis in the elderly and provide proactive interventions to avert its occurrence to improve quality of life and outcomes for this population.