In the setting of low or intermediate probability for PE, a negative quantitative D-dimer safely eliminates the need for follow-up diagnostic imaging.

**Background:** The D-dimer assay has been shown to safely rule out pulmonary embolism (PE) in patients with low clinical probability. However, it is not generally included in standard clinical algorithms despite ever-improving test performance. D-dimer may have the potential to decreased unnecessary diagnostic imaging.

**Objective:** To test the performance of clinical risk algorithms and a quantitative D-dimer assay in patients undergoing CT pulmonary angiography (CTPA) for the evaluation of PE.

**Design:** Prospective, observational study at a single academic medical center.

**Methods:** Patients with clinical signs of PE were stratified into low (0 to 3 points), intermediate (4 to 10 points), or high (>11 points) probability by revised Geneva score. Patients also underwent immunoturbidimetric quantitative D-dimer test and CTPA. A negative D-dimer result was defined as a value <1.2. Radiologists classified each CTPA as negative or positive. The sensitivity, specificity, negative predictive value (NPV), and positive predictive value (PPV) of the D-dimer was calculated for each probability group.

**Participants:** Of 745 consecutively registered emergency department patients with clinical signs of PE, 627 patients had a D-dimer and were included in the analysis. Pregnant patients, those with renal insufficiency, and those who refused CTPA were excluded.

**Results:** Most of the study patients were women (66%) with a mean age of 46.9 years. The majority of cases were classified as low or intermediate probability (97.4%). Of the 627 patients, 28 (4.5%) had PE by CTPA. The sensitivity, NPV, and specificity of D-dimer were 100%, 100%, and 25% for low probability, 100%, 100%, and 33% for intermediate probability, and 80%, 80%, and 37% for high probability, respectively. No patients with low or intermediate probability and a negative D-dimer were diagnosed with PE. Mean D-dimer level was 8.46.

**Conclusions:** D-dimer performance has improved since its introduction. The absence of false negatives in this low- and intermediate-risk cohort suggests that quantitative D-dimer use would have safely decreased CTPA use by 26%. Due to small sample size, D-dimer is not recommended in high-probability patients. Limitations include the necessary exclusion of 118 presumably higher-risk patients who did not undergo D-dimer prior to CTPA, the possibility of flawed calculation of the D-dimer cutoff value, and PE prevalence lower than some previous studies suggest.

**Reviewer's Comments:** Although this was an ambulatory study, the results will be of interest to hospitalists who practice in institutions with this new D-dimer technology. Elimination of unnecessary CTPA will decrease health care costs and radiation exposure, as well as the possibility of complications such as contrast nephropathy or allergy. Bear in mind that these results cannot be generalized to institutions with older qualitative D-dimer tests or those with other D-dimer cutoff values. Furthermore, we do not know how this D-dimer test will perform with other clinical scoring systems, such as the Wells criteria or PE rule-out score. (Reviewer-Jennifer Best, MD).

© 2009, Oakstone Medical Publishing

Keywords: Venous Thromboembolism, Pulmonary Embolism, D-Dimers, Diagnosis

Print Tag: Refer to original journal article
In decompensated heart failure, there may be a benefit to blood transfusions in critically ill patients with severe anemia.

**Background:** Patients with congestive heart failure often have concomitant anemia. Given the conflicting results of optimal hemoglobin levels in critically ill patients and the potential for volume overload in patients with decompensated heart failure, the utility to transfusion is unclear.

**Methods:** Data were obtained from physician surveys performed at 25 public hospitals. Physicians completed a questionnaire regarding patient characteristics, in-hospital course and management, medications, and diagnoses. Patients admitted with reported acute decompensated heart failure were isolated, and a subgroup who received a blood transfusion was identified. Information about a patient's hospitalization was cross referenced with hospital-based mortality data and the national death registry to determine the end point of all-cause mortality at 30 days, 1 year, and 4 years. A Propensity score matching was used to adjust for differences in severity of disease between those who were and were not transfused.

**Results:** Of the >4000 patients whose physicians completed the survey, 2335 had acute decompensated heart failure. Of these, 166 patients (7%) received a blood transfusion. Patients who received blood transfusions were more likely to be female, have diabetes and renal dysfunction, have signs of pulmonary edema, and require IV inotropes. In unadjusted analyses, the mortality of patients receiving blood transfusion was higher. In an analysis of 103 pairs matched for severity of illness and propensity for blood transfusion, however, patients who had received blood transfusions had a lower 30-day mortality rate than did the matched controls.

**Conclusions:** Patients in this study who received blood transfusions tended to be sicker with hemodynamic instability and signs of poor end-organ perfusion. Compared to matched controls who did not receive transfusion, however, these patients had lower 30-day mortality.

**Reviewer's Comments:** This article seems to contradict previous studies showing that blood transfusions showed no benefit in critically ill patients and may be associated with increased organ dysfunction and mortality in those with acute myocardial infarction. Other studies have shown that transfusions are associated with increased nosocomial infections in critically ill patients. The authors argue that those patients did not have decompensated heart failure and were not hemodynamically unstable. The methodology of this study, using retrospective data and relying largely on physician reports of admitting diagnosis rather than on objective findings, makes the findings difficult to interpret. We would benefit from a larger, more rigorous trial. We can all likely agree, however, that in the setting of decompensated heart failure, blood transfusions should be considered for hemodynamically unstable patients with severe anemia. (Reviewer-Michelle Mourad, MD).
Background: Transitions of care between the emergency department (ED) and the hospital are high risk for patients. Little is known about the efficacy of recorded (asynchronous) sign-out between ED and inpatient providers relative to oral (synchronous) communication at this juncture.

Objective: To determine the efficacy of an asynchronous ED sign-out system involving semi-structured voicemail dictation on quality and safety.

Design: Prospective pre-/post-analysis.

Methods: The system was tested for all internal medicine (IM) patients admitted from the ED to acute care at a 944-bed urban academic medical center. Perceptions of sign-out efficacy were assessed pre- and post-implementation with a 25-item self-administered questionnaire.

Results: Approximately 200 ED and internal medicine (IM) providers, including 37 pre- and 44 post-IM hospitalists, were surveyed. Sign-outs were recorded for 89% (1643 of 1836) of admissions; 65% to 70% of voicemails were accessed at least once. Median sign-out was 2.9 minutes. Utilization was sustained at 1 year. At 6 months, 49% felt that communication was good/excellent versus 51% at baseline; 56% of IM physicians and 100% of EM providers thought sign-out was easier. Overall, perceived sign-out helpfulness and accuracy and error likelihood were unchanged. IM physicians expressed more concern about decreased personal interactions and commented that sign-outs contained less useful clinical information. Sixty-nine percent of participants reported that interaction between providers was worse. Notably, only 15% of IM physicians always/usually had time to access voicemails before patients arrived on the floor; approximately 30% of voicemails were never accessed. There was no significant change in the rate of ICU transfer within 24 hours or in the number of IM-perceived adverse events.

Conclusions: Asynchronous ED sign-out was perceived to be easier and increased ED provider efficiency without adversely affecting safety. However, the system reduced direct physician interactions, leading to IM dissatisfaction.

Reviewer's Comments: This was a well-designed quality improvement study aimed at areas of interest for hospitalists: transitions of care, patient safety, and efficiency. Investigators utilized iterative feedback methods to improve the process during the study. While the authors concluded that busy EDs might consider this system to improve efficiency (it decreases ED work-flow interruption) without a negative impact on safety, it remains unclear if hospitalists would—or should—welcome this system. While rapid transfers to the ICU are one proxy of safety, negative impact of lapses in education and teamwork (which this study did not address) may greatly outweigh the benefits. As only 65% to 70% of voicemails were used, hospitalists may not feel that the sign-out added enough value to justify the time, and they (probably correctly) perceived that they were less able to influence ED management and disposition. Currently, there is no clear benefit to hospitalists to use this system. (Reviewer-Anneliese M. Schleyer, MD).

© 2009, Oakstone Medical Publishing

Keywords: Transitions, Sign-Out, Efficiency, Patient Safety

Print Tag: Refer to original journal article
Background: Influenza resulting in hospitalization carries high morbidity and mortality. It is not known whether viral kinetics differ in the hospitalized population.

Objective: (1) To determine whether viral load, replication, and response to antiviral therapy differ in hospitalized patients with severe influenza versus outpatient controls, and (2) to identify features that affect viral clearance.

Design: Prospective, observational study at a single teaching hospital in Hong Kong.

Methods: Patients with flu-like symptoms were admitted and screened with immunofluorescence assay (IFA) for influenza A and B. Confirmed patients with symptoms for ≤2 days (or later, at clinician discretion) were treated with 5 days of oseltamivir. Upon confirmation of influenza A or B, baseline nasal and pharyngeal swabs were obtained for viral load testing and viral isolation; this was repeated daily for 7 days after symptom onset. Emergency department (ED) patients with positive IFA were recruited as controls. Baseline data were obtained for all patients—medical comorbidities, vaccination status, symptom severity and time of onset, influenza complications, and use of antiviral therapy or corticosteroids.

Participants: Patients evaluated were aged >16 years and were admitted to the hospital with influenza A (n=147); control patients were aged 16 to 65 years and were discharged with confirmed influenza A or B from the ED. Exclusion criteria for controls included major medical comorbidity, influenza complications, and antiviral therapy. A subset of patients hospitalized with influenza B (n=29) was analyzed.

Results: All influenza was identified as H3N2. Mean age of hospitalized patients was 71.8 years. Sixty-four percent of patients had medical comorbidity, and median length of stay was 7 days. Two patients died. One hundred and ten patients (75%) received oseltamivir. Viral concentration correlated with symptom score and was higher among hospitalized patients than outpatients ($P=0.003$). Patients with major comorbidity had higher initial viral concentrations when presenting early (<2 days) or late in symptom course. Twenty-six percent of hospitalized oseltamivir-treated patients and 57% of untreated patients had persistent viral RNA at 7 days. Oseltamivir decreased viral RNA when started on or before symptom day 4 ($P<0.05$). Viral clearance decreased length of stay ($P=0.001$). Influenza B, medical comorbidity, and steroid use slowed clearance.

Conclusions: Viral activity is prolonged in patients hospitalized with influenza. Clearance is prolonged by influenza B, medical comorbidity and steroid use, but is increased by oseltamivir started within 4 days of symptom onset.

Reviewer’s Comments: The most interesting finding of this study is the benefit of antivirals given beyond 48 hours in patients ill enough to require hospitalization. Also, these details on viral kinetics may inform infection control practices (ie, isolation) within the hospital. There were some holes in this study: incomplete information about the control group (number and breakdown of influenza A/B) and an upper age limit for controls not imposed for the hospitalized cohort, limiting certainty that the groups were truly similar. Finally, it is important to recall that these findings may not necessarily generalize to H1N1, the current dominant strain. (Reviewer-Jennifer Best, MD).

© 2009, Oakstone Medical Publishing

Keywords: Influenza, Antiviral Therapy

Print Tag: Refer to original journal article
Ways to Reduce U.S. Health Care Costs

Improving Safety and Eliminating Redundant Tests: Cutting Costs in U.S. Hospitals.

Jha AK, Chan DC, et al:

Health Aff 2009; 28 (September/October): 1475-1484

Preventable adverse events and redundant testing account for a sizeable percentage of total health care costs.

Background: There is a paucity of recent data regarding the incidence and preventability of adverse events (AEs) in U.S. hospitals and the costs of related care. Such data might inform the patient safety movement.

Objective: To determine the potential financial impact of elimination of hospital AEs and redundant testing.

Design: Literature review with statistical modeling.

Methods: Researchers first established the definition of AEs and "preventable" AEs. For common AEs, published estimates for incidence, preventability, and related direct health care costs were sought. Studies addressing all 3 parameters were identified for 10 unique AEs. Using published data, models were developed to determine the number of AEs, percentage of preventable AEs, and related direct costs. The same approach was used for redundant testing. Results were stratified by AE and hospital characteristics.

Participants: 3808 studies were screened, from which 118 were selected. Data >15 years old and that originated in non-U.S. hospitals were excluded. Also excluded were admissions for routine labor and delivery and care of those aged <18 years.

Results: In 2004, approximately 32.8 million patients received care in U.S. hospitals and were, therefore, at risk for an AE. The at-risk population varied by AE. Approximately 5.7 million AEs occurred, and roughly 53.2% were preventable (in decreasing order: drug events, hospital-acquired infections, falls, and venous thromboembolism). Elimination of preventable AE and redundant testing alone would have yielded a yearly cost savings of at least $24.8 billion ($16.6 for preventable AEs and $8.2 for redundant testing). Adding "ideal" avoidable costs (including elimination of non-preventable AEs) would have increased this number to $40.5 billion. The greatest cost savings was related to elimination of hospital-acquired infections. Hypothesized financial savings were most notable for major teaching hospitals, which generate roughly 50% of total costs.

Conclusions: Addressing AEs and redundant testing would result in major savings for our health care system. This study differs from previous trials, which have generally relied on single-institution data. Limitations in this study include imperfect data, lack of data on childbirth and care of children and adolescents, inability to distinguish between levels of AE risk for a given patient, and, importantly, how financial gains might be offset by the cost of improving current programs. Nonetheless, the potential for cost savings should be a powerful motivator for providers and for health systems in which patient safety is a concern.

Reviewer's Comments: This is an interesting, although complicated, analysis that yields not entirely unexpected—but still sobering—conclusions. These data suggest that although it's going to cost a lot to fix health care, there's a lot to gain—first and foremost, an improvement in the quality of care to inpatients, and second, billions of dollars that may be better spent on reform, prevention, and innovative programs to support and maintain health. For these reasons, patient safety should be on top of the list. (Reviewer-Jennifer Best, MD).

© 2009, Oakstone Medical Publishing

Keywords: Adverse Events, Test Utilization, Health Care Costs

Print Tag: Refer to original journal article
After standardizing content of resident sign-out to include key clinical information along with a robust written sign-out, efforts should be made to decrease the number of hand-offs, increasing accountability and inquisitiveness.

**Background:** Hand-offs in care are a vulnerable time for patients. Information critical to their care can be miscommunicated or omitted, leading to errors in patient care.

**Objective:** To study the practices in internal medicine sign-outs and to evaluate determinants of sign-out quality.

**Methods:** The authors reviewed the audiotapes of oral sign-outs along with corresponding written sign-out for content, clarity, and environment. They also conducted interviews with covering interns on the post-call morning to determine the results of omissions and errors. The factors affecting quality and comprehensiveness of oral and written sign-out were then evaluated.

**Results:** The authors reviewed 88 sign-out sessions on 503 patients. Oral and written sign-outs included key factors of code status, current clinical condition, hospital course, and tasks to complete roughly two thirds of the time. Interview reports from post-call or night-load covering interns revealed that information needed to care for the patient overnight was available in sign-out only two thirds of the time. In serial sign-outs, 20% of the repeat sign-outs omitted or mischaracterized information. Most sign-outs included little questioning or clarification by the sign-out recipients. Factors affecting quality of oral sign-out included residents’ familiarity with patients, their sense of responsibility for patients, the number of sequential sign-outs, and comprehensiveness of the written sign-out.

**Conclusions:** Sign-out content may be standardized through the use of template written sign-outs. In addition, cultural changes (such as minimizing sequential sign-outs, fostering a sense of accountability, and encouraging increased engagement during sign-out) may improve sign-out quality and patient care during hand-offs.

**Reviewer’s Comments:** Most of the previous studies looking at sign-outs have focused solely on sign-out content rather than on the cultural and situational factors. This article demonstrates that sign-out frequently happens between providers who are unfamiliar with the patient and who may lack experience in anticipating and troubleshooting problems. Multiple hand-offs, in particular, are problematic, especially to a passive recipient. When examining and standardizing sign-out practices, attention should be paid both to content and the cultural practice of transfers of care. (Reviewer-Michelle Mourad, MD).

© 2009, Oakstone Medical Publishing

Keywords: Sign-Out, Internal Medicine Residents

Print Tag: Refer to original journal article
In patients given a β-blocker on the day of hip or knee arthroplasty, discontinuation of the medication in the first week after surgery is associated with an increased risk of POMI and death.

**Background:** Perioperative β-blockade has been shown to decrease postoperative myocardial infarction (POMI). However, widespread use of this therapy has been tempered by reports of increased rates of postoperative stroke and death.

**Design/Methods:** This is a retrospective cohort study of the records of 5158 patients who underwent elective hip or knee arthroplasty. The authors examined the association of β-blocker administration with POMI or death. Patients were stratified into 3 groups: (1) those who never received a β-blocker; (2) those who had a β-blocker ordered on the day of surgery and continued treatment throughout their hospital stay or for at least 7 days; and (3) those in whom a β-blocker was ordered on the day of surgery and then was discontinued. Using multivariate regression models, propensity score matching was used to examine associations between β-blocker prescription and the outcomes of death and POMI.

**Results:** β-blockers were ordered in 18% of patients on the day of surgery in a group of patients found to be older and sicker. In 25% of those prescribed β-blockers, the medication was subsequently discontinued during the hospital stay for unclear reasons. Seventy-seven patients in the study sustained a POMI (1.5%). Of the patients not on β-blocker therapy, only 0.8% sustained a POMI compared to 2.9% in the group receiving sustained β-blockers therapy and 7.9% in the group in which β-blockers were administered and then discontinued. After covariate adjustment, logistic regression models yielded an odds ratio of 2.0 (1.1 to 3.9; \( P =0.04 \)) for the association of discontinuation of β-blockers with POMI. Mortality (1% of patients) was also associated, although weakly, with β-blocker discontinuation.

**Conclusions:** In patients given a β-blocker on the day of surgery, discontinuation of the medication in the first week following arthroplasty is associated with a higher risk of POMI and death.

**Reviewer’s Comments:** This study has many limitations by design and is confounding, using a cross-over between an administrative and clinical database. Patients’ reasons for being prescribed a β-blocker on the day of surgery can only be surmised, and the reasons for β-blocker discontinuation are also unclear. By far, the biggest limitation is the inability to understand the determinants and timings for β-blocker discontinuation. In some cases, the discontinuation may have been precipitated by the POMI. This article may still be useful in raising caution about the risks of β-blocker discontinuation. In a world where hospitalists increasingly co-manage surgery patients, it often falls on us not only to appropriately recognize those who will benefit from β-blockers therapy, but also to continue patients on it through their perioperative period. (Reviewer-Michelle Mourad, MD).

© 2009, Oakstone Medical Publishing

Keywords: Perioperative β-Blockade

Print Tag: Refer to original journal article
In the setting of poor infection control techniques, portable x-ray equipment in the ICU can act to spread resistant Gram-negative bacteria from patient to patient.

**Background:** It is unclear if resistant bacteria can be spread by portable chest x-ray equipment in the ICU. **Objective:** To determine if resistant bacteria are transferred by the x-ray machine and whether improved infection control practices could reduce the rate of transfer. **Design:** A prospective observational study followed by an educational intervention and a post-intervention observation period. **Methods/Participants:** For consecutive radiographs during an observation period, radiology technician adherence to predefined infection control procedures (hand washing, changing gloves, etc) was recorded. During the same period, surface culture samples were collected from the x-ray machines both before and at the end of morning x-ray rounds in the ICU. Next, for the intervention, radiology technicians were educated about infection control practices each morning, and x-ray matching cultures were collected during this time period. Lastly, 5 months after the intervention, radiology technician observation and x-ray machine cultures were repeated to measure sustainability. **Results:** Radiology technicians were observed 173, 113, and 120 times in the observation, intervention, and follow-up periods, respectively. Adequate infection control was met 1% of the time in the observation period, 42% of the time during the intervention, and 10% of the time in follow-up. X-ray machine cultures revealed resistant Gram-negative bacteria 39% of the time during the observation period. This decreased to 0% of the time during the intervention with improved hygiene and increased to 50% in follow-up. **Conclusions:** X-ray machines can act as a reservoir for the transfer of resistant Gram-negative bacteria in the ICU. Poor infection control practices contribute to the equipment colonization, and educational interventions targeting radiology technicians may improve these practices and decrease bacterial colonization of x-ray equipment. **Reviewer’s Comments:** An intriguing and simple study showing that portable x-ray machines may be responsible for the spread of resistant Gram-negative bacteria in the ICU. Curiously, the study also showed that (at least at this institution) radiology technician adherence to infection control practices was poor but could be improved to around 40% through a daily educational intervention. If you are involved in infection control at your hospital, it is probably worth bringing this up with your radiology department (for both in and out of the ICU). For others, it is probably just a good reminder that bacteria can be spread by many means, and we should all, quite simply, wash our hands! (Reviewer-Bradley A. Sharpe, MD).

© 2009, Oakstone Medical Publishing

**Keywords:** Resistant Bacteria, Nosocomial Infections, Portable Radiographs

**Print Tag:** Refer to original journal article
Recognize that pancreatic cancer risk may be altered by the use of various antidiabetic regimens.

**Background:** Previous research has suggested a role of diabetes mellitus (DM) in pancreatic carcinogenesis. Metformin has been shown to decrease overall cancer risk in treated diabetics, but studies have not addressed the specific effect of antidiabetic therapies on pancreatic cancer (PC) risk.

**Objective:** To determine the effects of various antidiabetic therapies on PC risk.

**Design:** Case-control study at a single site.

**Methods:** Each recruited case and control was interviewed regarding demographics and known or suspected PC risk factors; 571 subjects provided blood samples for measurement of hemoglobin A$_{1C}$. The relationship of risk factors, therapy, and related variables to PC was determined by logistic regression analysis.

**Participants:** Cases ($n=1004$) were patients with newly diagnosed and pathologically confirmed pancreatic ductal adenocarcinoma presenting to an academic cancer center. Controls ($n=867$) were healthy, non-blood relatives and friends of patients attending appointments elsewhere within the center. All subjects were non-smoking U.S. residents without a cancer history.

**Results:** 973 cases and 863 controls were analyzed. Smoking, alcohol consumption, family history of cancer, and BMI $>$25 increased PC risk, as did DM (OR, 2.37). Compared to non-diabetics, metformin users showed a significantly decreased PC risk (OR, 0.38). Non-significant increases in risk were seen with insulin secretagogues (IS) and thiazolidinediones (TZD). In diabetic patients, the use of insulin (OR, 4.99) and IS (OR, 2.52) significantly increased PC risk, and metformin significantly decreased PC risk (OR 0.38). Metformin's effects were seen with both short- ($\leq$2 years) and long-term (>5 years) use. Short-term insulin use was associated with increased PC risk, but was possibly confounded (cancer may increase hyperglycemia, leading to insulin use). Long-term use of insulin weakly, but significantly, increased PC risk. Hemoglobin A$_{1C}$ values did not differ between users of IS, metformin, or TZD. Metformin users differed from non-users only by significantly increased use of insulin; beneficial effects remained when analysis was restricted to those who had never used insulin.

**Conclusions:** PC risk was lower in metformin-using diabetics than in non-users, without confounding by diabetes-related variables. Insulin and IS use significantly increased risk. Protective effects of metformin are likely multifactorial. The relationships between PC and long-term insulin and IS deserve additional study. Study limitations include the possibility of recall bias, a single site limiting generalizability, and the inability to determine whether reduced cancer risk was related to less-severe DM (metformin use more likely) or metformin-related improvements in DM control.

**Reviewer's Comments:** Hospitalists often choose or modify medications for newly diagnosed or poorly controlled DM. Although larger confirmatory studies are warranted, metformin should be considered in appropriate patients (barring contraindications), not only for diabetic effects, but also for possible preventive benefits, particularly in those with PC risk factors. Remember, these patients were already on metformin; evidence is lacking here to support de novo addition for prophylaxis. (Reviewer-Jennifer Best, MD.)

© 2009, Oakstone Medical Publishing

Keywords: Pancreatic Cancer, Diabetes Mellitus, Medical Therapy

Print Tag: Refer to original journal article
Exercise in ICU May Improve Recovery

Early Exercise in Critically Ill Patients Enhances Short-Term Functional Recovery.

Burtin C, Clerckx B, et al:

Crit Care Med 2009; 37 (9): 2499-2505

Structured daily cycling exercises in appropriate critically ill patients may improve short-term functional status.

**Background:** Muscle wasting is common in critically ill patients and is associated with increased mortality, longer ICU stay, and worse functional status at discharge.

**Objective:** To investigate the impact on critically ill patients of a daily exercise session with a bedside cycle ergometer.

**Design:** Randomized, controlled trial.

**Methods:** Once stable after hospital day 5, critically ill patients with an expected ICU length of stay of >7 days were screened. Patients with conditions impairing the cycling movement, anticipated death, coagulation disorders, or cardiorespiratory instability were excluded. All patients received daily passive or active physical therapy, but the intervention group also performed 20 minutes a day of passive or active exercise on a bedside cycle ergometer. This cycling exercise was stopped if there were significant hemodynamic consequences.

**Results:** 90 patients were randomized; the majority (79%) were surgical patients. The intervention group received, on average, 4 cycling sessions per week. At discharge, 6-minute walking distance was longer, quadriceps were stronger, and subjective assessment of functional status was better in the intervention group. No differences were found between groups in terms of measured functional status (standard tools), time to wean from ventilation, ICU length of stay, hospital length of stay, discharge to home versus nursing facility, or mortality. One patient suffered a ruptured Achilles' tendon.

**Conclusions:** Structured daily cycling in the ICU may improve strength and some functional outcomes for selected critically ill patients.

**Reviewer's Comments:** Overall, this was an intriguing but relatively poorly done study. First, all patients received physical therapy, but the intervention group received 20 minutes more per day of exercise. It is unclear if this accounted for the difference or if it was specifically due to the cycling exercise. Second, the majority of patients needed to be excluded for clinical reasons, so it is unclear how generalizable the results are. Third, the outcome differences were small and may not be clinically significant. Fourth, given the marginal benefit, one wonders if the cost (equipment, personnel to set up, etc) would be worth it. However, there is a valuable lesson here—critically ill patients may be able to participate in physical therapy and will likely benefit from it. We should all be getting physical therapy personnel involved early in our critically ill patients. (Reviewer-Bradley A. Sharpe, MD).

© 2009, Oakstone Medical Publishing

Keywords: Exercise Therapy, Physical Therapy, Critical Illness, Intensive Care

Print Tag: Refer to original journal article