

revision rate of the ASR, which became evident after 9 months when it was compared with all other total conventional hip prostheses in the Australian Joint Registry (9-month-to-1-year hazard ratio, adjusted for age and sex, 2.62 [95% confidence interval, 1.67 to 4.11]) and which precipitously worsened over time.<sup>5</sup>

As thousands of Americans are painfully learning, there are unknown risks with devices that enter the market without clinical data showing safety and effectiveness, and implanted body parts cannot be recalled as easily as defective auto parts. The recently passed Medical Device User Fee and Modernization Act contains a provision that should make it

easier for the FDA to close the loophole for the remaining 19 class III devices by allowing the agency to reclassify devices by order rather than through regulation. There would be value in an FDA-sanctioned registry.

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## Post-Hospital Syndrome — An Acquired, Transient Condition of Generalized Risk

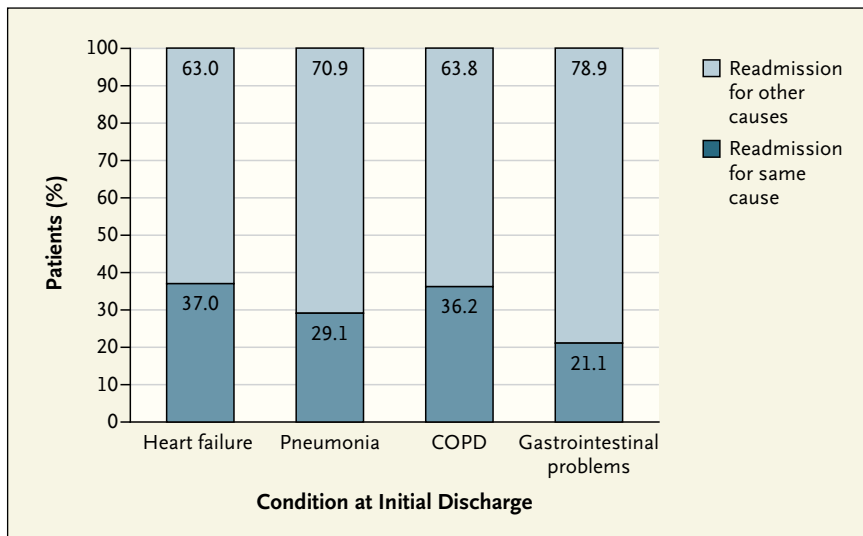
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To promote successful recovery after a hospitalization, health care professionals often focus on issues related to the acute illness that precipitated the hospitalization. Their disproportionate attention to the hospitalization's cause, however, may be misdirected. Patients who were recently hospitalized are not only recovering from their acute illness; they also experience a period of generalized risk for a range of adverse health events. Thus, their condition may be better characterized as a post-hospital syndrome, an acquired, transient period of vulnerability. This theory would suggest that the risks in the critical 30-day period after discharge might derive as much from the allostatic and physiological stress that patients experience

in the hospital as they do from the lingering effects of the original acute illness. At the time of discharge, physiological systems are impaired, reserves are depleted, and the body cannot effectively defend against health threats.

Nearly one fifth of Medicare patients discharged from a hospital — approximately 2.6 million seniors — have an acute medical problem within the subsequent 30 days that necessitates another hospitalization. These recently discharged patients have heightened risks of myriad conditions, many of which appear to have little in common with the initial diagnosis. For example, among patients admitted for treatment of heart failure, pneumonia, or chronic obstructive pulmonary disease

(COPD), the cause of readmission is the same as that of the index admission for only 37%, 29%, and 36%, respectively.<sup>1</sup> The causes of readmission, regardless of the original admitting diagnosis, commonly include heart failure, pneumonia, COPD, infection, gastrointestinal conditions, mental illness, metabolic derangements, and trauma (see graph). The breadth of these readmission diagnoses has been shown in studies using administrative claims and those using chart reviews. Thus, this observation is not likely to be merely the result of variation in coding. Further evidence of the distinctiveness of this syndrome is that information about the severity of the original acute illness predicts poorly which patients will have an adverse medi-



Proportions of Rehospitalizations for Causes Other Than the Condition at Initial Discharge.

Data are from Jencks et al.<sup>1</sup>

cal event soon after discharge and require readmission.<sup>2</sup>

How might the post-hospital syndrome emerge? Hospitalized patients are not only enduring an acute illness, which can markedly perturb physiological systems, but are experiencing substantial stress. During hospitalization, patients are commonly deprived of sleep, experience disruption of normal circadian rhythms, are nourished poorly, have pain and discomfort, confront a baffling array of mentally challenging situations, receive medications that can alter cognition and physical function, and become deconditioned by bed rest or inactivity. Each of these perturbations can adversely affect health and contribute to substantial impairments during the early recovery period, an inability to fend off disease, and susceptibility to mental error.

Researchers have documented the prevalence and risk of these stressors. For example, hospitalized patients often experience disturbance of sleep, and studies have revealed polysomnographic

abnormalities in hospitalized patients, including reductions in sleep time and stages R (rapid eye movement [REM]) and N3 (slow wave) and an increase in stage N1 (non-REM). This disruption can have debilitating behavioral and physiological effects: sleep deprivation adversely affects metabolism, cognitive performance, physical functioning and coordination, immune function, coagulation cascade, and cardiac risk. Disruptions of the sleep-wake cycle may cause perturbations in circadian rhythms and may have adverse effects even independently of sleep deprivation and abnormalities. These disturbances in hospitalized patients may confer jet-lag-type disabilities. Studies of people with jet lag have revealed increased incidence of dysphoric mood, diminished physical performance, cognitive impairment, and gastrointestinal disturbances.

Nutritional issues during hospitalizations may cause problems, yet often receive limited attention. In one study, one fifth of hospitalized patients 65 years of

age or older had an average nutrient intake of less than 50% of their calculated maintenance energy requirements. Patients are commonly ordered to have nothing by mouth for specified periods, during which they are not fed by alternate means. Cancellations and rescheduling of procedures or tests can extend these periods. For patients receiving mechanical ventilation or who cannot take food by mouth, there are often delays in addressing nutritional needs. These deficits, rarely addressed at discharge, can lead to protein-energy malnutrition. Friedmann et al. have found loss of weight and decreased blood albumin levels after discharge to be strong predictors of readmission within 30 days.<sup>3</sup> Meanwhile, malnutrition can affect every system in the body, resulting in impairment of wound healing, increased risk of infections and pressure ulcers, decreased respiratory and cardiac function, poorer outcomes of chronic lung diseases, increased risk of cardiovascular and gastrointestinal disorders, and poorer physical function.

On the cognitive front, hospitalized patients often meet a variety of health care professionals but have little time to learn their names or understand their roles. Schedules are often unpredictable, and in patients who are already under stress, information overload can be stressful and may even provoke confusion. Moreover, these stressors of hospitalization can cause delirium, which is associated with increased risk after discharge.

Pain and other discomforts, common among these patients, are often inadequately addressed. They can lead to sleep disorders,

mood disturbances, and impaired cognitive functioning, and are known to influence immune and metabolic function. Moreover, medications to treat symptoms can negatively affect the early recovery period. Sedatives, especially benzodiazepines, are commonly prescribed and may become part of the discharge regimen. Undersedation can cause hypercatabolism, immunosuppression, hypercoagulability, and increased sympathetic activity. Oversedation can dull the senses and impair cognitive function and judgment and may also lead to post-traumatic stress disorder.

to focus on the factors during the hospitalization and the early recovery period that contribute to the period of vulnerability.

What can be done now? At a minimum, we should assess a patient's condition at discharge by soliciting details far beyond those related to the initial illness. As we determine readiness for transition from the inpatient setting, we should be aware of functional disabilities, both cognitive and physical, and align care and support appropriately. We should also use risk-mitigation strategies that stretch beyond the cause of the initial hospitalization and seek

hancing cognitive and physical function. During hospitalization, clinicians should not only address the urgencies of the acute illness but also seek to promote health actively by strengthening patients and contributing to their physiological reserve. Attention to sleep, nutrition, activity, strength, and judicious symptom management may pay great dividends. Many interventions may be akin to those developed for reducing delirium. Shorter lengths of stay put an even greater premium on preparing patients for a successful convalescence from the first day.

If this construct is valid, we must ensure that we are doing no harm in the course of assisting patients who are acutely ill. We will need to expand our efforts to reduce readmissions during this high-risk period, exploring new approaches to making hospitalization less toxic and promoting the safe passage of patients from acute care settings.

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***Comprehensive strategies for mitigating post-hospital syndrome and its accompanying risks might begin with efforts to target the stressors that probably contribute to vulnerability in patients soon after discharge.***

Finally, hospitalized patients commonly become deconditioned, so recently discharged patients often have impaired stamina, coordination, and strength, which place them at greater risk for accidents and falls. These limitations may also diminish their ability to comply with postdischarge instructions such as daily use of a scale to weigh themselves. The capacity to resume basic activities or attend a follow-up appointment can be affected.

Recognition of the post-hospital syndrome can provide the impetus for developing novel interventions to promote recovery. Although we need to continue to improve transitional care and ensure that the condition for which a patient was initially admitted is successfully treated, we also need

to prevent infections, metabolic disorders, falls, trauma, and the gamut of events that commonly occur during this period of generalized risk.

Comprehensive strategies for mitigating post-hospital syndrome and its accompanying risks might begin with efforts to target the stressors that probably contribute to vulnerability in patients soon after discharge. We should more assertively apply interventions aimed at reducing disruptions in sleep, minimizing pain and stress, promoting good nutrition and addressing nutritional deficiencies, optimizing the use of sedatives, promoting practices that reduce the risk of delirium and confusion, emphasizing physical activity and strength maintenance or improvement, and en-