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Medicine Health RHODE ISLAND

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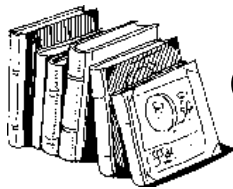
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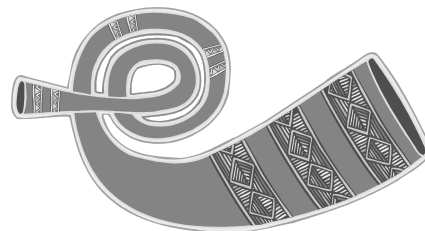
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Commentaries

Rating Instruments



One of the requirements for any planned clinical study is having an instrument to measure whatever you're studying. For instance, if you set out to prove that a treatment helps schizophrenia, you need an objective scale that measures that aspect of schizophrenia you think the treatment works on (say hallucinations or delusions, amotivation or poor planning). Some scales measure a wide variety of signs and symptoms. Others are highly focused. But whatever scale is used must make "sense." Generally the scales used have been used before, and are widely accepted by experts as true or reliable measures of schizophrenia. Increasingly researchers are using scales that attempt to measure general well-being, presumably taking into account all aspects of the disorder and the side effects of the treatment. Since different physicians may see each disease differently, and since we all rate "quality of life" based on our own value judgments, there are frequently many potential rating scales for any particular study.

Rating instruments are clearly a requirement for clinical research. But the development of rating instruments has turned into a cottage industry. A process called "validation" is required in which a rating scale is rated against scales already in use and then compared and contrasted. And these scales don't all work too well, validated or not.

You would be surprised how much credence may be put into a scale that evolved 30 years ago over a few beers. Back in those days, the development of rating scales did not yet have a life of its own. A scale made sense, got used, then used some more until it became "the gold standard," whether good or not. "If we don't use it people will criticize us," is a common refrain. It's the explanation used by a fictional character of James Thurber. The character starts a rumor that gold has been found in some far-off land. This triggers a gold rush so popular that after a while the character joins it. He explains that "if so many people believe it, maybe it's true." And so a clinical tool, developed haphazardly, becomes an untouchable measuring device.

I recently served on a review board that evaluated a grant seeking \$750,000 to "validate" a scale for measuring cognitive function in PD. Another grant sought half that amount to develop a rating scale for PD patients on their ability to perform "instrumental activities", like balancing a checkbook, paying bills, driving a car. I served on a board that reviewed every scale known to have been used for rating psychosis in PD, none of which were any good. We unanimously agreed that a new scale was needed and some of us will, presumably, help develop such a scale. Maybe even me. The need remains unfulfilled.

Whenever I think about validated and universally accepted scales, I always think of the Simpson-Angus Scale, the "gold standard" scale for rating parkinsonism in trials of antipsychotic drugs, a scale used, I think, in every study of an antipsychotic in the last few decades. It is terrible. It is not acceptable to anyone actually interested in rating PD signs because it overemphasizes some signs and undervalues others. But it is inconceivable that a new study would abandon it in favor of an instrument used by doctors knowledgeable about PD, unless the study was performed by neurologists.

The best scale I've ever used is the **Clinical Global Impression Scale (CGIS)**. It is the scale used since time immemorial by all physicians everywhere, even before clinical trials were invented. It asks, "How sick is the patient?" The **Clinical Global Impression of Change (CGIC)** Scale then rates the response. "How much different is the patient?" In these days of technology, one uses the so-called "Likert" scale to complete this scale. I am actually not sure what a Likert scale is, but every Likert scale seems to mean that the rating scale employs numbers from one to seven. For the CGIS a score of one is normal. Seven means the patient is among the sickest with this condition. For the CGIC scale, a zero means without change, a 3 is markedly better, and a -3 is markedly worse. What could be simpler? What more information does one get from a quality of life scale supplemented by measures of everything you can think of?

I am not a believer in the dictum of the movie, *Field of Dreams*, "if you build it they will come." That is, if you show that enough scales measure a change then the intervention must work. I am a believer that people vote with their feet. If a treatment works people will want it. If it works, the CGIC scale will register an improvement. The CGIS will tell us how sick the patient was both at entry and exit.

I asked a patient who had been hospitalized for psychosis for two weeks about his akathisia, a syndrome of uncomfortable restlessness that resulted from his drug treatment. He was no longer psychotic. How uncomfortable was the akathisia? "Very." How does it compare to the discomfort of the psychosis? "No comparison. If I knew how terrible I'd feel with the treatment I would never have sought help. I'd rather have remained psychotic." As the old saw goes, the treatment was a success but the patient died. The CGIC captures all. It would not have been fooled.

Most doctors do not use scales to rate their patients on their various disorders. Mostly we form a gestalt impression, a clinical global impression score, if you will. Whenever I think of psychiatric measures, I envision the cartoon by Gary Larson in which a Sigmund Freud-like psychiatrist, while listening to the patient lying on a sofa, writes in his notebook, "Just plain nuts." That is exactly how we think: normal, a little sick, a lot sick, very sick, whether it's heart failure, pneumonia, cancer, dementia or psychosis.

As much as I've disparaged rating scales, I strongly endorse their use, but not to the point of overlooking clinical judgment, which in my mind, trumps all. Clinical judgment plus common sense should be the foundation of any study, and any treatment. When I was criticized recently for not having a validated scale for determining whether patients were bothered by a runny nose, since I had simply asked if they had a runny nose (with a few qualifiers), I concluded that too many of my colleagues have lost sight of the forest. If patients don't think they have a runny nose, I

don't need to think about sticking pledges up their nose to measure secretions. If they do have this problem, then I might consider it. For a pilot study, one should not have to invest more time and money to validate a test than one will spend to do the actual study.

Sometimes it's better to ask the patient, and not recreate the old parable of

the blind men and the elephant. How do you feel? and are you better? are good starts. I rate rating instruments on the Friedman common-sense scale.

— JOSEPH H. FRIEDMAN, MD

Disclosure of Financial Interests

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The Questionable Art of Detachment

Three nations make legitimate claim to William Osler [1849 – 1919], perhaps the foremost physician of the 19th and 20th Centuries. He was born in Canada and educated at McGill University, pursued much of his clinical career in the United States [particularly at Johns Hopkins Medical School, which he co-founded], and achieved his most prestigious appointment in England, where he was both knighted and appointed as Regius Professor of Medicine at Oxford University.

In a speech given before the Canadian Medical Association in 1902, Osler declared: "A rare and precious gift is the Art of Detachment, by which a man may so separate himself from a life-long environment as to take a panoramic view of the conditions under which he has lived and moved: it frees him from Plato's den long enough to see the realities as they are, the shadows as they appear."

Detachment—and its antonym, attachment—have bare-boned meanings but operate more in the realm of nuances. To be attached to someone or something means, in the minds of many, to be warm, affectionate, open, courageous enough to embrace the novel and to be adequately assertive in one's feelings. It is a positive word. One view holds attachment as a worthy, perhaps necessary, emotion that reflects a positive, decisive attitude. To be detached, on the other hand, often means that one is remote, clinically judgmental, cold, without feeling, perhaps even bereft of humanity. It is a decidedly negative, bloodless word suggesting a calculating, aloof person who lacks spontaneity or affection.

Thus there are two irreconcilable views on the role of detachment as it pertains to the practice of medicine: One view holds detachment as essential for the successful practicing physician; the alternative view declares it to be inimical to the patient-physician relationship. Each view has enduring merit—and each, its implacable foes. Many of these differences may reflect more when, or during which era, the words had been uttered rather than their objective merits or deficits.

Consider the physician practicing in the year 1890. At best, surgery was a haphazard intervention; and internal medicine, soiled as it was with fads and eccentricities, was little more than the art of suppressing pain, providing a measure of comfort, allaying the anxieties of the patient and family, giving a name to the disease afflicting the patient, providing an educated guess as to the outcome and conversing with the patient while God undertook the cure. Charlatans—both within and beyond the profession—abounded and most medications were either harmful or useless. [Osler once declared that if all of these medications were willfully tossed into the seas, the only resultant harm would be rendered to the marine creatures.]

Under these circumstances when effective intervention was minimal, Osler saw the compassionate physician as one who main-

tained his equanimity rather than presented a façade of indecision and worry. "Imperturbability means coolness and presence of mind under all circumstances, calmness amid storm, clearness of judgment in moments of grave peril, immobility and impassiveness." This rare quality of detachment and objectivity, Osler believed, could readily be misinterpreted as indifference or insensitivity. In yet another oration to young physicians, Osler quoted Marcus Aurelius: "Thou must be like a promontory of the sea, against which, though the waves beat continually, yet it both itself stands, and about it are those swelling waves stilled and quieted."

Osler viewed himself as much a teacher as a healer. He believed strongly that "He who knows not, and knows not that he knows not, is a fool. Shun him. He that knows not, and knows that he knows not, is simple. Teach him." Teach him, yes, since he is a colleague who does not deny the immensity of his ignorance. And above all, teach oneself so that one will be a better physician tomorrow than today.

The advances achieved by the science of medicine in the last ten decades may cause us to forget how little medicine had available to it before the dawn of the 20th Century. Diseases such as diphtheria, poliomyelitis, rheumatic fever, measles, pertussis, osteomyelitis and a host of others are now mere words of past history rather than the daily work-load confronted by the physician of 1890. And today's medical armamentarium – the antibiotics, vaccines, hormones, psychoactive chemicals and a lengthy roster of life-sustaining medications—emerged resolutely from the labors of these predecessors who had struggled in the past with those diseases.

The patrician aloofness and detachment, perhaps necessary a century ago, has given way to a newer profile of the practicing physician. Today's graduating physicians reflect, to a substantially greater degree, the ethnic diversity of American society. And over 50% of Brown University's new physicians are women, in contrast to the virtually all-male contingent of physicians at the onset of the 20th Century.

Compassion, humility, openly expressed doubts and a sense of shared humanity might have been impediments to Dr. Osler's newly graduated colleagues in 1890. Today, however, these qualities have become central to the rudiments of medical school education; and hints of these laudable attributes are actively sought when medical school admissions committees review prospective candidates. Osler would have liked this new brand of physician.

— STANLEY M. ARONSON, MD

Disclosure of Financial Interests

Stanley M. Aronson, MD, has no financial interests to disclose.

American College of Physicians, Rhode Island Chapter Regional Conference, June 13, 2007 – Podium Presentations

Estrogen Inhibits Cardiomyocyte Hypertrophy By Modulating Calcineurin Signaling Pathway

Feng Wang, MD, Associate, Roger Williams Hospital, and Richard Patten, MD, Tufts University

INTRODUCTION

Clinical studies have shown that female gender is associated with a lower overall incidence of left ventricular hypertrophy than male, but the mechanisms underlying the gender-based differences remain unclear. Recent animal experiments have shown that administration of 17 β -estradiol (E2), the primary circulating form of estrogen, to ovariectomized female mice attenuates the pressure overload-induced cardiac hypertrophy. However, how sex hormones influence cardiomyocyte hypertrophy is not well-understood. In this study, we examined the effects of E2 on cardiomyocyte in response to hypertrophic agonists and on calcineurin signaling pathway – one of the major pathways involved in cardiomyocyte hypertrophy.

METHODS AND RESULTS

In cultured rat cardiomyocytes, pretreatment with physiologic levels of E2 (1-10 nM) prior to phenylephrine (PE, 50 μ M) stimulation for 24 hours led to a maximal 38% decrease in cell size measured with fluorescent microscopy, compared with cardiomyocytes stimulated with PE in the absence of E2 ($p < 0.05$). Expression of a constitutively active mutant of the catalytic subunit of calcineurin (CnA) completely abolished the anti-hypertrophic effect of E2 ($p > 0.05$). To explore whether E2 inhibited agonist-induced activation of calcineurin and the downstream

nuclear factor of activated T-cells (NFAT) signaling, we transfected cardiomyocytes with a luciferase reporter gene containing a NFAT-activated promoter. In parallel with the above findings, pretreatment with E2 (10 nM) inhibited PE (50 μ M)-induced NFAT activation quantified with luciferase activity by 32% ($p < 0.01$), but did not reduce NFAT activation induced by expression of CnA ($p > 0.05$). These observations suggested that E2-mediated reduction of cardiomyocyte hypertrophy result from inhibition of the calcineurin signaling pathway. Finally, to determine which estrogen receptor (ER α Vs. ER β) conferred inhibition of hypertrophy, we infected cardiomyocytes with adenovirus encoding either ER α or ER β . Pretreatment of E2 (10 nM) resulted in significant inhibition of PE (50 μ M)-induced hypertrophy in cardiomyocytes overexpressing either ER α or ER β (46% and 51%, respectively), suggested that both receptors mediate the inhibitory effect of E2.

CONCLUSIONS

We have demonstrated that E2 prevent cardiomyocyte hypertrophy induced by hypertrophic agonists by modulating calcineurin signaling pathway. These initial findings will add to our understanding of the role of sex hormones in regulating cardiomyocyte hypertrophy, and the gender-based differences found in cardiac diseases.

Pulmonary Embolism In a Patient with Pernicious Anemia and Hyperhomocysteinemia

Jaspreet Dhillon, MD, Flavio Casoy, Maria Mae Modesto, Akhtar Ali, Eleanor Summerhill, MD, Memorial Hospital

CASE PRESENTATION

A 56-year-old man presented with a one-month history of increasing shortness of breath. Past medical history was significant for hypertension and hypothyroidism. Family history was significant for pernicious anemia. He denied chest pain, cough, fever or chills. There was no history of recent travel or prolonged immobilization. Physical examination was remarkable only for a loud P2 and bilateral varicose veins. There was no JVD and lungs were clear auscultation. Laboratories revealed hemoglobin of 10.0 g/dL, hematocrit 28.9% and MCV of 134.7 fL. ABG on room air was 7.43/35/74/95.1%. Doppler ultrasound of the legs was negative for deep venous thrombosis. However, CT angiogram revealed bilateral pulmonary emboli. 2-D echocardiogram showed a dilated, hypokinetic right ventricle; moderate to severe tricuspid regurgitation; and moderate to severe pulmonary hypertension with an estimated pulmonary artery pressure of 65 mm Hg. Hypercoagulable work-up was negative other than an elevated homocysteine level of 50 μ mol/L (normal range 5-12 μ mol/L). Further work up showed a low vitamin B12 level of < 150 pg/ml, elevated methylmalonic acid level of 2208 nmol/L, intrinsic factor antibodies and gastric parietal cell antibodies. It was felt that the patient had a hypercoagulable state caused by hyperhomocysteinemia. The patient was anticoagulated with heparin followed by coumadin. He was also started on homocysteine lowering drugs

including intramuscular vitamin B12, folate and pyridoxine. His dyspnea improved and he was discharged home. At 6 month follow up, homocysteine levels returned to the normal range.

DISCUSSION

Pernicious anemia (PA) is the most common cause of vitamin B12 (cobalamin) deficiency. It is an autoimmune disorder associated with decreased production of intrinsic factor from parietal cells. Intrinsic factor, a glycoprotein, binds to cobalamin and facilitates its absorption into the ileum. Thus PA leads to vitamin B12 deficiency. Vitamin B12 is a cofactor in the synthesis of methionine from homocysteine. Thus, deficiency of vitamin B12 leads to accumulation of homocysteine. Homocysteine has atherogenic and prothrombotic properties, which are responsible for thrombosis. To the best of our knowledge, only 3 cases of PE associated with PA have been reported in the literature. In one case, the patient had concomitant prothrombin gene mutation, an independent risk factor for thrombosis. The other two cases were similar to ours and had no other hypercoagulability disorder. This case therefore supports the hypothesis that hyperhomocysteinemia secondary to PA may be a risk factor for pulmonary embolism.

Infection or Malignancy by PET/CT: A Cautionary Case Report

*Furha Cossor, MD, Kim McDonough, MD, Jennifer Gass, MD, and Don S. Dizon, MD,
Warren Alpert Medical School/Rhode Island and the Miriam Hospitals*

INTRODUCTION

For women completing treatment of breast cancer, national guidelines do not recommend routine screening of asymptomatic patients.¹ For those with signs or symptoms worrisome of metastases, however, imaging with PET/CT has proven useful and in one series, sensitivity and specificity approached 96% and 90%, respectively.² However, radiographic findings even in "appropriate clinical context" must be cautiously interpreted. We present the case of a woman in remission from a node-positive, locally advanced breast cancer on Tamoxifen who presented with rib pain and was found to have PET/CT evidence consistent with pulmonary metastases. Further evaluation showed this to be disseminated pulmonary MAI infection. A 75-year-old female presented with an abnormal left breast mammogram in 2004. Subsequent biopsy showed a pleomorphic lobular breast carcinoma, ER/PR+, HER2neu-. She underwent partial mastectomy and sentinel lymph node biopsy for a 4.5cm infiltrating lobular carcinoma with positive lymphovascular invasion involving one of seven nodes. She received adriamycin/cyclophosphamide but due to treatment-related complications switched to cyclophosphamide, methotrexate, and 5-fluorouracil followed by paclitaxel. Following treatment she was placed on Tamoxifen. Two years later she presented with rib pain. CT scan confirmed nodular lesions consistent with metastases and PET scan confirmed increased FDG-uptake in the lungs. The case was presented at the Multidisciplinary Tumor Board who concurred with a

diagnosis of metastatic breast cancer. After consideration of treatment options, she opted to enroll in a clinical trial of chemotherapy with or without bevacizumab. Prior to start of therapy she was admitted with hemoptysis. Bronchoscopy was negative for endobronchial lesions, however AFB smears on BAL fluid were positive. Further DNA probe testing of the bacilli proved negative for TB but was consistent with MAI. A pulmonary consult suggested biopsy of all suspicious lung lesions. All final biopsies confirmed MAI and no evidence of malignancy was identified. Therefore, she was placed on an aromatase inhibitor as treatment of her breast cancer and placed on antibiotics for disseminated MAI.

DISCUSSION

Caution when interpreting imaging studies indicated to work-up metastatic disease in a patient with breast cancer is warranted. Other etiologies that can cause FDG-uptake must be ruled out, such as infection, inflammatory conditions, or granulomatous diseases. This case also illustrates the need for biopsy to confirm the diagnosis of metastatic breast cancer, lest patients are treated with chemotherapy unnecessarily. Resources: 1. Nelson NJ. Do follow-up tests actually help detect recurrent disease? *JNCI* 2000;92:1798-800. 2. Lind P, Igerc I, et al. Advantages and limitations of FDG PET in the follow-up of breast cancer. *Eur J Nucl Med Mol Imag* 2004;31:S125-34.

Characteristics and Outcomes of Patients In the Rhode Island Takotsubo Cardiomyopathy Registry

*Hanna N. Ahmed, MD, Associate, Richard A. Regnante, MD, Russell A. Linsky, MD, Steven B. Weinsier, MD,
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INTRODUCTION

Takotsubo cardiomyopathy is a rare phenomenon in which patients present with signs and symptoms mimicking an acute coronary syndrome, and thus undergo cardiac catheterization. At the time of catheterization, however, no critical coronary lesions are found. A characteristic left ventriculogram suggests the diagnosis of Takotsubo cardiomyopathy. Methods: The medical records and cardiac catheterization data from patients who carried a presumed diagnosis of acute coronary syndrome but had no critical coronary lesions at time of catheterization were reviewed over a two-year period. A total of forty patients met all the proposed Mayo criteria for the diagnosis of Takotsubo cardiomyopathy. Results: Over two years, 40 of 5107 patients with presumed acute coronary syndrome met all of the proposed Mayo criteria for a diagnosis of Takotsubo cardiomyopathy instead. This represents a frequency of 0.8%. Of this group, 95% (38/40) were female. The average age of patients in this population was 68, with a range from 44 to 85 years old. Most (39/40) had no prior history of coronary artery disease. Sixty percent (24/40) had a clearly identified preceding stressor. Seventy percent (28/40) reported chest pain, 32.5% (13/40) reported

only shortness of breath, and 17.5% (7/40) reported both as presenting symptoms. Fifty percent (20/40) of the patients presented with ST-elevations on EKG. Seventy-eight percent (31/40) had dynamic EKG changes. Troponin-I was positive in ninety-five percent (37/40) of patients, with an average peak value of 7.3 ng/mL. At time of cardiac catheterization, the majority of patients had apical dyskinesia, except for one patient whose left ventriculogram demonstrated mid-anterior and mid-inferior akinesis with apical sparing. The average ejection fraction was 38%. Eight patients were intubated, three of whom required the use of vasopressors. Three patients experienced ventricular tachycardia or ventricular fibrillation, were successfully resuscitated, and had normal neurologic function at the time of discharge. There were three deaths. One patient died of acute heart failure. Two patients died of non-cardiac causes before adequate follow-up was obtained. Follow-up echocardiographic data was available for 29 patients, and all demonstrated recovery of wall motion abnormalities and left ventricular ejection fraction to an average of 60%. No thromboembolic events or recurrences were observed.

CONCLUSION

As in prior case series, most affected patients in our registry were older females. A key feature of this syndrome is its reversibility in myocardial dysfunction over a relatively short period of days to weeks. The acute phase may lead to critical illness with episodes of ventricular tachyarrhythmias and death.

The overall short-term prognosis is good if patients survive the acute phase. Optimal long-term medical therapy has not been well-established at this time. Recurrences are rare, but have been reported. In our case series, no patient has had a recurrent episode to date. The pathophysiology of Takotsubo cardiomyopathy is unclear at this time.

Inhibition of Glycogen Synthase Kinase (GSK) – 3 β Attenuates Progressive Renal Inflammation In Rats With Unilateral Ureteral Obstruction

Thejaswini Kempnanjappa, MD, Lance Dworkin, MD, Rujun Gong, MD, PhD. Dept of Internal Medicine, Roger Williams Medical Centre, Boston University School of Medicine Division of Kidney Diseases, Rhode Island Hospital, Warren Alpert Medical School

BACKGROUND

GSK 3 β is a ubiquitous serine threonine protein kinase that is involved in regulation of many cell function and has recently been implicated in the pathophysiology of a number of diseases including Diabetes Mellitus type 2 and Alzheimer's disease. Studies in our lab suggest that GSK 3 β is involved in the regulation of acute inflammation. Because interstitial inflammation is an important component of **chronic progressive renal disease (CKD)**, the purpose of this study was to investigate the effects of a GSK 3 β inhibitor on renal injury in a model of CKD. Method: Eight male Sprague-Dawley rats, four control and four study group, were used. Body weight was measured at the beginning of the study. The experimental group received intra peritoneal injection of 200 mg/kg of valproic acid and the control group received vehicle injection for four days. On the fifth day, **unilateral ureteral obstruction (UUO)** was performed on all rats, followed by three more days of injections of valproic acid or vehicle. After 3 days the animals were weighed and then sacrificed. Kidneys were removed, weighed, sectioned and stained for morphologic study. ED-1, a macrophage marker, was used to assess the extent of the in-

flammatory infiltrate. The number of ED-1 positive cells was measured by absolute cell counting after immunohistostaining and by western immunoblot assay. Result: The animals tolerated valproic acid treatment very well. Kidney weight to body weight ratio was reduced in vehicle treated rats, indicating progressive kidney atrophy induced by UUO injury. This was significantly attenuated in the valproic acid treated group. Macroscopic examination of the VPA-treated group did reveal increase in the size of the kidney compared to the UUO control group. Light microscopy revealed that VPA strikingly reduced renal inflammation and fibrosis. Absolute counting of ED-1 positive cells showed a reduction in the inflammatory cells in the VPA group. This finding was further corroborated by western immunoblot assay, which demonstrated less expression of ED-1 protein in VPA treated kidney. Conclusion: Our findings suggest that GSK-3 β plays a pivotal role in renal injury in chronic kidney disease. The GSK-3 β inhibitor VPA substantially reduced renal inflammation and injury in an animal model of chronic kidney disease. This study may represent the first step toward the development of novel therapeutic agents for chronic renal disease.

Successful Mitral Valve Repair is Associated With Preoperative Left Ventricular Function and Immediate Post Repair Anterior Leaflet Mobility

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BACKGROUND

For appropriate patients, **mitral valve repair (MVR)** is preferred to replacement for **mitral regurgitation (MR)**, but recurrent MR can require reoperation. We hypothesize that intraoperative **transesophageal echocardiographic exam (TEE)** can predict short and long-term mitral valve outcome after repair. Methods: We reviewed the intraoperative TEEs of 8 known failed repairs and compared them to 35 randomly selected cases from a pool of 160 patients who had elective MVR over the past 6 years. Failed repair was defined as greater than or equal to moderate MR (greater than or equal to 2+ by qualitative color Doppler) or stenosis (MS, area < 2.0 cm²) on the intraoperative post-repair TEE or follow-up transthoracic echocardiogram. TEE measurements were performed digitally offline by observers blinded to outcome. Pre-op LVEF was reported from cath data. Results: Pt age=61.6 \pm 14.6yrs, 62%

male. The etiology of MR was functional in 14 and posterior and/or anterior leaflet prolapse in 29. Of the 8 failed repairs (6 MR, 2MS), 3 occurred during the same surgery, 5 at followup. Greater anterior leaflet mobility, quantitatively reflected by smaller post-op annulus to coaptation point distance (Ann-coapt; 0.38 \pm 0.14 vs 0.64 \pm 0.30 cm; p<0.05) and qualitatively assessed as either restricted or mobile, was associated with success. (p<0.05). Pre-op findings associated with failure were a reduced LVEF (55.0 \pm 11.5% vs 38.5 \pm 15.4%; p=0.03), a larger annular diameter (4.13 \pm 0.56 cm vs 3.51 \pm 0.47 cm; p = 0.03), and a longer posterior leaflet (2.05 \pm 0.47 cm vs 1.38 \pm 0.43 cm; p<0.01). Neither surgical procedure (12 CABG/MVR, 4 AVR/MVR; 27 Isolated MVR) nor pre-op mitral leaflet function/morphology was associated with outcome, but may reflect small sample size. Conclusions: Pre-op and immediately post-op TEE variables are associated with short

and long term success after MVR, and can be used to guide pre-op and intra-op decision making. Pre-op, a reduced LVEF and larger annulus were associated with unsuccessful repairs,

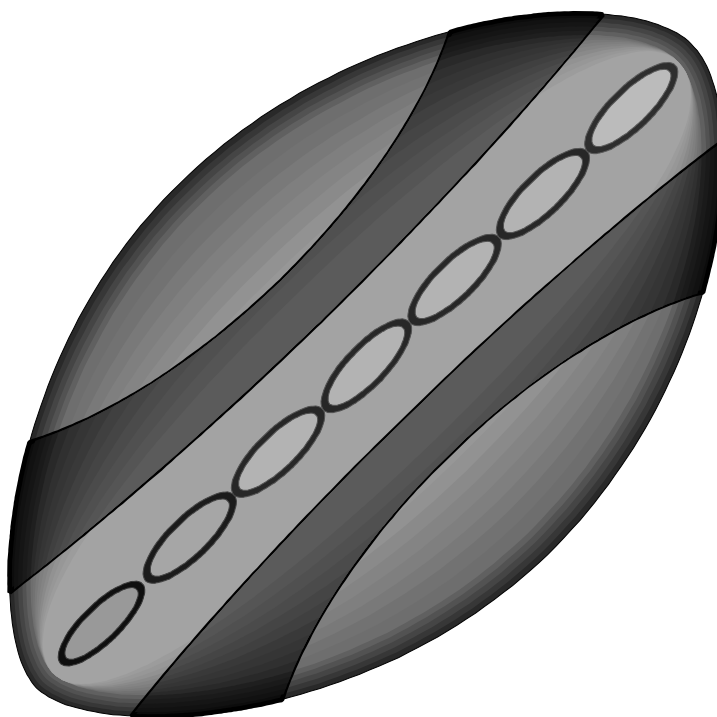
possibly suggesting a later stage of disease. Post-op, greater anterior leaflet mobility was associated with successful repairs, highlighting the importance of anterior leaflet function after MVR.

The Case of a Surfer With Sudden Hemiplegia

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A 31 year-old previously healthy male presented to the ED after sudden onset of right-sided weakness and paresthesias. He had been surfing earlier that day without any acknowledgement of trauma or weakness. In the evening, he noted “pins and needles” in his right leg, which progressed to his right arm and face. He was unable to ambulate secondary to right-sided weakness, and was notably dysarthric when he called 911. His weakness had entirely resolved 90 minutes from the time of onset when seen in the ED. Vital signs on admission were WNL. His general physical exam was unremarkable but for posterior nuchal pain, predominantly right sided. Neurological exam was significant for lateral nystagmus, power 4/5 in the RUE and right dysmetria. CT head on admission was negative for ICH or infarct. An MRI of the brain showed FLAIR and T2 signal hyperintensity in the posterior right cerebellar hemisphere compatible with an acute lacunar infarct. MRA of the head and neck revealed a hypoplastic right vertebral artery from C2 to the skull base. Angiography demonstrated tight stenosis of the cervical vertebral artery at C1-C2 on the right, extending to the level of foramen magnum. He was diagnosed with right extracranial **vertebral artery dissection (VAD)** and was started on a heparin infusion, with goal to transition to coumadin thereafter. VAD is an uncommon cause

of stroke, affecting predominantly those aged 45 years and under. The combined incidence of carotid artery dissection (CAD) and VAD is about 2.6/100,000 with CAD being 3-5 times more common than VAD. The primary lesion involves an expanding hematoma in the vessel wall. The intramural hematoma may arise spontaneously, through an intimal tear, or subsequent to minor trauma. The dissection may lead to complete occlusion of the vertebral artery or may seal off, remaining asymptomatic. Extension of the dissection intracranially to involve the basilar artery results in infarction of the brain stem or cerebellum with fatal consequences. Intimal disruption also leads to increased thromboses and emboli with subsequent stroke syndrome. Focal neurologic signs develop in up to 85% of patients, most commonly symptoms related to the lateral medullary syndrome. Heparin followed by warfarin therapy for 3-6 months is the standard treatment for VAD. Prognosis is good in those with extracranial dissections: up to 88% of patients have complete neurologic recovery. VAD may easily be misdiagnosed as musculoskeletal pain or migraine, thus early diagnosis is dependant on a high index of suspicion. VAD should be considered in younger patients who present with stroke syndromes to identify this rare but potentially dangerous condition without delay.



Neuropathic Pain

Michelle L. Mellion, MD

Chronic pain can be classified as either nociceptive or neuropathic. Nociceptive pain is caused by mechanical, inflammatory or thermal injury. There is usually an associated identifiable cause such as sports/exercise injury, arthritis or infection. Nociceptive pain can be acute or chronic and frequently responds to treatment. Neuropathic pain, on the other hand, is caused by a primary lesion or dysfunction of the peripheral or central nervous system which commonly persists beyond the normal healing period. Approximately four million Americans develop chronic neuropathic pain each year.¹ The estimated prevalence in the general population is 1.5%.² Causes include post-herpetic neuralgia, diabetic peripheral neuropathy, radiculopathy and complex regional pain syndrome; however, there frequently is no identifiable cause.

Between 600,000 to 800,000 cases of herpes zoster occur in the United States each year. Of those cases, between 9% and 24% will develop **post herpetic neuralgia (PHN)**. Fifty percent of patients older than 70 years old will develop PHN. **Diabetic peripheral neuropathy (DPN)** occurs in 11.6% of those who are insulin dependent and 32.1% in those who are not, with an estimated prevalence of up to three million people in the United States.³ Low back or neck pain is one of the most common complaints that brings patients to their physician. While the exact percentage of patients with purely neuropathic low back and neck pain is unknown, chronic radicular pain will develop in more than 20% of those requiring spinal surgery, with an annual prevalence of more than 2 million cases in the United States.³ Management of neuropathic pain can be difficult. The direct and indirect costs to the individual in terms of suffering, familial relationships, health care expenditures, and quality of life can be devastating. The cost to society in lost productivity and disability is overwhelming. Annual health care expenditures can be three times higher than that for age-matched controls.² Congress has declared this present de-

cade the "Decade of Pain Control and Research" and declared pain the "fifth vital sign."¹

With neuropathic pain, complex underlying mechanisms cause the symptoms acutely and the chronic changes that modify the nervous system. Central sensitization, peripheral sensitization, reduced inhibition and sympathetic activation can contribute to neuropathic pain.³ Central sensitization is caused by over-activity of the second order neurons located in the dorsal horn. This over-activity can lead to enhanced pain transmission to higher cortical regions. Peripheral sensitization can feed into central sensitization. Damage to peripheral nerves can lead to hyperexcitable nerve terminals.³ Additionally, peripheral receptors at the nerve terminals may have a lowered threshold for activation because of altered expression of ion channels and expansion of their receptive fields. Neurotoma formation, which is the result of expanded receptive fields and altered ion channel expression, leads to enhanced release of excitatory neurotransmitters.³ Disinhibition, on the other hand, is caused by reduced activation of central inhibitory inputs leading to a reduced modulatory presence of endogenous opioids, serotonin and norepinephrine. The sympathetic nervous system may also contribute to nervous system dysfunction by enhancing signal transduction from the dorsal root ganglion, catecholamine release and expression of adrenergic receptors.³

Neuropathic pain clinically is either stimulus-evoked or stimulus-independent.¹ Stimulus-evoked pain is characterized by hyperalgesia and allodynia. Hyperalgesia is an exaggerated pain response produced by normally painful stimulus, whereas allodynia is produced by a stimulus that is not usually painful. Sensitization of primary afferent nociceptors causes hyperalgesia, whereas central sensitization causes allodynia. Stimulus-independent pain is characterized as paresthesias or dysesthesias. These uncomfortable, persistent or paroxysmal sensations can be described as burning,

tingling, shooting, stabbing or electrical.¹ They are produced by ectopic impulses and damaged or leaky ion channels. Hypoesthesia, reduction of normal sensation and anesthesia, loss of sensation, can also be a manifestation of neuropathic pain.¹

Assessment of a patient suspected of having neuropathic pain should include a complete medical history, review of systems, general physical examination, and complete neurological examination.⁴ In addition, there should be an investigation of sleep disturbances, work related issues and social supports. Psychological assessment is necessary to identify contributing psychological comorbidities. It is also necessary to try to identify any secondary gain issues. Directed questioning about the location, quality, duration, and pattern of the pain can help identify the etiology and assist in treatment planning.⁴ Adjunctive studies such as MRI, laboratory studies, nerve conduction study/electromyography, nerve/skin biopsy and autonomic testing help to identify the cause or confirm the diagnosis of neuropathic pain.⁴

The treatment strategy should address the fundamental mechanisms of pain, attempt to normalize the underlying central nervous system dysfunction and alleviate unpleasant signs and symptoms.⁶ The practitioner should address his/her patient's expectations of treatment. Patients should understand that there is no cure for neuropathic pain. Most of the medications studied for the treatment of neuropathic pain are considered clinically important if the data show a reduction of 30% on pain scales.⁴ Only a few medications have been studied in randomized controlled trials for treatment of post-herpetic neuralgia, diabetic peripheral neuropathy or trigeminal neuralgia. These medications include the 5% lidocaine patch, capsaicin cream, gabapentin, valproate, carbamazepine, pregabalin, tricyclic antidepressants, venlafaxine, duloxetine, oxycodone, tramadol and baclofen.⁵ The therapeutic use of these medications has been extrapolated to other neuropathic pain syn-

dromes in an “off-label” indication. Other medications such as levetiracetam, oxcarbazepine, tiagabine, topiramate, zonisimide, and various **selective serotonin reuptake inhibitors (SSRIs)** and anti-inflammatories have been studied, but have not shown efficacy.⁵

First-line treatment for neuropathic pain includes gabapentin, 5% lidocaine patch, tricyclic antidepressants, tramadol and opioids.⁴ Gabapentin is recognized as a very highly effective treatment of neuropathic pain. While carbamazepine has been shown to be very effective in the treatment of trigeminal neuralgia and lamotrigine has had some success in the treatment of DPN, central post stroke injury, spinal cord injury and HIV, neither of the medications or other antiepileptics have a many indications in the treatment of neuropathic pain as gabapentin.⁵ It has been shown in eight double-blind randomized controlled trials to be effective in the treatment of diabetic neuropathy, PHN (for which it is FDA-approved), phantom limb pain, Guillain-Barre syndrome, spinal cord injury and complex regional pain syndrome type 1 compared with placebo.⁵ Dosages up to 3600 mg/day reduced pain and some trials showed an improvement in sleep, mood and quality of life. Dworkin, et al. recommended that the patient have a three to eight week titration period plus

one to two weeks at the maximal tolerated dosage.⁴

Pregabalin, the so-called “son of gabapentin,” is also effective for the treatment of PHN and DPN.^{7,8} The mechanism of action is similar to that of gabapentin. Some authorities believe that pregabalin has a better side effect profile and may be a bit more effective than gabapentin, but there have been no direct head-to-head clinical trials.⁵

Topical agents can be effective. The 5% lidocaine patch is recognized as being effective especially in PHN and focal neuropathic pain syndromes.^{9,10,11} Two published double-blind randomized controlled trials have shown statistically significant pain reduction with the 5% lidocaine patch vs. placebo in PHN and focal neuropathic pain syndromes. Titration with the patch is not necessary. An “adequate” trial should last about two weeks.⁴ While the 5% lidocaine patch has been shown to be effective in the treatment of some neuropathic pain syndromes, capsaicin cream has failed to show any significant overall effect in six randomized controlled trials. Clinical trials are in progress to test the efficacy of capsaicin in the patch formulation.⁵

Tricyclic antidepressants were the first non-analgesic medications to be proved effective for neuropathic pain in placebo-controlled trials. However, stud-

ies have shown that they have little efficacy in the treatment of HIV sensory neuropathy, pain from spinal cord injury and chemotherapy induced neuropathy.¹² Amitriptyline is the most studied and seemingly effective, but its side effect profile can be prohibitive especially in elderly patients. Head-to-head studies with nortriptyline and desipramine showed these medications to be just as effective as amitriptyline, with less side effects.¹³ The medications are usually prescribed at lower doses than those used for depression. An “adequate” trial will take from six to eight weeks, with at least one to two weeks at the maximum tolerated dosage.⁴

Opioids have also been tried in the treatment of neuropathic pain. These studies were usually short, only eight to twelve weeks, but showed some benefit with oxycodone in the treatment of PHN and PDN.^{14,15} Treatment with these medications may be difficult because of the issues of addiction and tolerance. Tramadol, whose major metabolite is a mu opioid agonist, may be substituted in place of opioids given its lesser abuse potential. This medication is usually initiated at 50 mg qd or bid and can be increased to its maximum tolerated dosage over four weeks.⁴

Other antiepileptics like lamotrigine and carbamazepine are considered sec-

Table 1.

Drug	Symptoms Treated	Starting and Maximum dose	Trial Period
Gabapentin	Hyperalgesia, allodynia, Shooting, lancinating pain Burning	Initiate at 100-300 mg qhs, then titrate every 1 to 7 days by 100-300 mg to target dose of 1800 to 3600 mg/day	3-8 weeks
5%Lidocaine Patches	Hyperalgesia, allodynia	Wear patch 12 hours on/12 hours off; no more than 3 patches at a time	2 weeks
Tricyclic Antidepressants	Shooting, lancinating pain and burning	Initiate at 10-25 mg qhs and increase by 10-25 mg/day every 3-7 days as tolerated up to 100 mg/day	6-8 weeks
Opioids	Allodynia	Start 5-15 mg of morphine sulfate every 4 hours for 1-2 weeks then convert to long-acting formulation; continue immediate release formula for break-through; can also try fentanyl patch	4-6 weeks
Tramadol	Allodynia	Initiate at 50 mg qd or bid and increase by 50-100 mg/d in divided doses every 3-7 days to target of 400 mg/d	4 weeks

Discussion of Off-Label or Investigational Product

Off-label use for neuropathic pain: 5% lidocaine patch, capsaicin cream, gabapentin, valproate, carbamazepine, pregabalin, tricyclic antidepressants, venlafaxine, duloxetine, oxycodone, tramadol and baclofen.

Investigational use for neuropathic pain: levitracetam, oxcarbazepine, tiagabine, topiramate, zonisimide, and various selective serotonin reuptake inhibitors (SSRIs) and anti-inflammatories

ond-line. Some of these medications can treat specific underlying symptoms of neuropathic pain more effectively than others. Gabapentin, 5% lidocaine patch and capsaicin cream have been shown to be better than other medications in the treatment of hyperalgesia, while the tricyclic antidepressants, carbamazepine, venlafaxine and lamotrigine are more effective in management of shooting or lancinating pain.¹ Allodynia responds best to gabapentin and tramadol. The burning pain associated with neuropathic pain syndromes can be treated effectively with amitriptyline and gabapentin.¹ Pregabalin has also been shown to be effective in many of the same neuropathic pain syndromes as gabapentin and anecdotally patients may have a better response to treatment with this medication.

The use of combination therapy, rational polypharmacy, is important. Many patients with neuropathic pain have more than one type of pain symptom that may not respond to only one medication. By utilizing combination therapy, it is possible that the medications may address the different underlying etiologies and work synergistically to alleviate symptoms which, in turn, may lead to smaller amounts of the medications used. Studies have found that the combination of morphine and gabapentin and venlafaxine and gabapentin maybe effective.¹⁶ For those patients with very severe pain and who cannot tolerate the side effects of the oral medications or who are not responding, interventional strategies such as injection of local anesthetics, corticosteroids, nerve blocks or therapy with botulinum toxin can be tried.¹⁷ Although no formal, randomized clinical trials have been performed, anecdotal reports show that intrathecal pharmacotherapy via an implantable pump with opioids, clonidine, baclofen and local anesthetics may be helpful in the treatment of neu-

ropathic pain.^{18, 19} Nonpharmacological management may be helpful. Educating patients about proper sleep hygiene, encouraging exercise, utilization of physical and occupational therapy, bio-feedback, cognitive behavioral techniques and TENS therapy may be helpful adjunctive therapies;²⁰ however, their successful use has not been substantiated by large randomized controlled trials.

The diagnosis, management and treatment of neuropathic pain can be extremely challenging. A patient can be best diagnosed and managed by knowing the typical clinical manifestations and understanding the underlying mechanisms of neuropathic pain. However, patients' expectations of treatment should also be addressed in an accurate and thoughtful manner. While many of these treatments can reduce pain, more often than not the symptoms will not be completely eliminated. Through education, understanding, and rational medical treatment a valuable treatment strategy for neuropathic pain can be developed.

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Pain Management In the Elderly Surgical Patient

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Rhode Island ranks sixth nationally in the percentage of elderly residents, with over 14.5% of the population over age 65;¹ and the over 85 age group is the fastest growing portion of the population. Not surprisingly, the demand for healthcare services, including surgical interventions, will increase in the elder population. Surgical procedures no longer have age restrictions, as the demand for these interventions by the patients, and the success of modern surgical and anesthetic techniques have been demonstrated. Unfortunately, the pain associated with acute trauma and operative procedures is often inadequately managed.² Several barriers have been identified to effective pain management in the elderly, including an external locus of control in many elderly patients, fear of opioid side effects on the part of patients and healthcare providers, and the difficulty assessing pain in the cognitively impaired patient.³

Inadequate postoperative pain control is a concern on several levels. In the current healthcare environment, adequate pain control is regarded as a patient right, not simply a comfort issue. As the healthcare consumer becomes more educated patient satisfaction becomes more of a driving issue, generating greater attention on perioperative pain management concerns. Furthermore, evidence suggests that inadequate analgesia may contribute to prolonged hospitalization in the elderly, increased complications, and poorer patient outcomes.^{4,5} In this review, we will draw attention to some of the difficulties encountered in caring for the elder patient experiencing acute pain, and offer insights into the evaluation and treatment of this problem.

PAIN ASSESSMENT IN THE ELDERLY

A wide variety of validated assessment tools exist for the measurement of pain. While each method has value, it is important to recognize two important issues in applying these tools in the clinical environment.

First, no single assessment tool will be useful in every patient. The best ap-

proach is to have several different assessment tools, and to try and determine which one best suits the patient.^{6,7} For example, elderly patients often will do better with a simple word scale, such as none, mild, moderate, and severe, than a numeric rating or a visual analog pain scale. Many cognitively impaired elder patients have difficulty considering pain as a graded event. Pain is simply problematic, above their threshold, or not a problem, below their threshold. The FACES pain scale might appear to be a useful alternative to the number and word scales, but even this tool has inadequacies. Testing of the FACES scale in the elderly has demonstrated problems with the interpretation of the facial expressions as indicative of affective emotion, rather than pain.⁸ Some elders will misinterpret the scale as indicating sadness, rather than pain intensity, and underweight their pain on the scale.

Second, clinical caretakers frequently fail to recognize that the pain rating should act as a trigger for intervention. Pain ratings also serve as a measure of the effectiveness of the prescribed analgesic treatment. The recent emphasis on including pain scores on patient vital sign flow sheets, along with the other vital signs, has not clearly resulted in more effective pain intervention. A recent study at a Veterans Administration Hospital demonstrated the consistent recording of elevated pain scores, without evidence of intervention or improvement.⁹ Physicians, nurses, and other healthcare professionals need to recognize that an elevated pain score (>4 on a 10 scale) must trigger some analgesic intervention, then document evidence of improvement, or explain why no intervention or improvement was noted. There is a need to establish clear intervention guidelines for an elevated pain score, and to require appropriate documentation. As emphasized, no single assessment tool works for every patient, thus, several diverse

tools should be available, with appropriate standards for intervention established for each.^{7,8}

ANALGESIC OPTIONS: NON-DEMAND TECHNIQUES

One of the best approaches to controlling postoperative pain, is to employ techniques that do not require the patient to request treatment (Table 1). Examples of this approach include the use of selective nerve blocks, continuous delivery epidural or plexus analgesic infusions, and the use of around the clock **nonsteroidal anti-inflammatory drugs (NSAIDs)** and sustained release opioids. The NSAIDs exhibit a ceiling effect, and do not typically require titration. However, some consideration must be given to coexisting disease states, such as impaired renal function, bleeding concerns, and cardiovascular disease.^{10,11} The cyclooxygenase-2 inhibitors (COX-2 inhibitors) were, and are excellent choices for perioperative analgesia. Their lack of effect on platelet function make them extremely useful during the pre and postoperative phase, provided care is taken to avoid patients at risk for renal failure and those with severe ischemic coronary disease. Unfortunately, the only parenteral NSAID available, ketorolac, has one of the worst track records regarding safety in the elderly. Ketorolac has been reported to produce renal failure in some elderly patients following a single dose, and is associated with an increased risk of gastrointestinal bleeding in patients over the age of 75, particularly when used beyond 5 days. Ketorolac doses should be reduced to 15mg every six hours in patients over age 65, and limited to 3 to 5 days in most elderly patients. Celecoxib remains an excellent choice for many elderly patients.

Table 1: Non-Demand Analgesic Options.

Regional Anesthetic Nerve Blocks
Epidural Analgesia
NSAIDs
Acetaminophen
Continuous Wound Irrigation Catheter
Sustained Release Opioids

Over the past 20 years, anesthesiologists have played a more aggressive role in the treatment of postoperative pain. In addition to designing anesthetic techniques to minimize the impact of pain through the use of tailored pharmacologic interventions, many anesthesiologists include the extended use of anesthetic techniques, such as regional nerve blocks and epidural analgesia, beyond the operating room. For example, many extremity surgeries, brachial and femoral plexus nerve blocks are useful options to reduce pain in the early postoperative period. While they seldom provide more than 8-10 hours of anesthesia, they do allow for significant reductions in opioid use during the initial 24 hours, and there effects may be extended through the use of a continuous analgesic infusion via a catheter introduced into the appropriate neural plexus. Since most of these patients are able to transition to oral medications following the majority of extremity surgeries, this is a useful approach for ambulatory procedures, as the nerve block may allow for fewer opioid side effects as well as a reasonably comfortable first night. In-dwelling plexus catheters may be inserted at the time of the initial nerve block, which will allow for a continuous infusion or repeated bolus injections of local anesthetic; however, these techniques have not yet gained widespread acceptance outside of a few academic centers. For selected patients, this may be an option if the patient is anticipated to encounter severe pain, poorly tolerates systemic analgesics, or if dense analgesia is required for repeated manipulation for range of motion exercises.

Epidural analgesia is an excellent option for pain control following upper abdominal and intrathoracic surgical procedures. Epidural opioid/local anesthetic combinations are very effective analgesics, consistently demonstrating lower pain scores with significantly lower systemic opioid exposure, compared to intravenous opioid administration. Despite the greatly reduced systemic opioid dose, nearly an order of magnitude less than with patient controlled analgesia, epidural analgesia does not appear to offer a significant advantage over intravenous opioids with respect to postoperative central nervous system side effects, including respiratory depression, sedation, and pruritis.^{12,13} Local anesthetics are helpful in reducing the amount of opioid needed, but may introduce a greater risk of hypotension, pressure sores, and peripheral nerve compression injuries. Despite some drawbacks, epidural analgesia can be extremely beneficial in controlling pain and potentially reducing side effects, particularly with surgeries close to the diaphragm. A major advantage of epidural analgesia is that it can provide continuous pain control without disruption. Occasional technical difficulties aside, when epidural analgesia works well, it can provide a near pain free experience.

OPIOIDS AND THE ELDERLY

In dealing with severe postoperative pain, the opioid analgesic class remains the definitive therapy for most patients. Unlike the NSAID class, there is no clear analgesic ceiling effect for most patients.

the minimum effective blood level for an opioid tends to be variable, and may escalate during protracted therapy. Serum opioid levels are not helpful in directing therapy, and are simply a confirmation that the patient is taking the medication. Fortunately, the opioids are fairly well tolerated, from the standpoint of organ toxicity. Even in high doses, virtually no effects are seen on the hepatic, renal, or cardiac systems. Studies from mu-receptor knockout mice, indicate that in the absence of the mu-receptor, mu selective agonists have no detectable effects on these mice.¹⁵ All of the analgesic effect and side effects are eliminated. Side effects, such as nausea, vomiting, sedation, itching, constipation, and respiratory depression, tend to define the limits of clinical therapy. Pain in most patients can be controlled without encountering excessive side effects, but in the occasional patient, side effects may limit satisfactory pain relief. In these patients aggressive management of the side effects becomes an essential component of providing adequate pain control.

All too often, the opioids are underutilized, or even withheld, in the elderly postoperative patient, especially among individuals experiencing cognitive impairment. The more severe the communication deficit, the more likely the patient will have their opioids limited, out of concern that they are contributing, or will contribute to the development of postoperative delirium.¹⁶ Many factors can contribute to postoperative delirium, including advanced age, education, alcohol use, long acting benzodiazepines, and preexisting dementia. (Table 2) Although sedative medications may contribute to delirium, several recent studies suggest that the opioid use for postoperative pain displays an inverse relationship. Elder patients undergoing surgical repair of a hip fracture who received less than 10mg of morphine per 24 hour span, were more likely to develop postoperative delirium.¹⁷ Furthermore, both elevated preoperative and postoperative pain scores appear to be associated with a greater risk of developing postoperative delirium.¹⁸ A recent review on this topic, argues strongly that more aggressive pain treatment is needed, and may contribute to improved patient outcomes.¹⁶ Postoperative delirium nega-

Table 2: Risk Factors for the Development of Postoperative Delirium

Preoperative Factors

Poor Preoperative Pain Control
Preexisting Cognitive Impairment
Advanced Age
ASA Physical Status Greater than 2
Preexisting Alcohol or Benzodiazepine Use
Nursing Home Resident
Vision and Hearing Impairment

Postoperative Factors

Meperidine Use
Long-Acting Benzodiazepines
Poor Postoperative Pain Control

Opioid dose requirements are primarily determined by individual tolerances, determined in part by genetic variation, and in part by individual experience. Opioid tolerance develops rapidly following administration, even in the acute pain setting; however, in most circumstances, rapid resolution of pain over 3 days following surgery helps to prevent drug tolerance from becoming a significant factor in the postoperative patient.¹⁴ Unlike most drug classes,

tively impacts on successful rehabilitation, contributes to prolonged hospitalization, and increases the need for extended care facility admission. Additional controlled studies are needed to clarify the relationship between pain and delirium, but current data strongly suggest that better pain control may reduce the incidence of delirium, and at the very least, does not appear to contribute to delirium.

As indicated above, assessing pain can be difficult in patients with cognitive impairment. The more severely the patient's communication skills are impaired, the greater the likelihood that analgesics will be withheld, potentially adding to the risk of delirium, as they are unable to respond regarding their pain status. Exposing the patient to a variety of different pain assessment methods may prove satisfactory, once a usable tool is identified. In the severely impaired elder, pain scales may be unusable, necessitating the use of a behavioral assessment of pain, much like that employed for nonverbal children. Unfortunately, behavioral assessments of pain frequently underestimate an individual's suffering, but in the absence of an alternative, it is better than no treatment. In this setting, it becomes essential to plan for a system of nondemand analgesic delivery, and to allow for supplemental doses of opioid, should the patient's behavior suggest agitation or pain.

OPIOIDS AND FALLS IN THE ELDERLY

An extensive literature has documented that long-acting benzodiazepines, tricyclic antidepressants, serotonin selective antidepressants, and anticonvulsants contribute to the likelihood of falling in the over 65 year old population. (Table 3) Although the opioids are sedatives, the existing literature does not as strongly implicate the opioids as contributing to falls in elders.^{19,20,21} There is a paucity of data dealing specifically with the inpatient postoperative population, but what evidence that is available suggests there is a modest increase in the risk of falls associated with acute opioid administration. However, much more information is available on the impact of opioid analgesics on falls in the outpatient and institutionalized patient. In these settings, there are conflicting data to suggest a modest increase risk for

falls in some populations, and mounting evidence that suggests that the opioid analgesics actually reduce the relative risk of falls among ambulatory and institutionalized elderly. Most of these data arise from uncontrolled survey trials, but it remains highly suggestive of considerable benefit in favor of treating pain. Exactly how opioids might reduce the incidence of falls is unclear. Pain involving the lower extremities has been linked to an increase risk of falls in the elderly. Conceivably, the opioid analgesics help to improve mobility by reducing pain and allowing more comfortable ambulation. By enabling easier movement, elders may remain more active, retain muscle tone, and experience greater social interaction.

...good perioperative pain control may actually reduce postoperative delirium and improve perioperative morbidity

During a period of escalating opioid use, there may be some increased risk of impaired coordination, but this appears to abate fairly rapidly in most patients. Studies examining motor coordination associated with operating a motor vehicle support this notion. Unlike the benzodiazepines, which are associated with persistent impairment of motor coordination, the opioids are much less problematic.²² However, in the acute pain setting, particularly in the opioid naïve patient, caution to prevent falls is wise. Residual anesthetic effects, fluid shifts, and pain related mobility dysfunction are potential contributing factors to falls. Opioids may ultimately be beneficial in improving mobility, particularly after the transition to oral administration, but this is difficult to tease out in the mix of physiologic changes following physical trauma. In one study, the use of oral opioids was associated with a reduced incidence of postoperative delirium, but it is difficult to distinguish if this was related to less invasive operative interventions.¹⁸

PAIN TREATMENT STRATEGIES

From the data presented above, several treatment strategies may be suggested to improve perioperative pain management in the older patient. Poorly controlled preoperative pain predicts difficulty with pain control during the postoperative period.²³ Efforts to improve preoperative pain control may reduce the need for postoperative opioids, and may contribute to a less stormy postoperative course. The routine practice of withholding NSAIDs for two weeks prior to surgery is an unnecessary practice in most patients, and can increase the likelihood of producing a pain flare in arthritic patients. The NSAIDs are commonly withheld due to fear of contributing to operative bleeding. The majority of NSAIDs have relatively short half-lives, particularly ibuprofen, and will be substantially eliminated within 24 hours. If the patient is taking a long half-life compound, such as piroxicam, a short acting alternative NSAID or a COX-2 inhibitor may be substituted. Alternatively, providing an opioid or acetaminophen combination may be a reasonable alternative.

During the intraoperative phase, the use of local anesthetic infiltration and nerve blocks are reasonable options to minimize opioid requirements. Adjuvant analgesics such as dexmedetomidine or gabapentin may be useful in reducing opioid consumption during the perioperative phase. Unfortunately, there is little data available on the response of elderly patients to these agents during the perioperative period. Gabapentin, an anticonvulsant, has been reported to be a useful perioperative analgesic, reducing opioid consumption equivalent to that of the NSAID and coxib classes.²⁴ Further research is needed to determine if gabapentin, particularly when combined with concomitant opioid administration, contributes to an increase risk of sedation, confusion, and falls in the elderly postoperative patient. As a class, anticonvulsants significantly increase the risk of impaired coordination and falls among elders.

Opioids remain the mainstay of pain treatment during the perioperative period. The particular opioid selected does not appear to be of major concern, with one glaring exception. Meperidine has a consistent track record of contributing to

Table 3: Medications and the Risk of Falls in the Elderly.

Increase Risk of Falls
Anticonvulsants
Tricyclic Antidepressants
Selective Serotonin Reuptake Inhibitors
Benzodiazepines

Reduce Risk of Falls
Opioids

perioperative delirium. Even at fairly low doses, unlikely to be associated with the accumulation of the normeperidine metabolite, meperidine seems to adversely impact mental status. This delirium inducing effect may be related to the anticholinergic activity associated with meperidine, and its rapid transit into the central nervous system. Patients with renal impairment share an even greater risk of complications due to the accumulation of normeperidine, which may elicit seizure activity. As a general rule, meperidine is a poor choice as an analgesic, and is best avoided in the care of the geriatric population, if not most postoperative surgical patients.²⁵

A general rule to follow in prescribing opioids to the elder population is "Start low and go slow!" In the cognitively intact elder, **patient-controlled analgesia (PCA)** is a useful method, in that it allows for the delivery of small opioid doses at needed intervals. To be effective, an adequate loading dose must be delivered at the initiation of treatment. If aggressive measures are not taken to attain an acceptable level of comfort, the PCA device will not allow the patient to achieve comfort using the PCA mode. As a rule, the elderly appear to require loading doses similar to younger patients; however, the duration of action of most opioids appears to be prolonged due in part to delayed clearance of the drug and to the accumulation of active metabolites. This is particularly true for long half-life opioids such as methadone, but may also occur with morphine and meperidine. Careful monitoring and frequent assessment remain a priority. Confusional states often develop insidiously in elders following surgery, and frequently go undetected without careful assessment. As a result, improper use,

overuse and under use, of the PCA delivery system can occur.

Transcutaneous delivery systems, including transdermal fentanyl patch and a PCA transdermal fentanyl device may be useful in some settings. The transdermal fentanyl PCA device uses an iontophoretic method to enhance the delivery of fentanyl through the skin, providing rapid onset of action without the need for intravenous access. Advantages of transdermal delivery include the avoidance of venipuncture or injections, continuous delivery, and the ability to bypass the gastrointestinal tract which may reduce the constipating effects of the opioids. This route, relative to oral delivery, also reduces metabolite production, as it avoids the first-pass metabolism by the liver. More clinical experience will be needed with the transdermal PCA device, but it may prove to be a useful technique for both inpatient, and outpatient postoperative pain control.²⁶

CONCLUSION

The **Joint Commission for the Accreditation of Healthcare Organizations (JCAHO)** recognizes pain treatment as an obligation to all our patients. Fear of harm and side effects frequently hinders the delivery of adequate analgesia to the elderly population. Many of these fears, including the risk of falls and delirium, appear to be unfounded, based on current research. In fact, good perioperative pain control may actually reduce postoperative delirium and improve perioperative morbidity. The keys to providing safe and effective pain treatment include frequent monitoring for side effects, regular assessment of pain scales, and the assessment of analgesic response allowing for adjustments. The application of non-demand analgesic techniques can help to reduce the need for opioids and reduce their associated side effects. Opioid analgesics remain our best analgesic option, and should not be avoided in the elder patient. Remember, start low, go slow, and reevaluate at frequent intervals to guarantee safety and patient satisfaction.

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Trends of Visits to Rhode Island Emergency Departments for Pediatric Sexual Exposures, 1995-2001

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The Department of Children, Youth and Families investigates claims of child sexual abuse and law enforcement officials provide accounts of the frequency of reported sexual assaults that occur in Rhode Island. However, the incidence and categories of child sexual exposures evaluated in Rhode Island emergency departments (EDs) have not been quantified. An understanding of the frequency of ED visits for pediatric sexual exposures and a delineation of the temporal patterns of these visits are needed. With this information, clinicians, hospitals, policymakers, and agencies that provide support to survivors of sexual violence can better address the needs of this population. This study reports the distribution of pediatric sexual exposures from sexual assault, suspected sexual abuse, and consensual sex evaluated in Rhode Island EDs. The incidence of ED visits for these exposures by year, gender, and age are provided. The temporal patterns of ED visits for these sexual exposures are assessed by day of the month, month of the year, day of the week, and hour of the day.

METHODS

Study Setting and Population

This study included pediatric patients evaluated for known or suspected sexual exposures at the eleven civilian EDs in Rhode Island from January 1995-June 2001 [Hasbro Children's Hospital, Women and Infants' Hospital, and the nine general hospitals (Kent Hospital, Landmark Medical Center, Memorial Hospital of Rhode Island, The Miriam Hospital, Newport Hospital, Our Lady of Fatima Hospital, Roger Williams Medical Center, South County Hospital, and The Westerly Hospital)]. Each hospital's institutional review board approved the study.

Pediatric patients were 17-years-old and younger. ED visits for sexual exposures were categorized as sexual assault, consensual sex, and suspected sexual abuse. Sexual assault was defined as "any contact of an offender with the genitalia of a non-consenting victim."¹ The classification of sexual exposures as consensual

sex was based upon the patient's description of the nature and intent of the sexual encounter. At the time of their ED evaluation, these patients claimed that their sexual encounter was consensual. Suspected sexual abuse constituted evaluations in the ED because a sibling or household member had been sexually assaulted or abused or because a parent or guardian was concerned that sexual abuse or an assault might have occurred. For these evaluations, the child being examined

denied being sexually abused or assaulted or it was unclear or unknown if the child had been sexually abused or assaulted. It is probable that ED visits classified as suspected sexual abuse or consensual sex may truly have been sexual assaults. Because the actual type of sexual encounter could not always be discerned at the time of the ED visit, we classified the exposures based on the report of the evaluation by the examining ED clinician.

Table 1 Pediatric Sexual Exposure ED Visits

	All Patients <i>n</i> =886	Sexual Assault <i>n</i> =679	Suspected Sexual Abuse <i>n</i> =163	Consensual Sex <i>n</i> =44
Median Age (Range)	12 (0-17)	13 (0-17)	4 (0-17)	14 (12-17)
	%	%	%	%
Age				
0 to 5 years	27.8	20.8	64.4	0.0
6 to 11 years	18.2	18.7	20.9	0.0
12 to 17 years	54.0	60.5	14.7	100.0
Gender				
Male	15.5	13.3	27.6	4.6
Female	84.5	86.7	72.4	95.4
Exposure Contact				
Genital Touching or Oral	28.8	36.7	1.2	9.1
Vaginal/Anal	44.5	52.7	0.0	81.8
Unclear/Unknown	26.7	10.6	98.8	9.1
Hospital Type				
Hasbro Children's Hospital	59.5	56.1	73.6	59.1
Women and Infants' Hospital	15.0	18.4	0.6	15.9
General Hospitals ¹	25.5	25.5	25.8	25.0
Year of Presentation				
1995	7.4	7.7	7.4	4.6
1996	12.8	11.2	19.0	13.6
1997	17.1	17.4	16.0	18.2
1998	16.4	15.2	23.3	9.1
1999	20.1	21.0	17.8	13.6
2000	16.9	17.5	11.6	27.3
2001 ²	9.3	10.0	4.9	13.6
Hours Elapsed Since Exposure³	<i>n</i> =638	<i>n</i> =580	<i>n</i> =21	<i>n</i> =37
<24	33.7	33.4	57.1	24.3
24-48	29.0	29.1	19.0	32.5
49-72	10.3	10.2	4.8	16.2
>72	27.0	27.3	19.1	27.0

¹ Fatima, Kent, Landmark, Memorial, Miriam, Newport, Roger Williams, South County, and Westerly

² January-June 2001

³ Hours elapsed since exposure was not available for all patients.

Table 2 Rates of Child Sexual Exposure ED Visits

All Pediatric Sexual Exposure ED Visits per 100,000 RI Children ²		
Age	0 to 17 years	0 to 17 years
	Unadjusted	Adjusted
Year	IR (95% CI)	IR (95% CI)
1995	27.8 (21.1, 34.5)	31.6 (24.5, 38.8)
1996	47.8 (39.0, 56.6)	55.8 (46.3, 65.4)
1997	64.0 (53.9, 72.2)	77.1 (65.9, 88.3)
1998	61.2 (51.2, 71.1)	63.3 (53.1, 73.4)
1999	73.8 (63.0, 84.6)	75.9 (64.9, 86.9)
2000	60.5 (50.8, 70.1)	62.9 (53.0, 72.7)
2001 ¹	66.1 (56.0, 76.2)	71.3 (60.8, 81.9)
1995-2001	52.6 (49.1, 56.0)	62.7 (58.9, 66.4)

¹For January-June 2001, visits were doubled to approximate a full year

²RI Children Population Estimates: Population Estimates Program, Population Division, U.S. Census Bureau, Washington, DC 20233

Case Selection

Hospital billing databases were searched using International Classification of Disease, Ninth Revision, Clinical Modification (Department of Health and Human Services, 6th Edition, 2001) (ICD-9) codes to identify these visits. For pediatric sexual exposures, these codes were 995.53 (child sexual abuse), 995.83 (adult sexual abuse), E.960.1 (rape), V15.41 (rape), and V71.5 (observation following rape). Four EDs had separate ED provider and hospital billing databases. These separate billing databases were searched independently to maximize capture of patient visits. For these four hospitals, the two databases were merged, the duplicates removed, and a single list of visits was generated. For all other hospitals, the sole source for cases was the hospital's billing database. One hospital did not have records of visits prior to 1998 available for review. Based on the data for 1998-2001, this hospital would likely have evaluated about nine

Table 3 Pediatric Sexual Exposure ED Visits by Year, Age and Gender

Sexual Assaults ED Visits per 100,000 RI children ²								
Age	0 to 5 years old		6 to 11 years old		12 to 17 years old		0 to 17 years old	
	Female	Male	Female	Male	Female	Male	Female	Male
Year	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)
1995	25.2 (9.8, 40.8)	9.5 (0.2, 18.8)	20.7 (6.3, 35.0)	7.3 (0.0, 15.6)	70.3 (43.3, 97.3)	2.6 (0.0, 7.6)	38.1 (26.9, 49.4)	6.6 (2.0, 11.1)
1996	31.2 (13.6, 48.9)	7.4 (0.0, 15.7)	38.1 (18.8, 57.3)	12.0 (1.5, 22.5)	107.5 (74.2, 140.8)	2.6 (0.0, 7.6)	58.2 (44.3, 72.2)	7.4 (2.6, 12.3)
1997	50.7 (27.9, 73.5)	17.6 (4.6, 30.7)	54.7 (31.8, 77.8)	9.4 (0.2, 18.6)	189.2 (127.7, 250.6)	5.0 (0.0, 12.0)	90.9 (73.5, 108.3)	10.7 (4.9, 18.5)
1998	38.4 (18.3, 58.4)	12.9 (1.6, 24.3)	23.0 (7.1, 39.0)	11.6 (1.4, 21.8)	172.9 (131.2, 214.6)	12.5 (1.5, 23.5)	80.4 (63.6, 97.2)	12.3 (6.1, 18.6)
1999	43.8 (22.3, 65.2)	28.5 (11.6, 45.3)	52.9 (30.8, 75.0)	15.9 (4.1, 27.7)	211.2 (165.7, 256.6)	9.7 (0.2, 19.2)	103.0 (84.7, 121.4)	17.8 (10.3, 25.2)
2000	63.1 (37.8, 88.3)	25.2 (9.6, 40.9)	30.5 (13.9, 47.1)	11.1 (1.4, 20.8)	161.9 (122.0, 201.3)	4.7 (0.0, 11.2)	84.5 (68.1, 100.8)	13.4 (7.0, 19.7)
2001 ¹	26.7 (10.2, 43.3)	5.1 (0.0, 12.2)	28.2 (12.2, 44.1)	17.8 (5.5, 30.2)	250.6 (201.8, 299.2)	4.6 (0.0, 11.0)	102.7 (84.6, 120.8)	9.4 (4.1, 14.8)
1995-2001	39.7 (32.1, 47.3)	15.1 (10.5, 19.6)	35.7 (28.7, 42.7)	12.2 (8.3, 16.2)	165.0 (149.7, 180.3)	6.0 (3.1, 8.8)	79.9 (73.8, 86.1)	11.1 (9.8, 13.3)

Suspected Sexual Abuse ED Visits per 100,000 RI children ²								
Age	0 to 5 years old		6 to 11 years old		12 to 17 years old		0 to 17 years old	
	Female	Male	Female	Male	Female	Male	Female	Male
Year	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)	IR (95% CI)
1995	20.1 (6.2, 34.1)	7.1 (0.0, 15.2)	2.6 (0.0, 7.7)	0	0	0	6.9 (2.1, 11.7)	2.5 (0.0, 5.3)
1996	26.0 (9.9, 42.2)	14.7 (2.9, 26.6)	12.7 (1.6, 23.8)	9.6 (0.2, 19.0)	10.7 (0.2, 21.3)	5.1 (0.0, 12.2)	8.7 (3.3, 14.1)	4.9 (1.0, 8.9)
1997	24.0 (8.3, 39.7)	22.7 (7.9, 37.5)	9.9 (0.7, 19.7)	2.4 (0.0, 7.0)	7.9 (0.0, 16.9)	0	7.8 (2.7, 12.9)	7.4 (2.6, 12.2)
1998	54.8 (30.8, 78.8)	18.1 (4.7, 31.5)	11.5 (0.2, 22.8)	2.3 (0.0, 6.9)	10.5 (0.2, 20.7)	5.0 (0.0, 11.9)	18.3 (10.3, 26.3)	5.8 (1.5, 10.0)
1999	46.5 (24.4, 68.6)	5.2 (0.0, 12.3)	16.8 (4.4, 29.3)	0	7.6 (0.0, 16.3)	0	14.5 (7.6, 21.4)	1.6 (0.0, 3.9)
2000	18.4 (4.8, 32.0)	7.6 (0.0, 16.1)	4.7 (0.0, 11.2)	6.64 (0.0, 14.2)	7.5 (0.0, 15.9)	2.4 (0.0, 7.0)	5.8 (1.5, 10.1)	2.4 (0.0, 5.0)
2001 ¹	16.0 (3.2, 28.9)	5.1 (0.0, 12.2)	9.4 (0.2, 18.6)	0	9.8 (0.2, 19.5)	0	5.0 (1.0, 8.9)	1.6 (0.0, 3.7)
1995-2001	29.1 (22.6, 35.7)	11.5 (7.5, 15.5)	9.6 (6.0, 13.3)	3.0 (1.0, 4.9)	7.8 (4.4, 11.1)	1.8 (0.2, 3.3)	9.5 (7.3, 11.6)	3.7 (2.4, 5.0)

Consensual Sex ED Visits per 100,000 RI Children ²		
Age	12 to 17 years old	
	Female	Male
Year	IR (95% CI)	IR (95% CI)
1995	5.4 (0.0, 12.9)	0
1996	16.1 (3.2, 29.0)	0
1997	21.1 (6.5, 35.8)	0
1998	10.5 (0.2, 20.7)	0
1999	12.7 (1.5, 23.9)	2.4 (0.0, 7.2)
2000	27.4 (11.2, 43.6)	2.4 (0.0, 7.0)
2001 ¹	29.5 (12.8, 46.2)	0
1995-2001	15.5 (10.8, 20.2)	0.7 (0.0, 1.7)

¹For January-June 2001, visits were doubled to approximate a full year

²RI Children Population Estimates: Population Estimates Program, Population Division, U.S. Census Bureau, Washington, DC 20233

pediatric patients for sexual exposures during 1995 to 1997.

Data Collection and Processing

Medical records were searched for all patient visits identified by the ICD-9 code-directed database query. Each medical record was reviewed; visits for pediatric sexual exposures were included in this study. Repeat or follow-up visits for the same exposure were excluded. The age and gender of the patient, the category of sexual exposure, type of exposure (genital touching only, oral contact only, vaginal/anal intercourse), time of exposure and ED presentation, and hospital type were recorded on a standardized form. Two trained research assistants independently entered each form into an Epi Info 2002 (Centers for Disease Control and Prevention, Atlanta, GA) database and then performed a data comparison analysis to verify that all forms were entered correctly. Incorrect entries were corrected and subsequent analyses were performed on this verified database.

Data Analysis

The data were analyzed using STATA 9.2 (Stata Corporation, College Station, TX). For each of the three sexual exposure categories, the patients' age and gender, the characteristics of the sexual encounter, and location of their ED evaluation were described using summary statistics. Pediatric patients were divided into three six-year age groups: 0 to 5 years-old, 6 to 11 years-old, and 12 to 17 years-old. Using U.S. Census Bureau Rhode Island child population estimates, annual unadjusted **incidence rates (IRs)** of ED visits for these exposures (per 100,000 Rhode Island children) with 95% **confidence intervals (CIs)** were estimated for each sexual exposure category, as stratified by gender and age. For 2001, the January-June incidence was doubled to approximate the incidence for a full year. **Incidence rate ratios (IRRs)** with 95% CIs were used to compare unadjusted sexual exposure ED visits rates by sexual exposure category, age, and gender.

Adjusted IRs of ED visits for all child sexual exposures in Rhode Island were estimated by accounting for missing cases. Cases were missing because the medical records no longer existed or

Table 4 Cyclic Variation of Pediatric Sexual Exposure ED Visits

	Seasonality Test		Goodness of Fit	
	Σ^2	<i>p-value</i>	Σ^2	<i>p-value</i>
Month of Year	11.44	0.003	59.07	<0.0001
Day of the Month	4.37	0.112	46.48	0.028
Day of Week	11.44	0.003	1.89	0.930
Hour of Day	238.47	<0.0001	61.67	<0.0001

could not be located. The number of child sexual exposure cases for each year was adjusted by using estimates of the number of cases that would have been expected if the medical records were available for review. For the hospital with records unavailable for review from 1995-1997, the estimated number of cases for each of these years was imputed from the average number of cases per year from 1998-2001 data for this hospital. The estimated number of sexual exposure cases that would have been expected if all medical records could be located from each hospital for all years of the study was also calculated. For this estimate, the total number of sexual exposure cases was the number of known sexual exposure cases from the medical record review plus the number of expected number of cases from the medical records that were unavailable for review. The expected number of cases from records unavailable for review was the proportion of medical records reviewed at each hospital that were in fact sexual exposure cases multiplied by the number of records unavailable for review at that hospital for each year of the study. For example, if 90% of the medical records identified in the ICD-9 code search reviewed from a given hospital were verified as sexual exposures, and there were 10 medical records that could not be located for 1999 for that hospital, then there would be nine sexual exposure cases added to the known number of sexual exposure cases for that year. Because details on the missing cases were not available, we could not calculate adjusted IRs for each sexual exposure category.

Plots of the unadjusted frequency of ED visits for pediatric sexual exposures by month of the year, day of the month, day of the week, and hour of the day were created using R 2.5.1 (<http://www.r-project.org/>). Missing cases were not im-

puted. The Walter & Elwood seasonality test was used to identify cyclic patterns in pediatric sexual exposure ED visits over time. Goodness of fit testing was employed to assess the strength of the evidence for these patterns, based upon the available data.

RESULTS

ICD-9 Code Search Results

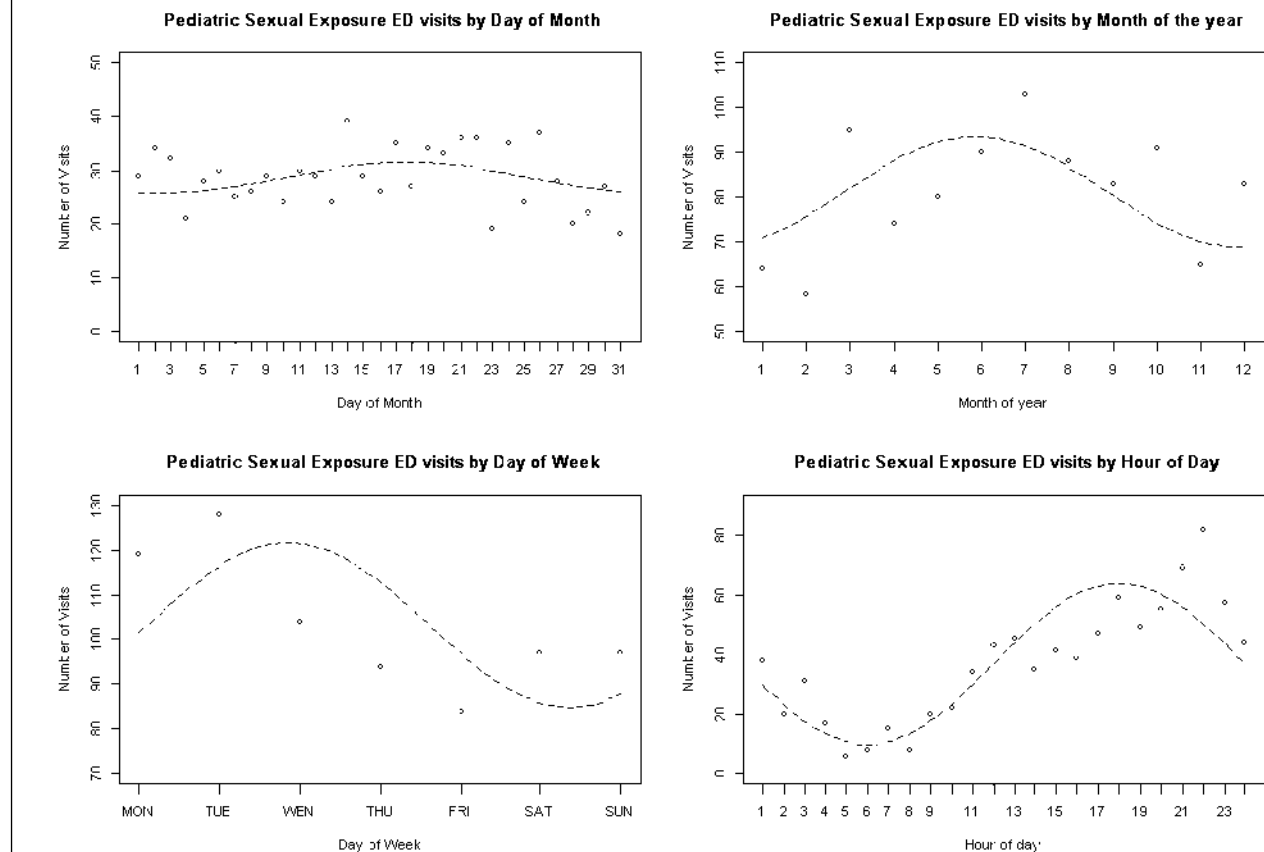
The ICD-9 code search revealed 1,101 potential ED visits for pediatric patients with sexual exposures. Of these, 1,020 (92.6%) were available for review and 886 (86.9%) of these were verified as patients with visits for sexual exposures, either through sexual assault, suspected sexual abuse or consensual sex. The remaining 134 patients had other diagnoses that were not related to a sexual exposure that constituted mistakes in ICD-9 coding.

Pediatric Sexual Exposures Evaluated in Rhode Island EDs

Of the 886 pediatric patients with ED visits for sexual exposures, their median age was 12 years-old (inter-quartile range: 5 to 15-years-old) (Table 1). The vast majority (84.5%) of patients were girls and over half of all patients presented to the Hasbro Children's Hospital ED (59.5%). Among patients for whom the time elapsed since the exposure was known (72.0%), most presented within 72 hours (73.0%).

Sexual assaults accounted for the largest proportion of the exposures (76.6%). The demographic characteristics of the patients varied across the sexual exposure categories. Suspected sexual abuse evaluations generally involved young children who were likely not old enough to provide a history of what had occurred (median age: 4 years-old, interquartile range: 2 to 9-years-old). For a far greater proportion of these patients than those in other categories, the

Figure 1



exposure type was classified as unclear or unknown (98.8%). In addition, the proportion of boys in this category was more than twice the proportion of boys in the other categories. The consensual sex exposure category involved a different subset of the pediatric population; it only involved older patients (median age of 14, range 12 to 17-years-old), and was almost exclusively girls. Most of these exposures involved vaginal/anal intercourse (81.1%).

Adjusted IRs of ED Visits for Pediatric Sexual Exposures

The adjusted IRs of ED visits for all pediatric sexual exposures in Rhode Island was estimated by year after accounting for missing cases (Table 2). The average IR of ED visits for sexual exposures was 62.7 cases per 100,000 for all children in Rhode Island. The annual IRs increased from 1995 to 1997 and then stabilized over 1997 through 2001. There was a lower IR for visits for these visits for 1995 compared to all other years, but limitations in our case finding methodology could be responsible for this apparent difference.

Unadjusted IRs of Pediatric Sexual Exposures ED Visits by Age, Gender, and Exposure Category

The unadjusted annual IRs of ED visits by sexual exposure category (sexual assault, suspected sexual abuse, and consensual sex) per 100,000 children in Rhode Island are reported in Table 3. There were no clear trends of visits by year across or within the three exposure categories. Across sexual exposure categories, the highest rates of ED visits were for sexual assaults. Among girls, the incidence of ED visits was greater for sexual assault than suspected sexual abuse (IRR 8.2 [6.6-10.3]) and consensual sex (IRR 5.0 [4.2-6.0]). Among boys, the incidence of ED visits was greater for sexual assault than suspected sexual abuse (IRR 3.0 [2.1-4.5]) and consensual sex (IRR 15.9 [7.4-40.4]).

Within sexual exposure categories, there were differences in IRs of ED visits by gender and age. Girls had higher rates of ED visits than males within each exposure category (sexual assaults: IRR 7.2 [5.9-

8.9], suspected sexual abuse: IRR 2.6 [1.7-3.9], and consensual sex: IRR 22.1 [10.5-56.0]). Among sexually assaulted girls, 12- to 17-year-olds had the highest IR for ED visits. The incidence of ED visits for sexual assaults for girls 0 to 5-years-old was similar to girls 6 to 11-years-old (IRR 1.1 [0.7-1.7]). Boys had similar rates of ED visits for sexual assault across the three age groups. The highest IRs of ED visits for suspected sexual abuse were highest among girls and boys 0 to 5-years-old. The incidence of ED visits for consensual sex was higher for 12-17-year-old girls than boys (IRR 22.1 [11.9-infinity]).

Temporal Patterns of ED Visits for Pediatric Sexual Exposures

Plots of the frequency of ED visits for sexual exposures are presented in Figure 1 and the results of the Walter & Elwood seasonality tests are shown in Table 4. The greatest incidence of ED sexual exposure visits occurred during the summer months, with a peak in June and a nadir in December/January. Sexual exposure ED visits were relatively constant by day of the month.

There was a peak in visits on Wednesdays and a nadir on Saturdays. Visits occurred primarily in the evening (peak 6 p.m., nadir 6 a.m.). Although the Walter & Elwood seasonality tests indicated cyclic variations by month, week, and hour of the day, goodness of fit testing suggested that the available data only supported the presence of variations by day of the week.

DISCUSSION

Incidence rates of ED visits for all pediatric sexual exposures in Rhode Island remained stable between 1996 and 2001. Given that most visits were for sexual assault, these data indicate that community-based interventions are needed to reduce the frequency of sexual assault among children in the state. ED visits for pediatric sexual exposures appear to be more frequent in the middle of the week, during evening hours, and during the summer months. The Rhode Island Domestic Violence Training and Monitoring Unit (DVU), which compiles police statistics on domestic violence and sexual assault, also found that reported sexual assaults peak during the summer months.^{2,3} EDs and agencies that provide services for sexual assault survivors should be aware of these patterns in their plans to render care for these patients.

Female adolescents have the highest rate of ED visits for sexual assault; they constitute a population for whom interventions to reduce this incidence are gravely needed. Although the majority of ED visits in Rhode Island for pediatric sexual exposures were for reported sexual assault, a sizeable proportion were for suspected sexual abuse, which can be difficult cases to unravel. The sexual exposure occurred more than 72 hours prior for 27% patients and for another 27%, the events of the exposure were unknown or unclear. These aspects make forensic evaluations and prophylactic decision-making in the ED challenging and underscore the importance of evaluations by pediatric sexual assault forensic experts.

ED visits for sexual exposures represent a small proportion of pediatric patients who are sexually victimized. Using US Department of Justice estimates obtained through the National Crime Victimization Survey (NCVS) as a reference, an average of 28% (range 15-38%) of sexually assaulted 12 to 15 year-olds

present to Rhode Island EDs for medical care.^{4,9} While only a fraction of pediatric sexual exposures result in ED visits, even fewer cases are reported to the police. Using State of Rhode Island law enforcement estimates as a reference, fewer than half of child sexual assaults and molestation are reported to police departments in Rhode Island.^{2,3} Interventions to encourage sexually victimized children and their parents to seek medical treatment shortly after the event and to report the victimization to law enforcement officials are also needed.

This study's findings should be interpreted in the context of its limitations. The data were collected from patient medical records, and thus are subject to documentation failures. Classification of patients into exposure categories was occasionally also limited by the information recorded in the medical records, but in general, enough information was available for the analyses. Some patient records could not be located, which necessitated estimating the impact of missing cases. Assumptions regarding missing cases, although reasonable, cannot be verified. The study cannot estimate the frequency with which patients present to other providers, such as the Hasbro Children's Hospital Child Protection Team, for evaluation of their sexual exposures. However, the study's focus was on the frequency of ED visits for these exposures.

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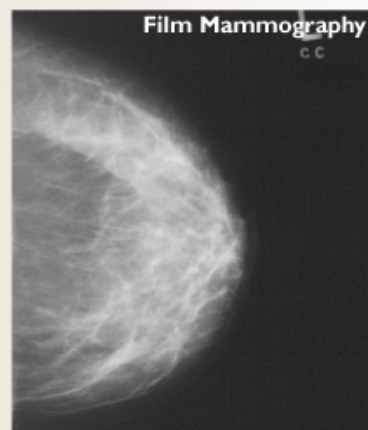
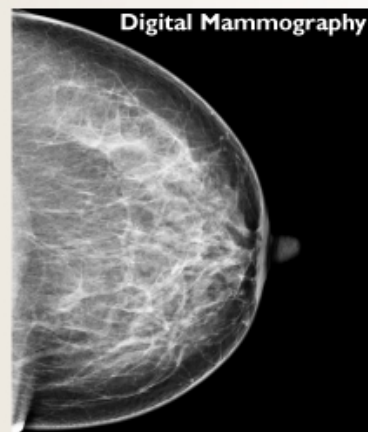
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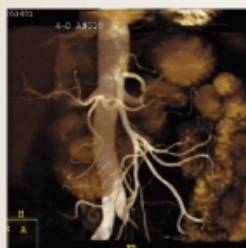
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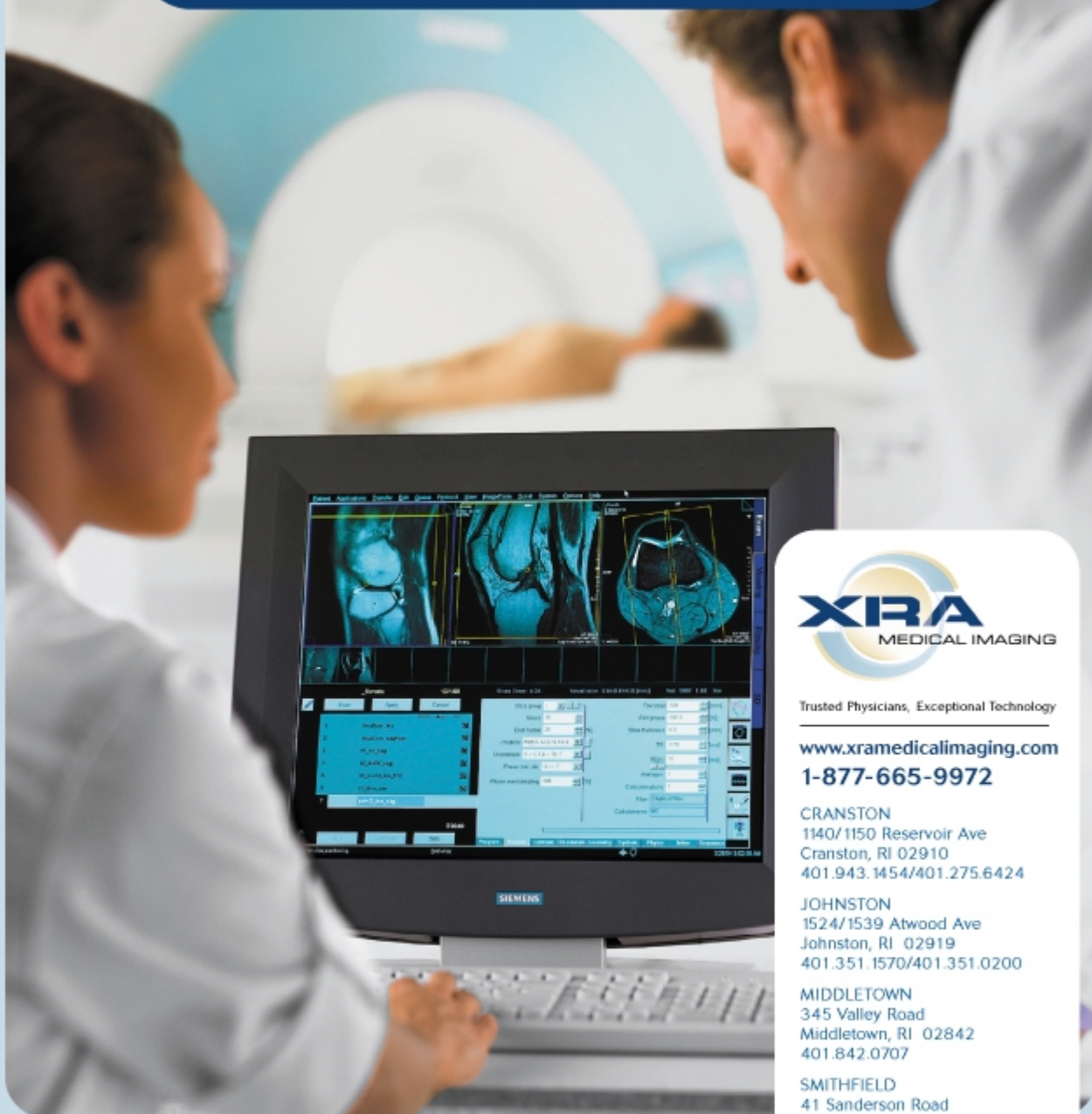
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Medical Intervention For Displaced Hurricane Katrina Victims Airlifted to Rhode Island

Kristina McAteer, MD, Lawrence Proano, MD, FACEP, DTM, and Robert Partridge, MD, MPH

On Tuesday, August 23, 2005, at 5:00 pm Eastern Daylight Time (EDT) tropical depression twelve formed over the south-eastern Bahamas, which was then upgraded to Hurricane Katrina by the FEMA National Response Coordination Center.⁵ Landfall was recorded on Monday, August 29, 2005 at 6:10 am Central Daylight Time (CDT) near Buras Triumph, Louisiana, with winds of more than 125 mph.⁵ By August 30th, it was clear the New Orleans levee breaches could not be plugged; and Governor Blanco ordered that all of New Orleans, including the Superdome, be evacuated secondary to flooding.⁵ Nearly 80% of the city was underwater by August 31st and the sandbagging of the 17th street canal levee was declared a failure.⁷ Approximately 1.5 million people were evacuated from damaged areas in Louisiana.⁷ Thousands were evacuated to neighboring states, including Texas, Mississippi, and Georgia in the days after the hurricane.⁷

The Rhode Island Department of Health (RI DOH) contacted Rhode Island Disaster Medical Assistance Team (RI DMAT) in the early days of September to discuss the possibility of receiving up to four hundred evacuees from the Gulf Region. Members from both the RI DMAT and the Rhode Island Medical Reserve Corps prepared a medical triage area at the Quonset Point Air National Guard Base, where the evacuees were scheduled to arrive on September 9, 2005. All evacuees were to be offered free medical screening and acute treatment by the physicians, nurses and support staff of the RI DMAT. This paper describes the medical screening, treatment and placement of Hurricane Katrina evacuees who were airlifted to Rhode Island.

METHODS

The investigation was observational in design. A retrospective chart review was performed for all evacuees who utilized the Disaster Field Hospital at the Quonset Point Air National Guard Base, North Kingstown, on the day of arrival and the

follow-up medical clinic from September 9 – 16, 2005. The RI DMAT team established a medical clinic in Middletown to provide follow-up care for the evacuees. The clinic opened on Saturday, September 10, 2005 at 8:00 am to begin processing arriving evacuees. The work was completed in a week and the clinic closed the following Friday, September 16, 2005 at 12:00 pm. It was staffed by volunteer physicians, nurses, **emergency medical services (EMS)** personnel and administrative personnel, all of whom were DMAT members. The clinic, established in a construction trailer, was open from 8:00 am to 6:00 pm Monday through Thursday, from 8:00 am to 12:00 pm on Friday. The day was divided into two shifts, 8:00 am to 1:00 pm and 1:00 pm to 6:00 pm, and was staffed by two physicians per shift, four to six nurses and at least two prehospital care providers. In addition, the weekend of September 10th and 11th, a local ambulance service provided an **advanced life support (ALS)** ambulance and a wheelchair van. During the weeklong operation, a triage desk was set up in the trailer, staffed by a nurse and an administrative assistant to greet evacuees. A private exam room was equipped with a cardiac monitor, oxygen, and advanced life support medications and could provide nearly all emergency medical procedures including advanced airway management, intravenous access, cardiac monitoring, electrocardiography, and splinting and wound management. Laboratory capabilities were available via regional hospitals. A separate room was designated for supplies and conference space. In a larger space within the trailer two additional stretchers were set up. A Zumro® rapidly deployable tent was set up outside the trailer with four stretchers, a table for interviewing and for additional screening. This was staffed with two nurses and/or pre-hospital care providers, and if needed, a physician. Pharmacy services were provided at no cost to patients by a major pharmacy chain based in Rhode Island; vision services were also provided free of charge by a local optometry center. Co-

operation from mental health workers and the American Red Cross supplemented the RI DMAT team core structure. A traveling team provided home visits to follow up with patients requiring wound checks, provide blood pressure checks and deliver medications that were provided by pharmacy support. The traveling team was comprised of a physician, a nurse and an emergency medical technician. The staffing of the clinic was a cooperative effort of several entities and disciplines, including the Rhode Island Medical Reserve Corps, the RI DMAT, Newport Hospital (providing some nurses and lab technicians), as well as Memorial Hospital of Pawtucket, Rhode Island, which provided a volunteer physician to work the full week in the clinic. In addition, Blue Cross/Blue Shield of Rhode Island provided another volunteer physician. Rhode Island Hospital provided two volunteer paramedics and a physician. Nearby local primary care physicians volunteered their time to see patients in their private offices and to provide follow up care for patients with chronic medical conditions.

Investigators abstracted demographic data, chief complaints, medical histories, medical management, final diagnoses and final disposition from the clinic charts. The final diagnosis was relevant to the chief complaint. Outcome data included whether the patient was referred to follow up care, what type of care was offered (mental services, vision services, etc), if an immediate medical transport was required and if patients were provided with prescriptions for medicines.

As an anonymous chart review, this investigation was granted an exemption from full review by the Rhode Island Hospital institutional review board.

RESULTS

At approximately 7:20 pm on September 9, 2005, the State of Rhode Island welcomed 106 evacuees airlifted from Louisiana. All evacuees were initially triaged. Fifty two patients (49.1%) received care in the Disaster Field Hospital at the airport. Two patients (1.9%)

were referred immediately to hospital emergency departments after medical screening and stabilization.

In the following days, additional evacuees arrived in Rhode Island from Louisiana. From September 9-16, 2006, a total of 136 patients were evaluated and treated at the DMAT facility. Ages ranged from 1 month to 90 years, with an average age of 42, and a median age of 46. Twenty-five patients (18.4%) were children (less than 18 years of age). The 136 patients requiring care presented for a total of 237 visits, averaging 30 visits per day; 26 (19.1%) patients required 2 visits, 18 (13.2%) patients required 3 visits, 6 (4.4%) required four visits, 3 (2.2%) required 5 visits and 1 patient (0.7%) patient had 6 visits. During the initial visit patients presented with one or more chief complaints. The most common chief complaint was for chronic or minor medical problems (hypertension, diabetes, hyperlipidemia) (44 visits), followed by dermatologic complaints (32 visits), neurologic/psychiatric complaints (26), general medical screening (25), pulmonary complaints (22 visits), and musculoskeletal problems (16 visits). There were Head/Eyes/Ears/Nose/Throat complaints (16 visits), cardiovascular problems (6 visits), gastrointestinal complaints (10 visits), obstetrical/genitourinary complaints (6 visits) and infectious disease complaints (3 visit). (Table 1)

During the week of operation, 4 (2.9%) additional patients were transferred from the DMAT facility to a hospital emergency department, and one patient was referred directly to a nursing home. Forty-eight patients (35.3%) were referred to a primary care provider. Thirty-one (22.8%) patients were advised to return to the DMAT clinic within 48 hours for a re-check. Seventeen (12.5%) patients were referred urgently to specialty care (orthopedics, ophthalmology, neurology, psychiatry, obstetrics, and dentistry). 106 of 138 (77.9%) initial patient contacts resulted in at least one prescription for medication.

DISCUSSION

Hurricane Katrina was one of the largest natural disasters in US history, resulting in the displacement of more than half of the population of New Orleans. Evacuees were transported by ground to nearby States, and by air to more distant States. Although a few reports in the medical literature address the needs of Katrina evacuees, these reports have focused on health conditions of sheltered persons, needs assessments, and emergency response planning for displaced populations.^{1,2,3} This is the first paper to describe the acute medical evaluation and treatment of a cohort of evacuees airlifted to a distant State.

Large proportions of evacuees had both acute and chronic medical problems. Many evacuees had acute problems that had developed since the disaster, and many needed their regularly prescribed medications. Major medical problems and major traumatic injuries were not seen, because FEMA permitted only persons fit enough to travel by air from New Orleans. The data described here provide information for physicians, nurses and emergency medical personnel planning medical support activities during future disaster relief efforts.

CHALLENGES

An important component of disaster relief is assessment of the medical program.⁴ Several lessons were learned during this operation. First, populations evacuated by air from disaster areas will require urgent access to health services, and these can be provided on-scene at the airport. Patients will be of varying ages, with chronic illnesses, and on multiple medications. One of the challenges facing health screeners is a paucity of information on these patients, many of whom have little or

TABLE 1. Medical conditions of RI Hurricane Katrina Evacuees

Medical Conditions	Number of cases	Re-Checks
HEENT		
Epistaxis	1	
Sinusitis	1	
Sinus Congestion	1	
Headache	4	
Otitis Media	1	
Dental Pain	1	
Seasonal Allergies	3	
Hordeolum	1	
Needs replacement eye glasses	3	
Cardiovascular		
Chest Pain	2	1
Congestive Heart Failure	2	1
Venous Stasis Ulcers	1	
Coronary Artery Disease	1	
Pulmonary		
Upper Respiratory Infection	7	
Obstructive Sleep Apnea	2	
Asthma	10	1
COPD exacerbation	2	
Bronchitis	1	
Infectious Disease		
Dog Bite	3	
Dermatologic		
Contusion	3	1
Folliculitis	1	1
Abrasion	3	
Rash	4	4
Abscess	3	4
Dermatitis	2	2
Tinea Cruris	1	
Insect Bites	3	
Cellulitis	3	
Scabies	1	
Blister	2	3
Diaper Rash	1	
Puncture Wound to Foot	1	
Ulcer	1	
Seborrheic Keratosis	1	
Eczema	1	
Tinea Munguim	1	
Neuro/Psych		
Insomnia	3	
Substance Abuse	5	
Anxiety	7	1
Bipolar	1	
Depression	5	
Grief Reaction	1	
Seizure Disorder	3	
Attention Deficit Hyperactivity Disorder	1	
Gastrointestinal		
abdominal pain	1	
Hemorrhoids	1	
GERD	6	
Gastroenteritis	2	
Musculoskeletal		
Back pain	4	
Arm pain	1	
Joint Sprain	4	1
Calcaneal fracture	1	3
Osteoarthritis	4	1
Muscle spasm	2	
Minor/chronic medical complaints		
Medication refill	1	
Anemia	2	
Diabetes mellitus	8	4
Hyperlipidemia	4	
Rheumatoid arthritis	1	

no access to or memory of details regarding their prior medical conditions and medications. Maintenance of patient confidentiality within a tightly knit relief community is also paramount. The cooperation of multiple entities contributed significantly to the success of this effort. Having not only care providers with multiple levels of training, but representatives from the RIDAMT, RI State government, RI Department of Health and industry permitted rapid, high quality care with accessible follow-up for the displaced population.

This event and mission affirm the diverse capabilities and utility of EMTs, nurses and emergency physicians, in the disaster setting. Similar future missions may substantiate the value of emergency medical personnel in disaster management and relief.

LIMITATIONS

This retrospective descriptive study is subject to the limitations of this type of study design. The medical database validity may have been influenced by variability between different clinicians who treated patients, and whose data recording may have been disparate in content or completeness. The diagnosis and treatment validity are subject to the limitations inherent in the delivery of emergency care in a disaster setting. In addition, the setting and conditions for this study may be different than that resulting from other natural disasters, and the results presented may not be generalizable to other populations evacuated by air from other disasters.

Finally, the disaster relief workers in this study are members of a specific US government organization, and may be more homogeneous than in other international efforts where diverse governmental and nongovernmental organizations provide the relief work. As such, the frequency and nature of medical conditions encountered in other disaster relief workers populations may be different than those described in this study.

CONCLUSIONS

This paper describes the acute medical evaluation and treatment of a cohort of Katrina evacuees airlifted to a distant State. About half of the evacuated population immediately used medical care. A significant percentage of those needing evaluation were children. Minor medical complaints and lack of medications for chronic medical problems were common. Immediate hospital transfer was rare. In the week following the airlift, significant proportions of the evacuated population were advised to return for re-evaluation within 48 hours or follow up with a specialist. Data from this study may be useful for organizations preparing to receive disaster evacuees airlifted from distant locations.

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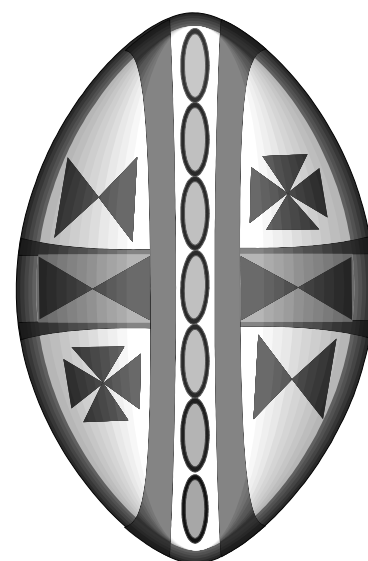
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Disclosure of Financial Interests

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The Creative Clinician

Intracerebral Aspergillosis

David L. Ain, Eleni Patrozou, MD, Edward Feller, MD, Suzanne de La Monte, MD, MPH, and Maria Mileno, MD

Diagnosis of central nervous system (CNS)

aspergillosis requires a high degree of suspicion, because fungal CNS infections frequently resemble pyogenic abscesses or malignancy. Laboratory findings do not always confirm the diagnosis, and neurological imaging is expected to be helpful.

We report a case of intracerebral aspergillosis in an immuno-compromised patient at high risk for pyogenic abscesses and malignant metastases, which highlights the non-specific and potentially misleading imaging features of suspected space-occupying intracerebral lesions.

A 44-year old man with recurrent head and neck cancers presented with acute onset of confusion and lethargy. The patient had a history of adenocarcinoma of the left parotid gland with bilateral nodal recurrence, requiring radiation and extensive neck dissection surgeries. He subsequently developed a squamous-cell carcinoma of the tongue, metastatic to the submandibular gland. He was receiving palliative treatment with weekly methotrexate and dexamethasone, 20 mg three times per day.

In the **emergency room (ER)**, the patient was afebrile. Examination was notable for Cushingoid appearance and absence of focal neurologic signs. The white blood cell count was $6.4/\text{mm}^3$ with 87% neutrophils and 7% bands. CT of the brain done without contrast showed multiple foci of abnormal low density; there were at least two in the right frontal lobe deep white matter, one in the left frontal lobe deep white matter, and another in the left anterior internal capsule. (Figure 1) The presumed diagnosis was multifocal metastatic disease, and the steroid dose was increased for vasogenic edema control. Subsequent brain MRI with gadolinium enhancement demonstrated multifocal ring-enhancing parenchymal lesions. The restriction seen on T2 MRI was felt to be more consistent with abscesses. (Figure 2)

Notably, two sets of blood cultures drawn at admission grew *Enterococcus*.

Antibiotics were initiated for the bacteremia and presumed septic brain emboli. However, the patient deteriorated rapidly. Because of multiple risk factors for invasive fungal disease, liposomal amphotericin B was initiated on day 3 of hospitalization. He died a week after admission. Histopathologic diagnosis of intracerebral aspergillosis was confirmed post-mortem. (Figures 3 and 4)

DISCUSSION

Disseminated aspergillosis most commonly develops in patients with hematologic malignancies or the acquired immuno-deficiency syndrome, or in transplant recipients.¹

Few cases of intracerebral aspergillosis in non-neutropenic patients with solid tumors, such as this patient, have been reported.²

This patient was on long-standing high-dose steroids, as part of his chemotherapy regimen. Data suggest a dose-dependent increase in the risk of invasive fungal disease with corticosteroid therapy; the level of glucocorticoid exposure required for predisposition to invasive fungal disease is unclear.³ Corticosteroids remain an under-estimated risk factor for disseminated aspergillosis. Moreover, the systemic effects of corticosteroids may lead to delayed presentation and recognition of CNS fungal infections due to the anti-inflammatory properties of glucocorticoids.¹

A high level of suspicion for intracerebral aspergillosis is critical because clinical findings can be non-specific, mimicking encephalopathy, intracranial malignancy, and bacterial emboli. Invasive CNS aspergillosis poses a formidable diagnostic challenge and therapies have limited efficacy so early diagnosis and initiation of therapy is critical.

Laboratory studies are frequently inconclusive in the diagnosis of intracerebral aspergillosis, and clinicians often rely on neuroimaging. CT findings may be nonspecific, and while the MRI appear-

ance of intracerebral aspergillosis has been described, imaging findings in immunocompromised patients can have decreased diagnostic utility, as enhancement and perifocal edema are sometimes not seen in these patients.^{4,5,6} Using MRI in immunocompromised patients, intracerebral aspergillosis is suggested by multiple moderate- or large-sized lesions with low to isointense signal on T2-weighted imaging, and high signal intensity on T1-weighted imaging.⁷

Because of these limitations, research has focused on the use of PET imaging to differentiate benign from malignant ring-enhancing lesions. A recent pilot study sug-

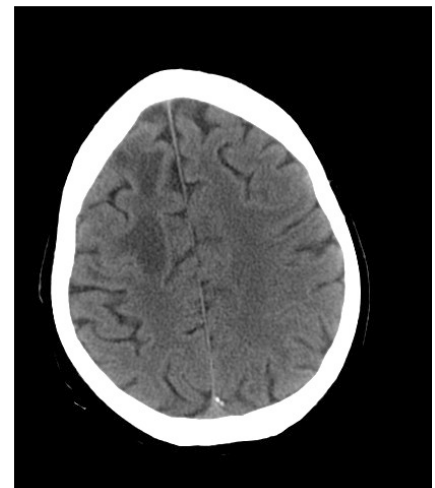


Figure 1.

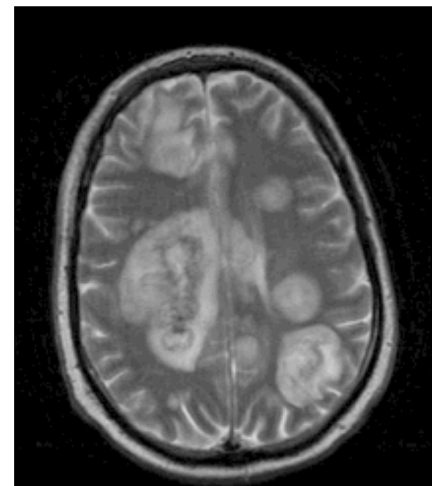


Figure 2.

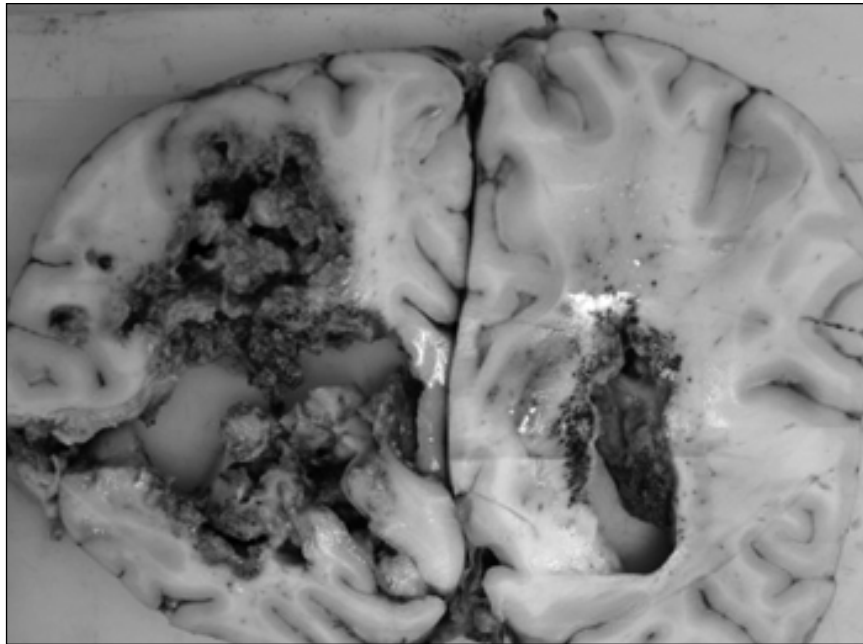


Figure 3.

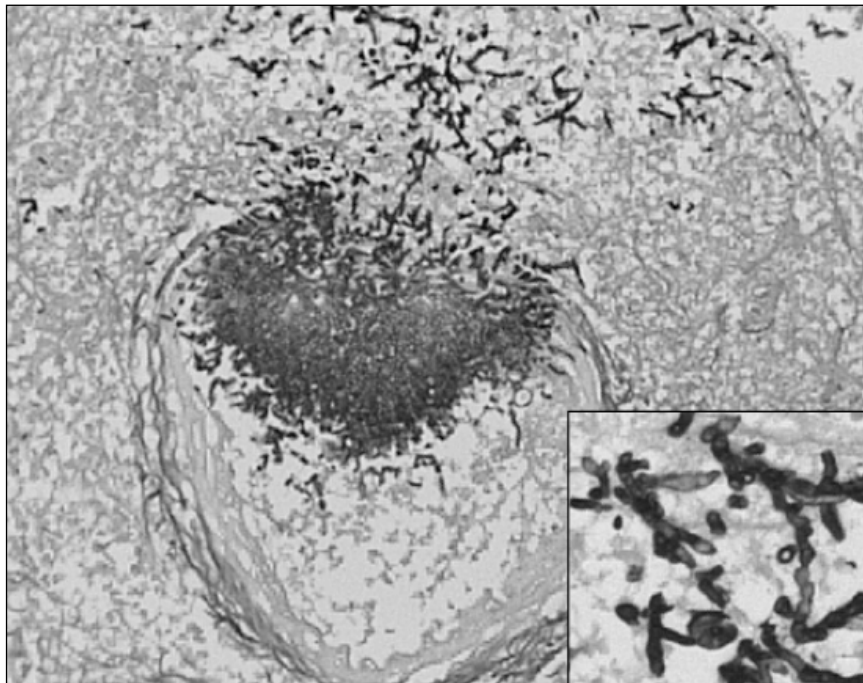


Figure 4.

gests that in the brain there is significant PET tracer uptake in abscesses, which renders metabolic imaging insufficiently reliable for distinguishing abscesses from tumors.⁸

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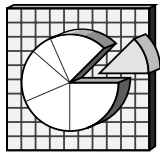
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Depression and Associated Health Risks and Conditions Among Rhode Island Adults in 2006

Jana Hesser, PhD, and Yongwen Jiang, PhD

Mood or depressive disorders affect about 20.9 million US adults (ages 18 and older), or 9.5% of the US population.¹ Within this grouping, major depressive disorder affects approximately 14.8 million American adults, or about 6.7% of adults.²

Depression can impact health-related quality of life, decrease adherence to health interventions, is linked to health risks, such as smoking, alcohol use, physical inactivity, and obesity, and can exacerbate or increase the risk of chronic illnesses.³ This report presents data on depression and associated health risks and conditions among Rhode Island adults using self-reported responses from Rhode Island's 2006 Behavioral Risk Factor Surveillance System (BRFSS).

METHODS

The BRFSS is a telephone survey administered in all 50 states and four US territories with funding and specifications from the Centers for Disease Control and Prevention (CDC).⁴ The BRFSS monitors the adult population for access to health care, selected health conditions and behaviors. From January through December 2006, the Rhode Island BRFSS conducted telephone interviews with 4,515 adults ages 18 and older.

In 2006 the BRFSS module on Depression and Anxiety was added to Rhode Island's questionnaire. The module included eight of the DSM-IV criteria for diagnosis of major depression.⁵ These questions ask the respondent how many days each of the following occurred in the past 2 weeks: (1) had little interest or pleasure in doing things; (2) felt down, depressed or hopeless; (3) had trouble falling asleep or staying asleep or sleeping too much; (4) felt tired or had little energy; (5) had a poor appetite or ate too much; (6) felt that you were a failure or had let yourself or your family down; (7) had trouble concentrating on things; (8) moved or spoke so slowly that other people could have noticed, or were fidgety or restless, moving around much more than usual. For each question, the number of days is converted to points (0-1 day = 0 points; 2-6 days = 1 point; 7-11 days = 2 points; and 12-14 days = 3 points) and the number of points is totaled across the eight questions to determine a **depressive symptoms severity score (DSS)**. A DSS of 0-4 is defined as no depression, 5-9 as mild depression, and 10 or more as moderate or severe depression, which reflects a diagnosis of **major depression (MD)**.

RESULTS

In 2006, 9% of RI adults, approximately 80,000 people, had a DSS of 10 or more, indicating MD. The prevalence of MD varied among demographic subgroups. (Figure 1) More women (11%) than men (6%) had MD, and the prevalence of MD decreased

with age. Fewer (8%) White non-Hispanics than either Hispanics (14%) or other non-Hispanics (15%) had MD, a difference which may be due in part to the higher proportion of older adults in the White non-Hispanic population. (Figure 1) MD rates were higher among persons with less than a college degree (12%), in households with incomes less than \$25,000 (22%), and among persons who are divorced/separated (16%), unemployed (26%), unable to work (50%), or disabled (25%).

Comparing health risks and health conditions for those with no depression, mild depression and major (moderate/severe) depression, risk increased consistently as depression severity increased for every variable examined. More than half (52%) of those with MD reported never, rarely, or only sometimes getting needed social/emotional support; more than a third (36%) were dissatisfied with life. (Figure 2) One quarter of those with MD lacked health care coverage, compared with 8% of those without depression. Persons with MD were at greater risk for a sedentary lifestyle, smoking, not wearing a seatbelt, and not receiving dental care.

People with MD more frequently had compromised health than persons with mild depression or without depression. (Figure 3) Thirteen percent of persons with MD had diabetes, 1 in 4 had asthma, 1 in 3 was obese. More than half (54%) of persons with MD reported having a physical disability, 38% reported pain-related activity limitations, and 48% had trouble learning, remembering, or concentrating.

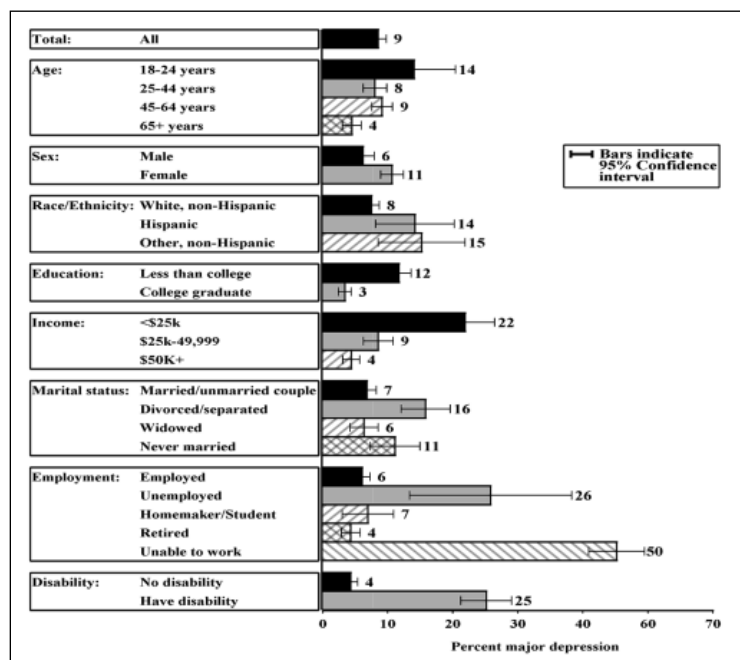


Figure 1. Prevalence of major depression, by selected characteristics, ages 18 and older, Rhode Island, 2006.

DISCUSSION

The analytic associations between major depression and the various demographic characteristics, health-risk behaviors, and health conditions do not necessarily identify causal relationships. For example, people with depression may be more likely to develop disabilities, but disabled persons may be more prone to depression. Similarly, people with depression may be more likely to smoke, but it is also possible that smokers are more likely to develop depression.

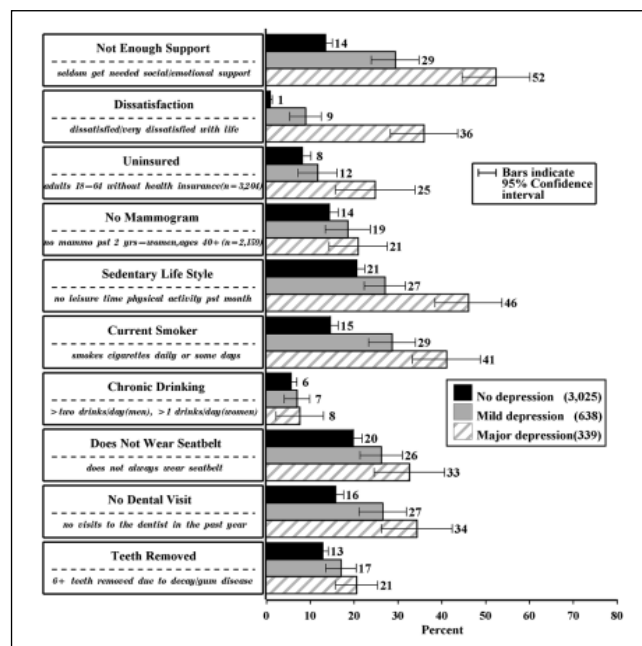


Figure 2. Health Risks by Depression Status, Ages 18 and Older, Rhode Island, 2006.

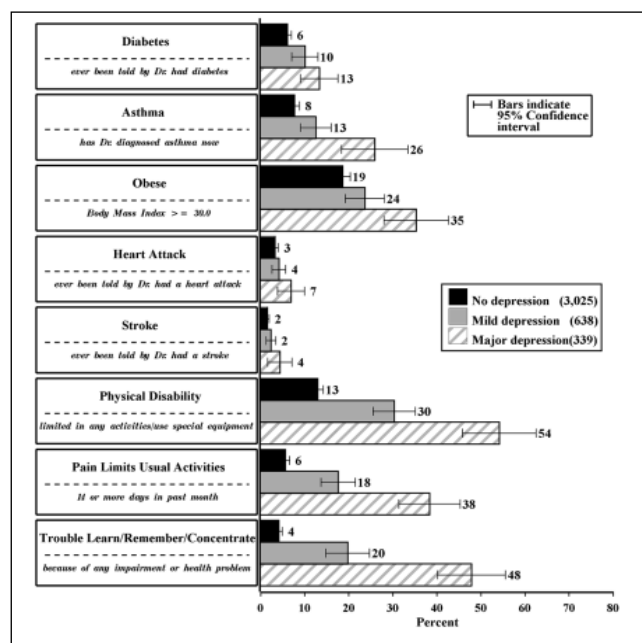


Figure 3. Health Conditions by Depression Status, Ages 18 and Older, Rhode Island, 2006.

However, the interrelationship between depressive disorders, chronic disease and health risk behaviors has implications for public health, health care delivery and medical practice and treatment.³ Our results identify populations “at risk” for major depression and indicate a need for increased mental health care, preventive health care and community support services for them. Furthermore, since those experiencing depression are at increased risk of compromised health, the assessment of health and health risk behaviors for this population is of special importance.

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5. National Survey on Drug Use and Health, Office of Applied Statistics, Substance Abuse and Mental Health Services Administration. June 11, 2007. <http://www.oas.samhsa.gov/2k7/states/depression.pdf> (Note: Major depression is defined using the diagnostic criteria set forth by the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*: a period of 2 weeks or longer during which there is either depressed mood or loss of interest or pleasure and at least four other symptoms that reflect a change in functioning, such as problems with sleep, eating, energy, concentration, and self-image.)

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Disclosure of Financial Interests

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Hospital Payment Monitoring Program: The Rhode Island Experience Reducing Admission Denials Through the Promotion of Hospital Observation Status

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With the current emphasis on quality improvement and reducing medical errors in hospital care (IOM, 2000), hospitals have begun to focus on measuring performance, implementing interventions to improve specific areas of care, and monitoring progress in making improvements. In particular, hospitals have been responsive to reporting requirements from the Centers for Medicare & Medicaid Services (CMS) and the Joint Commission on Quality and Safety. In Rhode Island, the Department of Health has instituted public reporting of patient satisfaction and clinical measures to provide hospitals with data on areas that may need improvement. The Hospital Association of Rhode Island has supported these efforts. Specific assistance to measure, report, and improve care has been provided by Quality Partners, the Medicare Quality Improvement Organization (QIO) for Rhode Island (RI). This paper reports on a recent joint initiative between Quality Partners and the hospitals in Rhode Island to monitor and correct errors in the admissions process and subsequent payment system.

This initiative grew out of a prior "Inappropriate Admissions" project in which Quality Partners conducted chart abstraction of hospital medical records and reported the results back to the hospitals. This was followed by a quarterly feedback approach in which data from the First-look Analysis Tool for Hospital Outlier Monitoring (FATHOM) reports were provided by Quality Partners to the hospitals. In turn, the hospitals developed and documented action plans related to their specific high volume target areas; these action plans were evaluated and monitored by the Quality Partners Project Coordinator. These efforts resulted in a decrease in the hospital payment error rate from a baseline rate of 6.07% to a re-measurement rate of 5.11%, supporting the approach that was pursued.

Despite these decreases, analysis of data from the Hospital Payment Monitoring Program (HPMP) Clinical Data Abstraction Center (CDAC) sample and Rhode Island's FATHOM data suggested the need to decrease the number of payment errors from admission denials. For example, Rhode Island's admission denials volume increased, from 33 denial errors at a cost of \$174,379 in 2003, to 39 denial errors in 2005 at a cost of \$178,664. Further analysis revealed that 44% of admissions denials were for one-day stays and 23% for two-day stays, as reported in the fiscal year 2004 Payment Error Cause Analysis report. Moreover, the proportion of one-day stays for Chest Pain (DRG 143) among Rhode Island Medicare inpatients has consistently increased while, nationally, the percent has declined. Quality Partners' review of the HPMP CDAC sample showed that payment errors were clustered in DRG 143 and that two other paired DRGs (DRG 182/183: Esophagitis, Gastroenteritis, & Miscellaneous Digestive Disorders, age greater than 17 with/without CC; and DRG 296/297: Nutritional & Miscellaneous Metabolic Disorders, age greater than 17 with/without CC) also have a high volume of errors, suggesting a potential crossover of these three DRGs, which are amenable to observation rather than

admission. Our analysis identified three common problems:

- Incomplete documentation to support an inpatient admission
- Documentation indicates lack of physician/provider understanding of the use of outpatient observation
- Unclear documentation in the medical record of patient's status, whether inpatient or observation

It was determined that a statewide initiative addressing admission denials for one-day stays was warranted. Based on these findings, Quality Partners proposed a statewide intervention for all 11 acute care PPS hospitals and a more intensive effort with three hospitals with a high volume of one-day stay for chest pain. By participating in this project, hospitals would engage in a quality improvement effort, requiring a thorough and systematic review of their systems. The hospital efforts were to be aimed at assuring that the beneficiary receives care in the appropriate setting of care. This has multiple benefits: reducing the risk of infection for patients who are diverted from the inpatient to the observation setting, and reducing payment errors for admission denials for the targeted DRGs. These benefits are also realized in the larger financial benefit hospitals would accrue, as a reduction in denials in turn means that hospitals would keep more of the payments they receive.

METHODS

Three sources of data were used to assess the impact of the intervention on one-day stays for the three targeted conditions: Medicare claims data, chart review, and a questionnaire. Medicare inpatient and outpatient claims data were used to measure the number of one-day stays as a proportion of all patients treated for each of the three target conditions, either in the emergency department, in observation, or as inpatients. The claims data were analyzed using SAS (Cary, NC) to report on the six indicators specified in Appendix I. As the claims data have a six month lag, it was also necessary to conduct chart abstraction during the course of the initiative. The chart review involved a sample of 10 medical records covering admissions July - December 2005, selected from each of the three high volume hospitals; another sample of 10 medical records for admissions March - July 2007 was reviewed. The data collection tool consisted of questions pertaining to the medical necessity of the admission using InterQual Criteria (see Appendix II). Additional questions asked about the use of observation status and Condition Code 44. A nurse reviewer abstracted data from the medical records and cases failing to meet InterQual Criteria were referred to a clinical advisor to determine the appropriateness of the admission. The third data source, a questionnaire, was administered to participants at the statewide educational session prior to beginning the session and at the conclusion to determine if there was an increase in knowledge as a result of attending the session. Each item on the question-

Table 1. Relative improvement on indicators from baseline to remeasurement

Indicator – DRG	High Volume/ Other	Baseline FY 2005 %	Remeasurement Feb – March 2007 %	Relative improvement %
1 – DRG 143	High volume	16.02	12.97	-19.06
	Other	10.14	8.97	-11.55
2 – DRG 182/183	High volume	4.93	2.79	-43.32
	Other	3.63	3.18	-12.38
3 – DRG 296/297	High volume	8.35	5.00	-40.10
	Other	7.98	3.27	-58.99

Table 2. Estimated financial impact at high volume hospitals

DRG	Computation for assessing financial impact	Savings for duration of initiative	Savings for one year following initiative
143	$((38/(1-0.19))-38)*3256$	\$29,023	\$174,617
182/183	$((14/(1-0.43))-14)*4439$	\$46,882	\$281,292
296/297	$((7/(1-0.4))-7)*4457$	\$20,799	\$124,796

naire was assigned one point for a correct answer and no points for an incorrect or missing answer; the points were then summed and divided by the total number of items, with the result multiplied by 100. Responses to the questionnaire items were used to assess whether there was an increase in knowledge as a result of attendance.

QIO INTERVENTIONS

Statewide Education

Quality Partners conducted a statewide educational session in collaboration with the Fiscal Intermediary, Pinnacle Business Solutions, entitled “Reducing Admission Denials Through the Promotion of Hospital Observation Status.” The four-hour session was held in December, 2006 with 59 people representing all 11 acute care hospitals in attendance. The goal of the program was to improve participants’ understanding and use of outpatient observation, inpatient admission and the use of Ambulatory Payment Classification (APC). Specifically, the Quality Partners presentation covered the following topics: why Rhode Island hospitals needed to do an HPMP project; what the data and chart review information showed; where the project was headed; how to reduce admission denials; and who should be using observation status. The Fiscal Intermediary followed with a presentation “Outpatient Hospital Updates.”

Prior to beginning the presentations, each participant was given a pre-assessment questionnaire to assess their understanding of the material was to be discussed during the session. At the conclusion of the presentations, a post assessment questionnaire, containing the same set of questions, was distributed to measure the effectiveness of the statewide educational session.

Education at the three high volume hospitals

Onsite intensive education occurred with the three hospitals that had a high volume of one-day stays. The onsite visits occurred in January and February 2007, with various members of each hospital’s staff including: Medical Directors, Directors of the Emergency Department, Directors of Case Management, Corporate Compliance Officers, and Chief Financial Officers. Quality Partners staff in attendance at each meeting included the HPMP Project Coordinator, the Director of Case Management and the Clinical Advisor. In addition to an in-depth discussion of the use of observation status, during each meeting the hospital-specific data were shared concerning the results from the baseline medical record abstraction, payment error amounts

and types, and performance in target areas.

At each of the sessions the hospitals were asked to develop action plans. The plans were submitted by April 2007. By the time this initiative began all of the high volume hospitals had observation status in place, so the hospital action plans described continuing educational sessions that were to be given by case management with the hospital physicians, concerning the use of observation status. In addition, one hospital planned to install software to facilitate this process.

Activity Log Reports

Another statewide intervention that was put in place during this initiative was to require hospitals to respond to their quarterly FATHOM reports. Specifically, hospitals performing above the 75th percentile in any of the targeted areas were required to respond via an Activity Log. The Activity Log prompted hospitals to describe how they were addressing areas in need of improvement.

RESULTS

Remeasurement Data

Table 1 shows the performance on each of the indicators for both the high volume and other hospitals. All six of the goals were met, and in fact exceeded. At baseline, 16.02% of all chest pain episodes, including emergency room visits, observation stays, and inpatient admissions, were for one-day stays. During remeasurement, this dropped to 12.97%, for a relative reduction of -19.06%. The relative reduction in one-day stays for DRG 182/183 at high volume hospitals was -43.32%. For DRG 296/297 the relative improvement at high volume hospitals was -40.10%. There was improvement on each of the three indicators for the other hospitals as well.

These relative improvements in the percent of one-day stays were used to assess the financial impact to Medicare Part A, as the funds that would have gone to pay for one-day stays were instead used to pay for outpatient care. This estimate only assesses cost savings to Medicare Part A. The formula used to estimate the savings is as follows: $((a_1/(1-(P_0-P_1/P_0)))-a_1)*\text{average claim payment at baseline}$, where:

- a_1 is the number of patients with one-day stays in the remeasurement period
- P_0-P_1/P_0 is the relative reduction in one-day stays from baseline to remeasurement

Table 3. Chart abstracted data								
Period	Patients placed on observation status		Admissions met InterQual criteria for inpatient admission		Chest pain correct diagnosis		Condition requires admission	
	n	(%)	n	(%)	n	(%)	n	(%)
Baseline: Jul-Dec 2005	8	(30)	13	(50)	23	(88)	1	(7)
Remeasurement: Mar-Jul 2007	4	(13)	22	(75)	27	(93)	2	(28)

Table 4. Results from evaluation of December 5, 2006 conference, excluding question 3				
Questionnaire	Evaluations Completed (n)	Average Score (%)	Standard Deviation	95% Confidence Interval (%)
Pre	48	82	9	78.8 - 84.2
Post	42	85	7	82.8 - 87.3

These computations of these formulas are expressed below in Table 2, with associated values to show the savings for each of the three DRGs for the duration of the initiative and for one year following completion of the initiative.

Based on these calculations, it is anticipated that the savings will be \$96,704 at the high volume hospitals for the duration of the initiative and \$580,705 for the year after the initiative is complete.

Table 3 represents the results of chart abstraction for the baseline and remeasurement periods. A total of 26 records were reviewed at baseline and 29 were reviewed in the remeasurement period. There was improvement in the percent of admissions that met InterQual criteria for inpatient admission, from 50% to 75%. In addition, there was a small increase in the percent of cases that were correctly coded with chest pain as the principal diagnosis, 88% at baseline and 93% at remeasurement. The number of cases evaluated for the question, "Condition requires admission" differs from the other questions as only those cases where the admission did not meet InterQual criteria were sent out for physician review, to determine if the condition required admission. Therefore, there were 13 cases in the denominator at baseline and 7 in the remeasurement period. Improvement was found in the percent of cases that required admission from 7% to 28%.

For the purposes of assessing the effectiveness of the December, 2006 statewide educational session, a questionnaire was administered to participants before beginning the conference and again at the conclusion of the conference. The purpose of the questionnaire was to determine whether participants experienced an increase in knowledge from attending the session. The questionnaire contained 18 True/False questions. A total of 48 participants completed the pre assessment and 42 completed the post assessment. Data analysis revealed that there was a substantial misunderstanding about one question concerning the absolute payment error amounts in 2005. When responses to this question were removed from the analysis, the average score increased from 82 to 85, as show in Table 4.

DISCUSSION

The initiative met the goals established at the outset. First, all of the performance goals for both the high volume and other hospitals were met and in fact, exceeded. As a result, the financial impact of the reductions in one-day stays is considerable. These reductions in one-day stays for the three indicator conditions clearly show that there was substantial improvement in knowledge gained by hospital staff participating in this initiative. Second, the chart review data show improvement in the number of cases that met InterQual criteria for admission and the number of cases that were appropriately admitted to as inpatients.

These improvements will have an impact on the payment error rates moving forward. Third, the hospitals have been highly responsive to the Activity Logs, which require them to describe their efforts to improve in targeted areas where their performance falls above the 75th percentile.

The Activity Logs submitted by the hospitals describe some of the systems changes hospitals are making to address the payment error rates. For example, hospitals have engaged in the following activities:

- Retrospective review of records to determine if condition code 44 should be considered
- Increase in the use of condition code 44
- Daily report listing all Medicare patients is provided to case managers for focused review on admission
- Annual review for all case managers on observation LOC with case studies
- Emergency department case managers review of chest pain criteria with ED physician team
- Tip sheet inserted in the front cover of medical records, highlighting observation status versus inpatient admissions and the phone number of case managers to respond to questions

Limitations

The full impact of this project will need to be monitored over the coming months. In April 2008, Quality Partners of Rhode Island plans to request additional ad hoc data for the period April through September 2007 to continue to monitor progress on these indicators.

In order to measure accurately the impact of the interventions on the targeted conditions for this initiative, it was necessary to use Medicare claims data. The claims data have a six-month lag; therefore, it is not possible to determine the effectiveness of the interventions until at least six months after an intervention is implemented.

Lessons Learned

A number of lessons were learned during the course of this initiative. In collaborating with the hospitals it was clear that the keys to success are:

- Obtaining institutional buy-in and administrative support
- Identifying a local champion to support the initiative
- Involving key personnel, such as case management staff
- Having a data abstraction or other systems in place to assist in case identification
- Highlighting the importance of shared goals

During the course of the onsite educational sessions with high volume hospitals, it was found that scheduling meetings to encompass the highest proportion of physicians, clinical and non-clinical staff was a challenge. At the same time, the attendance at the meetings showed that the hospitals made the meetings a priority and were focused on the information presented.

The successes experienced during this initiative are transferable to other conditions. The majority of hospitals are using observation for more than just the targeted conditions, therefore it is expected that in the coming quarters we will see a decrease in one-day stays across many of the DRGs, and subsequently in the payment error rate.

The results of this initiative show that when hospitals and a QIO jointly focus efforts on measuring performance, implementing targeted interventions that substantive change to one-day stays can result. Continued monitoring of performance will be conducted to assess the longer term impact that results from these efforts.

The indicators and performance goals for the initiative are described in detail below. Indicators 1, 2, and 3 are calculated for the baseline period, FY 2005, and for the re-measurement period, February - March 2007.

APPENDIX

Indicator 1: Proportion of patients in DRG 143 with one-day stay among all patients treated by a hospital for an episode of chest pain; **Goal:** 15% reduction (relative) in the IPG and 5% in all other providers.

Indicator 2: Proportion of patients in DRG 182/183 with one-day stay among all patients treated by a hospital for an episode of esophagitis, gastroenteritis or miscellaneous digestive disorders; **Goal:** 5% reduction (relative) in the IPG and 1% in all other providers.

Indicator 3: Proportion of patients in DRG 296/297 with one-day stay among all patients treated by a hospital for an episode of Nutritional and Miscellaneous Metabolic Disorders; **Goal:** 5% reduction (relative) in the IPG and 1% in all other providers.

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Appendix II	
REDUCING ADMISSION DENIALS THROUGH THE PROMOTION OF HOSPITAL OBSERVATION STATUS	
Patient Name: _____	Were all EKG's interpreted as normal?
Hospital ID#: _____	Yes _____
HIC #:	No _____
DOB: / / Age _____	Of no, explain: _____
Admission Date: / / Admission Time: (military time) UTC _____	Were renal enzymes drawn?
Discharge Date: / / Discharge Time: (military time) UTC _____	Yes _____
Discharge Status	If yes, were the renal enzymes within normal limits? Yes _____ No _____
<input type="checkbox"/> Home	Was a Stress Test performed?
<input type="checkbox"/> Transfer to Acute Care Hospital STOP review	Yes _____
<input type="checkbox"/> SNF	If yes, was the stress test results interpreted as normal? Yes _____ No _____
<input type="checkbox"/> I of A MA STOP review	Did this admission meet the Qual Criteria for inpatient admission?
<input type="checkbox"/> I of A	Yes _____
<input type="checkbox"/> Expired STOP review	No _____
<input type="checkbox"/> Other	Is Chest Pain the correct principal diagnosis?
Source of Admission:	Yes _____
<input type="checkbox"/> Home	No _____
<input type="checkbox"/> Physician Office	If no, what is the correct principal diagnosis?
<input type="checkbox"/> Transfer from Hospital	CAO _____
<input type="checkbox"/> SNF	Angina _____
<input type="checkbox"/> Other	ACS _____
Was patient admitted through the Emergency Room?	GI/ID _____
Yes _____	Gas embolism _____
If yes, record Date: / / and Time: (military time) UTC _____	Other _____
No _____	Reviewer ID#: _____
Was patient placed in Observation Status?	Other Review Comments: _____
Yes _____	
If yes, record Date: / / and Time: (military time) UTC _____	
Observation Order: UTC _____	
No _____	
Was there a subsequent order for patient admission?	
Yes _____	
No STOP review billing error	
Is there documentation that a "Condition Code 44" was issued?	
Yes STOP review billing error	
No _____	
Physician Review Did the condition require inpatient hospital admission? Yes _____ No _____ If no, why not? _____	



Feeding Tubes for Nursing Home Residents with Advanced Dementia: How to Approach Feeding Tube Decisions

Ana Tuya, MD, and Joan Teno, MD, MS

You are making routine rounds at the nursing home on your long-time patient, Sally Smith, who has suffered from Alzheimer's dementia for 8 years. She has resided in the dementia unit for the last 3 years. Her daughter Jane is, as usual, at the bedside trying to encourage her mother to finish the lunch tray in front of her. Sally has lost 12 pounds over the last year and appears frail and thin. You sit down with them and spend time talking things over with Jane who asks you what more she can do. You have taken care of Sally since she was in her early sixties, when she was a vibrant retiree who enjoyed daily Pilates classes, ballroom dancing, and playing cards at the community center. Sally no longer recognizes her daughter, spends most of her time in her room, and no longer ambulates. When hand-fed, she needs frequent cues, and often lets food pool in her cheeks without swallowing. Despite trials of antidepressants, appetite stimulants, careful hand feeding, and supplements, the weight loss has been steady. In addition, Sally was recently hospitalized due to the complications of aspiration pneumonia.

Sadly, Sally's story is a commonly encountered one. Dementia is the fifth leading cause of death in the USA and it is estimated that 30% of feeding tubes are placed in patients with dementia.² Families and physicians alike agonize over the right decision with regards to feeding in advanced cases of dementia. Feeding and swallowing difficulties are common with dementia. Dementia patients often cannot swallow, due to motor involvement and apraxia, and suffer complications including recurrent aspiration that leads to pneumonia, and weight loss. At the point where these symptoms and complications start to occur, patients are in the final stages of the disease trajectory. Most patients have months to a year of life remaining. Experts debate the long-term effects of artificial feeding and discuss whether it changes outcomes like nutritional state, pressure ulcer development or healing, and mortality. Emotion clouds the topic further, with distressed family members feeling that they could never "starve their loved one to death". The decision to place a feeding tube is often made by loving caregivers who feel they would be neglectful if they did not "try everything" to save their loved one.

Having this conversation with families can be the hardest of all decision-making discussions. The common perception among families and practitioners is that tube-feeding is more comfortable for the patient, and can prolong life as well as improve overall nutritional status, thereby preventing the complications of malnutrition. The evidence base consists mostly of retrospective analyses, observational studies and review articles, as randomized control trials with well-defined control groups are challenging and difficult to perform. As a health care provider, there are several key questions that should inform this decision:

WHAT ARE THE POTENTIAL BENEFITS OF A FEEDING TUBE?

For certain patients feeding tubes may be life-prolonging. For example, patients with **Amyotrophic Lateral Sclerosis (ALS)** may benefit from a feeding tube with a resultant longer life. However, such benefit has not been found in the systematic review of the literature to date with regards to dementia patients. Finucane and colleagues in 1999, in the first systematic review of the evidence, noted that a feeding tube inserted in a person with advanced dementia did not lead to prolonged survival, improved quality of life, prevention of aspiration pneumonia, or increased healing of pressure sores.¹ This landmark review led to the strongest evidence that using tube feeding in patients with advanced dementia did not lead to the desired outcomes.^{1,2} A more recent review also found no clear support for the belief that tube feeding can improve pressure sores or prevent them.² Finucane and colleagues' review targeted aspiration pneumonia prevention, amelioration of the consequences of malnutrition, and survival rates. The authors searched MEDLINE from 1966 through 1999 but found no randomized control trials to include. The review supported the belief that tube feeding does not prevent aspiration pneumonias or pneumonitis, with the evidence available in the literature.¹ Aspiration of oral secretions continued, as did reflux aspirations from the tube feedings themselves. Three case control studies described in the review demonstrated actual higher risks of aspiration pneumonia and death in tube fed patients. In addition, contrary to common perception, studies demonstrated that jejunostomy was not associated with lower risk than gastrostomy.¹

With regards to preventing the consequences of malnutrition, in several studies of tube-fed patients, markers of malnutrition did not improve with tube feeding. Weight loss, and muscle wasting persisted despite receiving appropriate calories and protein intake.¹ Evidence suggests that the underlying effects of chronic disease, immobility, and inflammation overcome the effects of artificial nutrition.² Finally, a feeding tube will not reverse the progression of dementia. So a key question is whether Mrs. Smith would want to live in state where she is unaware and unable to interact with her surroundings. Would she have consented to a feeding tube, if she could talk to us today?

WHAT ARE THE RISKS? WHEN YOU FORGO A FEEDING TUBE, ARE YOU STARVING SOMEONE TO DEATH?

There is small risk of mortality with the procedure that has been greatly minimized with the use of endoscopic percutaneous gastrostomy tubes. However, complications include leaking around the tube, tubes being pulled out by confused or demented patients, blockage of tubes, and the necessitation of ER visits for replacement of the tubes due to blockage or displacement. Also, a more important concern is that for some, restraints need to be utilized to pre-

vent a nursing home resident from pulling out the tube.² Additionally, survival analysis revealed unexpected results. Survival was poorer in the tube feed groups in various studies. Two large studies discussed in the review by Finucane and colleagues demonstrated median survival of tube fed patients was reduced.¹ In one study the median survival of tube fed patients was 7.5 months; in the second, 63% of patients had died one year after placement of a feeding tube. On the flip side, studies demonstrated that carefully hand fed patients had similar survival rates, not lower, as initially expected. One study compared demented patients who required assistance eating to similar non-demented counterparts in a long-term care facility. The study followed patients for two years and the patients in the hand-fed program had similar survival to those who fed themselves.¹ The literature review by Li reached similar conclusions.²

WHAT ARE THE ALTERNATIVES?

The feeding-tube decision is often clouded by our cultural mores of showing love with food. To allow our loved one to refuse food, lose weight, and “waste away” is seen as neglectful and as the imposing of suffering. An important alternative to a feeding tube is to give a concerted trial of hand feeding, for those persons where feeding a modified diet is safe. With involvement of speech therapy to educate the staff, you may be able to forestall the need for a feeding tube. As noted above, carefully hand fed patients had similar survival to those who fed themselves.^{1,2} For those persons where feeding is not safe, a critical question is what is the experience of dying without food or water? If you were to stop all nutrition and fluid, the patient would die of dehydration. For most part, this will involve drifting off into a coma with evidence of dehydration being treated by assiduous mouth care. That sensation can only be inferred by studies of neuro-degenerative patients who choose to stop a feeding tube and in the terminally ill. The evidence indicates that the majority of symptoms were not severe. Approximately 75% of terminally ill patients retain the ability to report hunger and thirst, but comfort feeding (small amounts of food, ice chips, sips of liquids or mouth swabs) was able to satisfy these feelings.² Though the comfort interventions did not provide adequate nutrition, they allowed the patient to remain free of hunger and thirst.

IS IT LEGAL TO WITHHOLD OR WITHDRAW A FEEDING TUBE IN RI?

While considerable concern was generated with the Schiavo case, there is important case law from the Supreme Court in *Cruzan vs. Director, Missouri Department of health*, and state law in *Gray vs. Romeo*. Both cases noted that a feeding tube is an artificial means of life-sustaining treatment that a competent person may choose to withhold or withdraw. The *Cruzan* case noted that a state had a right to set higher standards of safety to ensure that the wishes are those of the patient. *Gray vs. Romeo* ruled that patients have the right to refuse medical treatment, including feeding tubes. The judge ruled that the feeding tube placed in Marcia Gray, a 49 year-old woman who suffered a cerebral hemorrhage and never regained consciousness, should be removed in line with her previously voiced wishes.³ Mrs. Gray had discussed her wish to not be kept alive by artificial means with her husband after the *Quinlan* case became public. Based on case law, a physician in RI, with consent of a duly appointed health care proxy, can legally withdraw or withhold a feeding tube.

You sit down with Jane now and explain to her that the best approach is to continue careful and patient hand-feeding, aiming for comfort. Sally should be given small amounts of food and drink,

as she tolerates. However, aggressive feedings or tube feedings should be withheld, as they will not prolong her survival, or reverse her cachexia syndrome. The focus of care should change toward comfort. As physicians, we should assist families to make this difficult and emotionally charged decision. We should be willing to work with nursing home staff to find creative solutions to limited staffing for feeding, and with families to teach them how to support the staff in feeding their loved one. Caregivers need to be reminded that dementia is a terminal illness and tube feeding does not reverse the underlying process and can add to the suffering and complications. We should be comfortable discussing the trajectory of dementia and that death is approaching once these complications are noted.

Jane appreciates your honest discussion, and understands that she is not neglecting her mother or contributing to her death by withholding tube feeding. She asks you to consult hospice and to provide a plan for comfort feeding. The nursing staff and Jane coordinate a care plan that has divided responsibilities for feedings. Sally does not have any other aspiration pneumonias, but gradually continues along the course of her illness. Jane institutes a “do not hospitalize” order and Sally remains in the dementia unit until her death three months later. Her family was at her bedside, as were the nurses who had cared for her in her last few months. Sally had a peaceful death in the place she had called home for three years, and her family was grateful for the support of the medical team.

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The Political Economics of Public Health Neglect

William J. Waters, Jr, PhD

After thirty-six years in public health service, I would like to share my thoughts on the status of public health in our overall health policies.

Miniscule Allocation: The funding for public health is not commensurate with the epidemiologic evidence for public health intervention. Public health receives only about 3% of total US spending.¹ Yet a large proportion of the actual causes of mortality, morbidity, and health care costs are related to personal and societal lifestyle factors such as tobacco, physical activity, nutrition, weight, and alcohol.^{2, 3, 4} There needs to be a higher concordance between health spending and the epidemiologically determined causes of mortality and morbidity. Otherwise, we will always be spending huge sums of money to treat preventable diseases.

Discretionary Financing: In terms of absolute dollars, discretionary funding will never adequately fund public health.⁵ Medicare and Medicaid are financed on an "entitlement" basis. Eligible individuals have a legal right to covered medical services. Public health, though, is funded on a "discretionary" basis. As a result, Medicare and Medicaid expenditures are increasing while public health is struggling to survive. Probably the only practical way to ensure adequate funding is to create a public health trust fund that is financed as a percentage (e.g., 6% if an ounce of prevention is worth a pound of cure) of public (e.g., Medicare, Medicaid) and private (e.g., commercial health insurance and HMOs) personal health care benefit expenditures.

Spotty Coverage: Federal funding for public health is partial and competitive. Not every state and local Health Department is funded for essential public health services. The federal, state, local public health system in the United States is like Swiss cheese, with variations in revenue by state and locality. The span and depth of public health services for specific populations depends on their geo-political locus.⁶

Going forward, all populations should have the essential public health services.⁷

Lip Service: Given the relatively low level of public funding, public health programs cannot come close to improving population-based health status and achieving behavioral changes. Over the past three decades, the *Healthy People* program has articulated an ambitious set of national and state objectives.⁸ However, it surely is not possible to obtain these worthy objectives based on 3% of overall health expenditures. We have a profound mismatch between our national public health objectives and our allocation of national health resources.

Scale Up: The best chance for public health progress is through legislative, policy, and environmental interventions. In the current funding environment, we need to make public health progress with very limited resources. This means focusing on systematic legislative, policy, and environmental changes that have the potential to reach the entire population or large segments of the population at a relatively low cost.^{9, 10} No smok-

ing in public places, mandatory seat belt use, drunk driving controls, elimination of school-based junk food, and walkable community development ordinances are all examples of systematic approaches to achieve public health objectives.

Prevention First: As a nation and as states and localities we have a strong service ethic. When it comes to the provision of health and social services for people in need, we tend to be fairly generous. We are comfortable in a humanitarian rescue mode. However, we do not have a strong culture of prevention. We do not put prevention foremost in our strategies and actions. Thus, we waste time and resources treating problems that potentially could have been prevented (e.g., smoking and obesity related illnesses, and alcohol related illnesses and injuries). We need to develop a much stronger ethic of prevention. A prevention ethic would be more cost-effective and more humane.^{11, 12}

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William J. Waters, Jr, PhD, Deputy Director, Rhode Island Department of Health, retired in November 2007.

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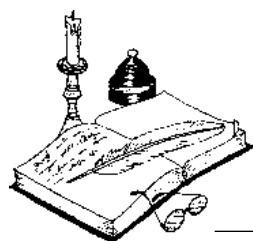
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Physician's Lexicon

The Vocabulary of the Basic Medical Sciences

The standard medical curriculum, until recently, was neatly divided between two years assigned to the basic medical sciences followed by two years devoted to the various clinical sciences. In the decades following the Flexner Report, the typical basic science sequence consisted of anatomy, histology, embryology, biochemistry and physiology during the first year; and neuroanatomy, microbiology, immunology, pathology and physical diagnosis in the second year.

The word, anatomy, is derived directly from the Latin, *anatomia*; but this in turn was taken from an earlier Greek word meaning to dissect. The Greek root, *tom-*, meaning to cut, appears in such English words as tomography, microtome and atom [so small that it cannot be cut.] Histology is derived from a Greek word meaning tissue. And embryology, also Greek, is defined as the study of that which grows in the body. The Greek prefix *em-* signifies within and the root *bryo-*

means to swell. Botanists have appropriated the root, *bryo-*, to give a name to the study of mosses [bryology.]

Chemistry, in English, descends directly from the French, *alquemie* which is derived from the Arabic word, *al-kimiya*. [The Arabic, *al*, is equivalent to the English word, the.] The Arabic word is traced back to a still earlier Greek term which can be followed still further to an ancient Egyptian word meaning the black arts [i.e., alchemy].

Physiology is rooted in a Greek word meaning nature. And the Latin derivative of this, *physica*, has become the origin of the word, physician. The suffix, *-logy*, is from a Greek root meaning the study of or the illumination of.

Microbiology is from two Greek roots meaning small [*micro-*] and life [*bios*]. The words bacterium and bacteriology were coined by the German naturalist, Christian Ehrenberg [1795 – 1876] to describe germs as seen

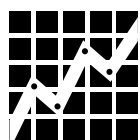
through the microscope. The word stems from the Greek meaning little staff or rod.

Immunology is based upon a Latin word *munia*, meaning duties or obligations, preceded by the privative prefix, *im-* meaning not. The *munia* root appears in words such as common, community, municipal, and communication, all carrying the sense of mutual duty, shared burdens or commonality.

And pharmacology is derived from a Greek root meaning healing drugs.

The word basic [as in basic sciences] descends from the Latin, *basis*, meaning low [as in words such as bassoon and basso]; and earlier from a Greek term meaning bottom or pedestal. The word, in English has evolved to serve an astonishing multitude of diverse meanings ranging from base [describing an essential piece of equipment in baseball] to a pejorative adjective meaning morally low or without dignity.

—STANLEY M. ARONSON, MD



RHODE ISLAND DEPARTMENT OF HEALTH
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VITAL STATISTICS

EDITED BY COLLEEN FONTANA, STATE REGISTRAR

Rhode Island Monthly Vital Statistics Report Provisional Occurrence Data from the Division of Vital Records

Underlying Cause of Death	Reporting Period			
	January 2007	12 Months Ending with January 2007		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	260	2,747	256.8	3,399.5
Malignant Neoplasms	191	2,294	214.4	6,132.5
Cerebrovascular Diseases	34	382	35.7	487.0
Injuries (Accidents/Suicide/Homicide)	31	536	50.1	8,251.0
COPD	41	464	43.4	385.0

Vital Events	Reporting Period		
	July 2007	12 Months Ending with July 2007	
	Number	Number	Rates
Live Births	1,082	13,513	12.7*
Deaths	800	10,033	9.4*
Infant Deaths	(5)	(100)	7.4#
Neonatal Deaths	(4)	(71)	5.3#
Marriages	973	6,964	6.5*
Divorces	247	3,138	2.9*
Induced Terminations	500	4,767	352.8#
Spontaneous Fetal Deaths	55	991	73.3#
Under 20 weeks gestation	(51)	(916)	67.8#
20+ weeks gestation	(4)	(75)	5.6#

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.

(b) Rates per 100,000 estimated population of 1,067,610

(c) Years of Potential Life Lost (YPLL)

Note: Totals represent vital events which occurred in Rhode Island for the reporting periods listed above. Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.

* Rates per 1,000 estimated population

Rates per 1,000 live births

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NINETY YEARS AGO, JANUARY 1918

William H. Smith, MD, in "Some Factors in the Diagnosis of Cardiac Conditions," cautioned against the "exaggerated importance" of cardiac murmurs in the diagnosis of cardiac disease. The draft had rejected men "with apical systolic murmurs." Dr. Smith noted: "I have had the opportunity to examine a certain number of these [rejected men]; in none have I been able to discover evidence of organic disease." He cited 19 other conditions associated with murmurs, including atheroma of the arch, syphilis of the arch, and malformations of the heart.

D.L. Richardson, in "Measles," described the symptoms, the etiology, and epidemiology. The death rates (per million living) were 101 in the United States, 354 in the United Kingdom, 260 in Prussia, 810 in France. The death rate in the United States was similar to that for scarlatina (104) and diphtheria (87). Hospital mortality rates were higher.

W. Louis Chapman, MD, in "Lead Poisoning: A Cause of Obscure Disease," noted: "...many symptoms considered as subjective, if observed for a time, are later shown to be caused by pathological conditions and would have been so considered had one's studies been sufficiently thorough." The State laboratory tested for lead in urine. "As yet it is not known how little lead may be ingested and show symptoms, or how much lead may be taken and not cause symptoms."

FIFTY YEARS AGO, JANUARY 1958

In "What is Your Diagnosis? – A Clinico-pathological Conference," attendees discussed a 50 year-old housewife who had come to her physician, in 1956, complaining of abdominal pain and a 40 lb. weight loss over the past year. Two years previously her sister died accidentally, and the patient's menses ceased. She developed hot flashes, was treated with hormone injections and pills. One year later she complained of nausea, a "full feeling" after eating. She stopped the hormones, but the symptoms continued. At this point she started to lose weight. A GI series and a gall bladder series were negative. Later that same year she was admitted to the Diagnostic Clinic in Boston, after losing 25 pounds, and spending much of the past 6 months in bed. When her weight dropped to 116 pounds, she was admitted to the hospital for an exploratory laparotomy, a pyloric myotomy and incidental appendectomy. She was discharged after 12 days; but, once home, the record noted she was "obsessed by abdominal pain." The decision was to admit her to a psychiatric hospital, but she died the next morning. Diagnostic suggestions: superior mesenteric artery with abdominal angina and thrombosis of coronary artery; pancreatitis; dissecting aneurysm of aorta; arteriosclerosis of aorta, generalized peritonitis; infarction of jejunum, ileum, cecum. The conclusion: "abdominal angina."

An Editorial feature, "Through the Microscope," repeated the fees for house calls, cited from the January 20 *Medical Economics*. Ob/gyn: \$8-9; internist: \$7-8; pediatrician: \$6-7; general surgeon: \$6; general practitioners: \$5-6.

TWENTY-FIVE YEARS AGO, JANUARY 1983

G. E. Erikson, PhD, in "History and Medicine: A Prologue," introduced papers gathered for the History and Medicine Oration sponsored by Miriam Hospital. This group of historical papers was dedicated to Seebert Goldowsky, editor of *Rhode Island Medicine*.

Among the papers: Albert W. Senft, MD, MPH, DTM&H: "Parasitic Disease and Exploration: A Glimpse of Central Africa in the 1860s;" Stanley M. Aronson, MD, "God and the Demon Rum in Colonial America;" and James H. Cassey, PhD, "Charles V. Chapin Re-Visited."

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COLUMN KEY

AP: Advances in Pharmacology
CC: Creative Clinician
GPP: Geriatrics for the Practicing Physician
HBN: Health by Numbers
IM: Image in Medicine
PHB: Public Health Briefing
PL: Physicians Lexicon
POV: Point of View

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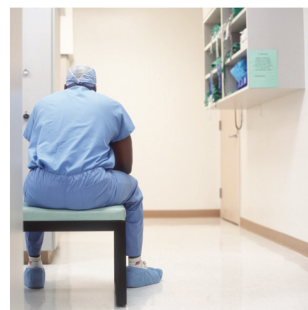
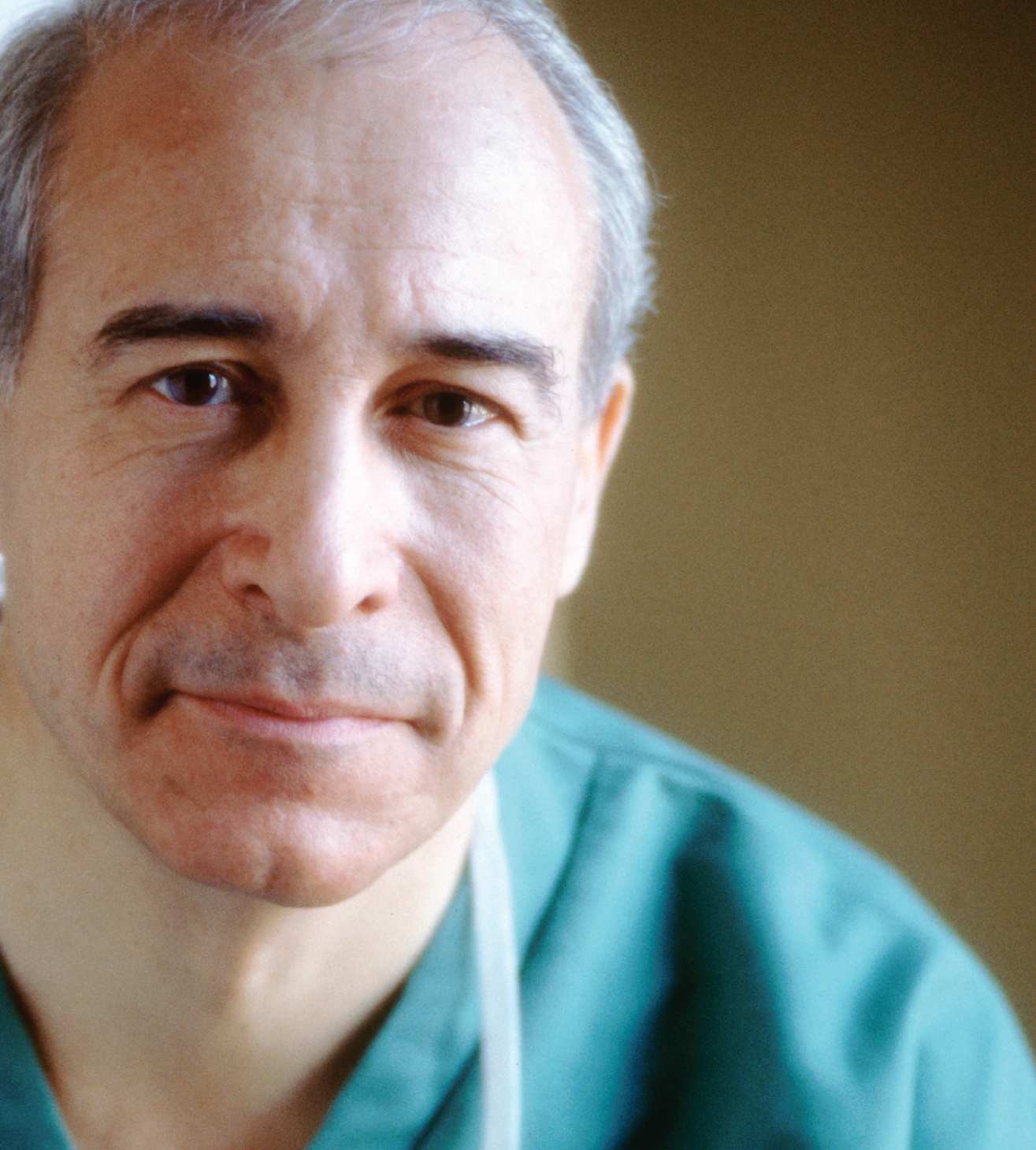
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