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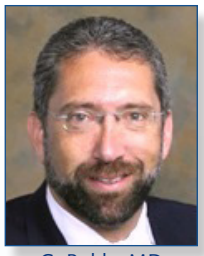
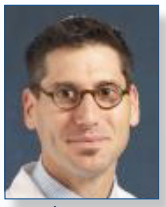
I. Jenouri, MD


G. Bubly, MD


Alyson J. McGregor, MD, gave a recent TEDx talk on "Sex Matters in Emergency Medicine." Link to video on page 23.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A. McGregor MD


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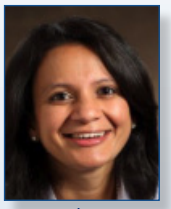
N. Raukar, MD


C. Zabbo, MD


P. Graves, MD


M. Kopp, MD


K. Baird, MD'17

This Is Not Your Grandfather's Emergency Department

ILSE JENOURI, MD, MBA; GARY BUBLY, MD, FACEP
GUEST EDITORS

Emergency Medicine (EM) is still a relatively young and rapidly evolving specialty. Like many of its elder siblings in the house of medicine, EM is undergoing exponential growth. In fact, it seems strikingly different from when we began practice a mere 16 and 25 years ago, respectively. During those decades we have witnessed the development of a second emergency medicine residency-training program in Rhode Island and several fellowship-training programs within emergency medicine in Pediatric Emergency Medicine, Ultrasound, Injury Prevention, Disaster and Emergency Medical Services, International Emergency Medicine, Simulation, Medical Education and Sex and Gender in Emergency Medicine within the confines of our small state. This issue of the *Rhode Island Medical Journal* (RIJM) contains noteworthy examples illustrating advances in some of these specialized areas within Emergency Medicine. We have also included some administrative pieces on Emergency Department throughput and the utilization of scribes in the ED setting.

Both locally and nationally, emergency department visits are increasing. We believe this is likely to continue as the population ages, the baby boomer demographic reaches retirement and beyond, and healthcare providers feel the impact of the "silver tsunami." The expansion of health insurance to the uninsured through the implementation phase of the Patient Protection and Affordable Care Act, if it parallels the Massachusetts experience, is likely to increase this trend as well. At this writing, we seem to be experiencing slightly increased volume, perhaps due to the Medicaid expansion. The impact of punitively large emergency department co-pays by insurers, expanded access to primary care by providers, and the incentivization of Patient Centered Medical Homes and Accountable Care Organizations (ACOs) arguably may have slowed this rising tide, but clearly has not reversed it. Hindering providers with time-consuming electronic medical records and throwing in other regulatory requirements creates a recipe for inefficiency.

So how do we do it all faster and better?

Ultrasound is one way we can theoretically increase the speed and accuracy of EM providers. The article by Liebmann and Kumar on point-of-care ultrasound use in emergency medicine provides an excellent primer on its evolving applications. From its introduction for central venous catheter insertion to expanding indications, ultrasound's portability, speed of imaging and absence of radiation have helped it gain favor as an important clinical adjunct. This article gives a snapshot view into its common clinical applications. Initially viewed with skepticism, it has been incorporated into EM residency curricula nationwide.

The article by McGregor and Choo on "The Emerging Science of Gender-Specific Emergency Medicine" provides a thought-provoking introduction into one of the newest fellowship and research areas within EM. We are hopeful that this fine-tuning of our clinical practice will lead to more personalized care for everyone.

The article by Chao and Raukar provides a timely review from the EM sports medicine perspective on the evaluation and management of concussion. Do you know which patients to send to the nearest emergency department?

In response to the rising patient volume mentioned earlier, and with the number of emergency departments diminishing nationwide due to hospital closures, emergency departments have been pressured to handle increased patient volume with greater efficiency. Some emergency departments have been fortunate enough to expand and renovate. For some, this challenge has been limited by construction costs and lack of capital, the certificate-of-need process, or sheer lack of space. Others have undergone reevaluation of their patient throughput processes to optimize efficiency without increasing staff. The "Extinction of Triage" article by Graves, Zabbo, et al. describes one facility's efforts to redesign their throughput processes with excellent results.

Finally, Emergency Medicine has been a leader in the use of scribes in the clinical environment to ease the adoption of electronic medical records. Since we are often asked about our scribe program, we have included an article explaining their role and an article giving one scribe's personal perspective on the transition from scribe to medical student.

During this era of seemingly constant change in medicine, we hope you will find these articles helpful in understanding some of the evolution occurring within emergency medicine.

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Emergency Ultrasound: Point-of-care Ultrasound in Emergency Medicine

OTTO LIEBMANN, MD; TOBIAS KUMMER, MD

INTRODUCTION & DEFINITIONS

Ultrasound is a safe and effective form of imaging that utilizes sound waves to examine internal human anatomy for diagnostic purposes and procedure guidance. With the advent of smaller, high quality machines in the 1990s there has been a growth of point-of-care ultrasound – ultrasound that is performed and interpreted by a provider at the patient's bedside in real time – in many medical specialties.[1,2] Many terms in the medical literature are used to describe this unique application of ultrasound (US); these include "bedside," "limited," "focused," and "goal-directed." The favored terminology is clinician-performed *point-of-care ultrasound* often abbreviated as POCUS.

Point-of-care ultrasound has been a part of the specialty of emergency medicine for two decades and is referred to within the specialty as Emergency Ultrasound (EUS). Emergency physicians are confronted with critically ill patients with undifferentiated complaints and must make time-sensitive diagnostic decisions or perform therapeutic interventions based on limited available information. Ultrasound can be performed directly at the time of the physical examination in a matter of minutes and can help to greatly reduce the number active differential diagnoses. These ultrasound examinations are integrated into Emergency Medicine diagnostic and treatment pathways at the point-of-care and seek to answer a specific clinical question. In this manner emergency physician-performed point-of-care ultrasound refines and accelerates bedside diagnosis, clinical decision-making, management, and disposition by providing limited, but directly relevant, clinical information.

History

Since its inception decades ago, EUS has developed into an essential component of emergency medicine practice. EUS competency is a core content requirement for all emergency medicine residents and part of the American Board of Emergency Medicine written and oral board examinations. EUS fellowships provide advanced training and are prevalent throughout the country with over 90 national programs.[3] Comprehensive specialty-specific guidelines for emergency ultrasound were first published over ten years ago by the American College of Emergency Physicians.[4]

Rationale

The emergency department provides a unique physical and clinical environment in which to apply point-of-care ultrasound. Variable ED volume and flow, critically ill patients, and patients with undifferentiated complaints all present unique challenges.

Because of this diversity of illness and illness severity, emergency ultrasound is conceptually divided into five functional categories: Resuscitative (e.g. acute cardiopulmonary resuscitation), Diagnostic (any emergent diagnostic capacity), Symptom/Sign-based (e.g. undifferentiated shock, dyspnea, chest pain), Procedure Guidance (e.g. central venous access, nerve block, peripheral IV, pericardiocentesis) and Monitoring (e.g. inferior vena cava measurements for volume resuscitation). Within each category Emergency Ultrasound can provide rapid assessment at the bedside.

Two brief clinical scenarios reflect challenges present in emergency medicine and highlight the rationale and categories outlined above. In the first clinical scenario, a patient with undifferentiated hypotension (e.g., an elderly patient found down at the side of road with loss of consciousness, mild back pain, but without obvious trauma) has bedside point-of-care cardiac, inferior vena cava, E-FAST (see below), and aorta exams which indicate hypovolemic or distributive shock (not obstructive or cardiogenic) and reveal the presence of a large abdominal aortic aneurysm (AAA). During the initial resuscitation, AAA is the presumed etiology of the patient's hemodynamic instability until proven otherwise, while several other etiologies are lower on the differential diagnosis. This case exemplifies a sign or symptom-based approach to undifferentiated hypotension, the utility of which is well described in the emergency medicine literature (**Table 1**).[5,6]

In a second clinical scenario, a patient with history and exam findings consistent with acute cholecystitis has a bedside point-of-care ultrasound which demonstrates

Table 1. Use of Ultrasound in Undifferentiated Hypotension

	Ultrasound Examination	
Etiology of Shock	**Inferior Vena Cava Findings**	**Cardiac Findings**
Hemorrhagic/ Distributive	Collapsing	Normal to hyperdynamic ejection fraction*
Cardiogenic	Non-collapsing	Decreased ejection fraction
Obstructive	Non-collapsing	Pericardial effusion, right heart strain

* May be decreased in late stage septic cardiomyopathy

gallstones and gallbladder wall thickening. The focused biliary ultrasound confirms the clinical suspicion as well as the diagnosis. A comprehensive right upper quadrant ultrasound performed by a radiology technician in the radiology suite, and interpreted by the radiologist, may include evaluation of the liver parenchyma, measurement of gallbladder width, measurement of intra-hepatic ducts, and often renal evaluation. This additional information may not be immediately relevant in the above mentioned clinical scenario. In the emergency department this is an example of emergency ultrasound as a functionally diagnostic exam. Diagnostic point-of-care ultrasound has also been shown to improve patient flow through the department, a valuable feature for any busy hospital center.[7] In both cases the treating emergency physician correlates the EUS imaging results with the patient's clinical picture within minutes of the patient encounter. If they do not correlate then alternate diagnoses and additional diagnostic studies will be indicated.

While EUS can be an invaluable tool for the emergency physician, it is nevertheless a user-dependent technology requiring technical expertise, image acquisition and interpretation, as well as clinical correlation in real-time at the patient's bedside. As with all such procedures and practices, it is imperative that the caring provider complete training, maintain skills, and understand its specific applications, strengths, and limitation

Specific Core Applications

Selected specific applications from **Table 2** will be discussed here briefly. Relevant clinical application, ultrasound findings, and limitations will be highlighted. Discussion of the technical performance of these exams is beyond the scope of this article.

Trauma

The Extended Focused Assessment with Sonography in Trauma (E-FAST) is an essential tool of the management of unstable trauma patients. The E-FAST evaluates the patient for pneumothorax, hemothorax, free intra-abdominal as well as pericardial fluid (***Image 1, Image 2***). When positive, this exam may dictate management; it has been shown to reduce mortality and time to operative care in critically ill patients.[8,9] It is imperative to understand the limitations of the FAST exam. It is designed to detect free fluid but does not differentiate blood from ascites or urine. Clinical correlation is necessary, especially in cases of patients with liver disease or pelvic trauma. In addition, the test characteristics of the exam are such that it may not detect amounts of free fluid less than 500 milliliters.[10] If clinical suspicion is high in the unstable patient, serial FAST exams have been shown to increase sensitivity. Fortunately, the FAST exam is most accurate in patients with hypotension where the rapid bedside information is most essential.[11] Lung ultrasound, the "Extended" component of the E-FAST, accurately detects traumatic pneumothorax and hemothorax (***Image 3***).[12,13]

Table 2. Emergency Ultrasound Modalities and their Core Applications

Examination	Selected Clinical Scenarios
E-FAST	Trauma (blunt & penetrating)
Biliary	Right upper quadrant abdominal pain
Pelvic	Suspected ectopic, intrauterine pregnancy
Cardiac	Shock, dyspnea, arrest
Abdominal Aortic Aneurysm	Shock, back pain, abdominal pain
Deep Venous Thrombosis	Suspected deep venous thrombosis
Bladder/Renal	Renal colic
Soft Tissue/Musculoskeletal	Abscess, joint effusion, dislocation
Pulmonary	Dyspnea, shock
Ocular	Retinal detachment
Monitoring	Shock
Procedural	(See Table 3)

E-FAST = Extended Focused Assessment with Sonography in Trauma

Image 1.

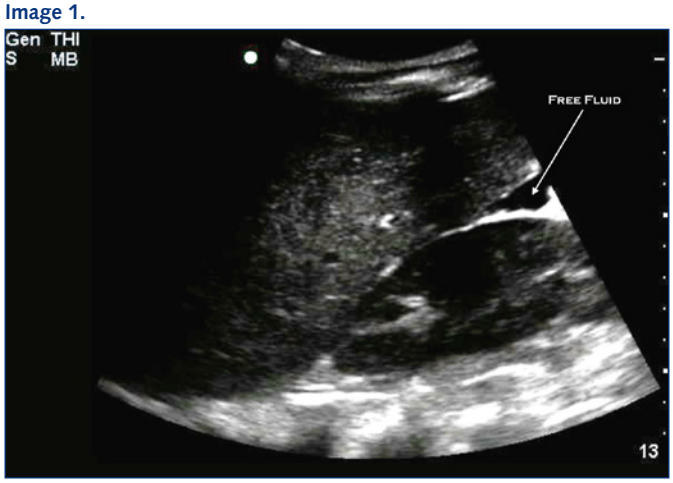
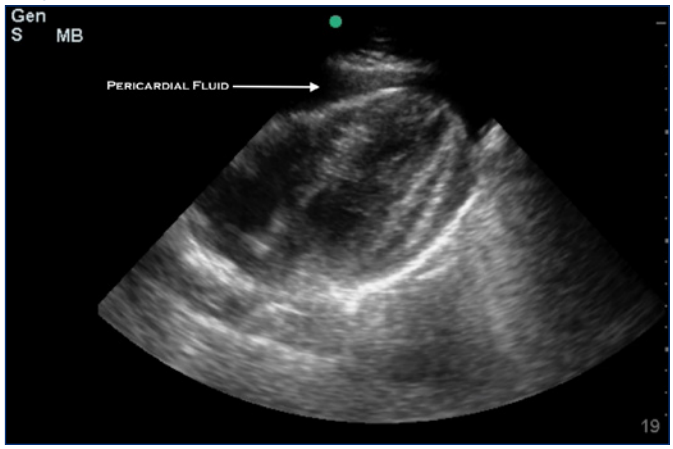
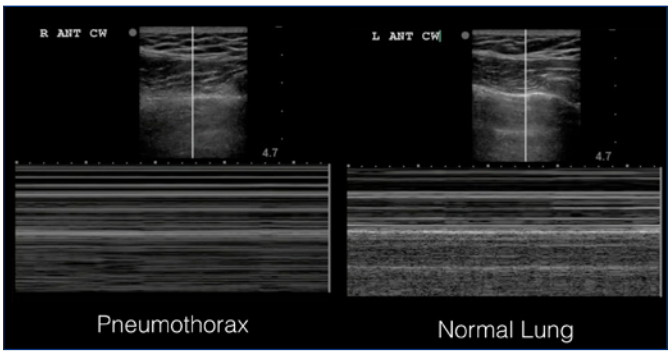


Image 2.



It is of greatest utility in unstable patients where chest radiography is indeterminate and CT imaging is not feasible. Ultimately the E-FAST can accelerate and optimize the emergency physician's care of critically ill trauma patients (e.g., tube thoracostomy, hospital transfer, laparotomy) and save lives by augmenting limited initial information.

Image 3.



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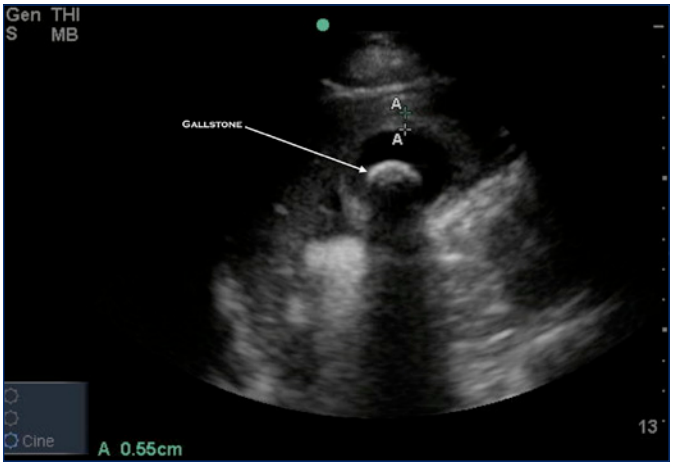

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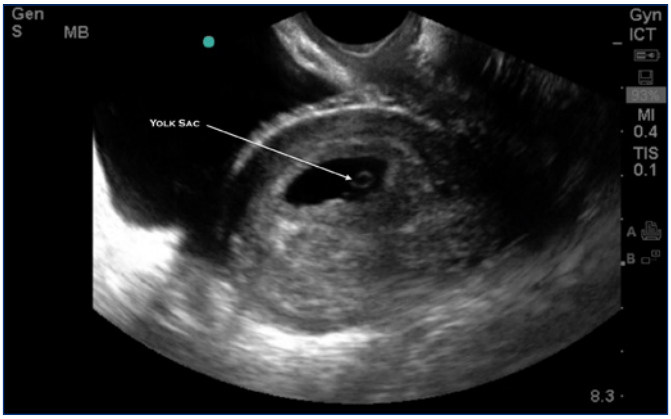


Gallbladder

The gallbladder exam, unlike the E-FAST, is rarely indicated in resuscitation but is particularly useful as a diagnostic exam in patients with suspected cholelithiasis or cholecystitis. The limited gallbladder exam includes evaluation for gallstones, gallbladder wall width, pericholecystic fluid, sonographic Murphy's sign and common bile duct width (***Image 4***). Several features of a comprehensive right upper quadrant ultrasound are omitted from the limited exam (e.g., gallbladder body width, liver parenchyma, intra-hepatic biliary tract). However, in coordination with a clinical evaluation, the limited right upper quadrant exam is well suited to diagnose cholelithiasis and acute cholecystitis.[14] The limited exam can also help determine which subsequent imaging modalities might be required (e.g. abdominal CT, comprehensive right upper quadrant US, or renal ultrasound) especially in the context of a normal point-of-care exam.

Pelvic

Pelvic ultrasound for intrauterine pregnancy (IUP) is used primarily in cases where ectopic pregnancy is suspected. Definitive IUP on limited pelvic ultrasound examination is defined as the presence of a yolk sac, fetal pole, or embryo (***Image 5***). In the unstable patient without definitive IUP the patient is presumed to have an ectopic pregnancy until proven otherwise.[15] The FAST exam, specifically the evaluation of Morrison's pouch in the right upper quadrant, is indicated in this scenario as the presence of free fluid predicts the need for operative management.[16] In the unstable patient with definitive IUP alternate etiologies should be sought for clinical presentation. Naturally, physicians must correlate with historical features (e.g. *In-vitro* fertilization) to determine if comprehensive pelvic ultrasound is indicated for detection of heterotopic pregnancy. In stable patients, point-of-care pelvic ultrasound is used to confirm IUP and to calculate fetal heart rate.

Cardiac

Focused cardiac ultrasound (FOCUS) is used for the rapid assessment of critically ill patients and includes assessment for pericardial effusion, global cardiac systolic function, right and left ventricular enlargement, and intravascular volume.[17] It is used in a variety of diagnostic and symptom and sign-based clinical presentations including undifferentiated hypotension, dyspnea, chest pain, suspected pericardial effusion, trauma and cardiopulmonary arrest. While FOCUS is an integral part of the initial time-sensitive evaluation and management of a critically ill patient, it does not replace the need for a comprehensive echocardiographic evaluation as indicated by the patient's presentation, physical exam findings, or initial diagnostic work-up.

Aorta

Emergency ultrasound accurately detects abdominal aortic aneurysm.[18] Rapid diagnosis of abdominal aortic aneurysm can save lives by shortening time to definitive management (***Image 6***). When the abdominal aorta is normal, alternate diagnoses must be considered based on the patient's chief complaint (e.g. new non-traumatic back pain) or clinical presentation. Ultrasound as a modality does not reliably detect whether or not there is *rupture* of the abdominal aorta, so correlation with the entire clinical picture is essential, and additional imaging is sought if the patient is stable.

Pulmonary

In addition to detection of traumatic pneumothorax and hemothorax (discussed in the E-FAST section), point-of-care

Image 6.

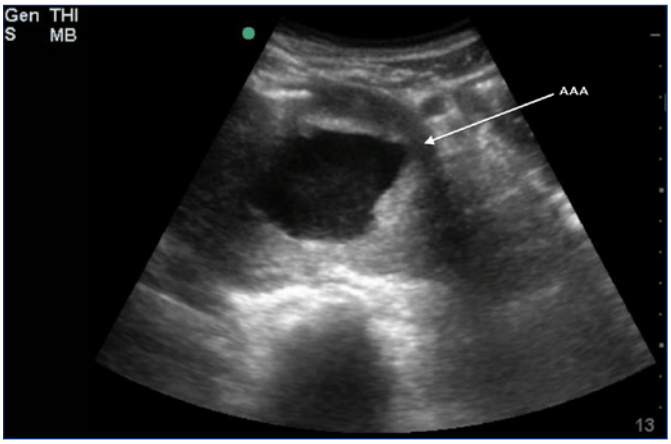


Image 8.

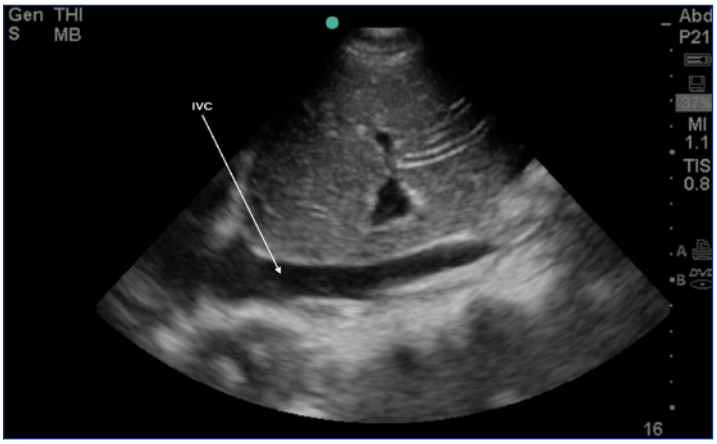


Image 7.

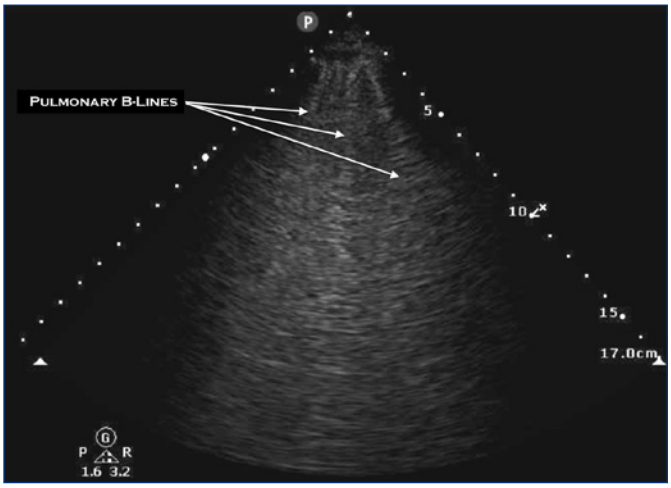
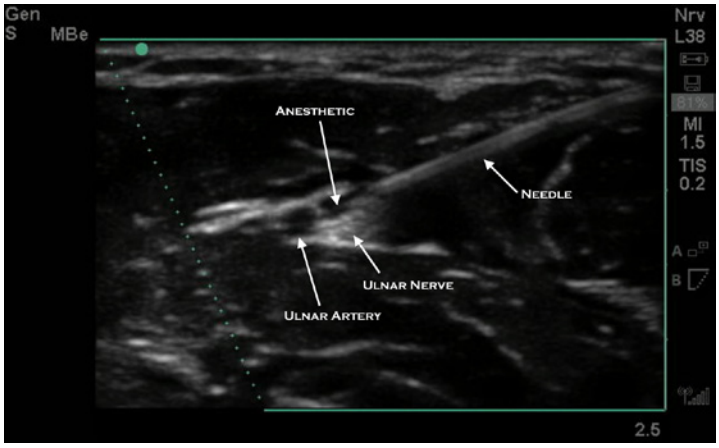


Image 9.



pulmonary ultrasound has a variety of diagnostic and symptom-based applications. It is most frequently applied in the patient presenting with dyspnea, where it can help differentiate COPD exacerbations from acute pulmonary edema as the etiology of the presenting complaint.[19] Specifically, the presence of *ultrasonographic* B-lines on pleural ultrasound reliably detects alveolar interstitial edema and adds valuable information to the total clinical assessment (***Image 7***). Point-of-care pulmonary ultrasound and cardiac ultrasound are often combined at the bedside in patients with this chief complaint. Pulmonary ultrasound also aids in the diagnosis and management of non-traumatic pleural effusions.[20]

Monitoring & Resuscitation

The inferior vena cava (IVC) is an easily visualized structure that provides valuable information in the hemodynamically unstable patient (***Image 8***). The amount of collapsibility of the IVC is also associated with specific central venous pressure measurements, and a change in the IVC measurements with fluid boluses predicts hemodynamic fluid responsiveness.[21] Patients with undifferentiated hypotension can be more easily classified as being in cardiogenic/obstructive or distributive/hypovolemic shock. A flat or significantly collapsing IVC is indicative of the latter types of shock and effectively eliminates many cardiogenic and obstructive etiologies of hypotension. In addition, integration of IVC and cardiac ultrasound into the management of sepsis is associated with management changes and improved outcomes.[22]

Procedural

Ultrasound guidance for emergency department procedures directly and significantly improves patient care. In 1999 Agency for Healthcare Research and Quality listed "real-time ultrasound guidance during central line insertion to prevent complications" as one of the twelve most highly rated patient safety practices to decrease medical errors.[23] This recommendation is based on multiple studies that have demonstrated reduced failure rate, reduced number of attempts, and reduced complications as compared with the landmark technique, most profoundly with cannulation of the internal jugular vein and in patients with complex medical conditions.[24] Ultrasound guidance is used in the emergency department to improve success rates and decrease complications in many other procedures (**Table 3**) (***Image 9***).

CONCLUSION

Emergency ultrasound is an essential component of emergency medicine practice and has been integrated into the training and board certification of all emergency physicians. It is performed at the bedside, directly at the time of the physical examination, in a matter of minutes. It has broad utility and serves, in its many functional categories, to aid in the diagnosis, management, and disposition of emergency department patients.

Table 3. Ultrasound Guidance for Procedures

Procedure	Benefits of Ultrasound-Guidance
Central venous catheterization	Improves success rate; reduces complications
Peripheral venous catheterization	Reduces central lines; reduces attempts
Arterial access	Improves success rate
Lumbar puncture	Improves success rate (primarily with increased BMI)
Paracentesis	Improves success rate; reduces complications
Thoracentesis	Improves success rate; reduces complications
Arthrocentesis	Improves success rate; reduces attempts
Regional anaesthesia	Reduces pain; reduces time to completion of procedure
Incision and drainage	Improves success rate; avoids unnecessary procedure
Identification and removal of foreign body	Improves localization
Bladder volume	Reduces unnecessary catheterization

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The Emerging Science of Gender-Specific Emergency Medicine

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INTRODUCTION

It is increasingly evident that sex and gender play an important role in disease and response to medical treatment. Accordingly, the National Institutes of Health (NIH) has begun targeting funding and initiatives toward sex- and gender-specific investigations. Although the field of Emergency Medicine (EM) has lagged behind other fields of medicine in its attention to sex and gender factors in research and clinical practice, the specialty has recently poised itself for significant growth in this area. The impetus for this increased attention to sex- and gender-specific medicine lies in the historical approach to gender in medicine in the United States and recognition of the resulting deficiencies in research, clinical practice, and medical education.

VIDEO – Click to watch Dr. McGregor's TEDx Providence talk, "Sex Matters in Emergency Medicine"

Historical Gender Bias in United States Medical Research

Scientific investigators have traditionally concentrated on the male patient for a number of reasons. First, the U.S. Food and Drug Administration (FDA), with the intention of preventing the abuse of women, categorized them as "protected subjects" in human clinical investigations conducted prior to World War II. The fear of harming women was compounded by fears that including women of childbearing age in clinical trials, particularly drug trials, might result in unforeseen teratogenic harm to the fetus. Further, there was uncertainty surrounding women's menstrual cycles, and how the fluctuating hormonal environment might affect comparisons made between subjects. For certain types of studies, hormonal differences might require increased sample size in order to allow investigators to control additionally for "stage of cycle."[1] Compounding considerations of risk, complexity, and cost was the implicit assumption that outcomes in men would be adequate proxies for outcomes in women, despite the fact that physiologic, anatomic, and metabolic differences between the genders argued against this assumption.

By the 1980s, with women's individualism brought to the nation's consciousness by the feminist movement, the concept of sex in human biology was revolutionized. In 1985, the National Institutes of Health (NIH) established a Public Health Service Task Force on Women's Health. Its recommendations for increased attention to women's health issues led to development of specific guidelines regarding the inclusion of women as subjects in NIH-funded extramural research.[2]Subsequently, in 1990, the Office of Research on Women's Health was established to ensure that women's health issues were adequately addressed in research conducted by the NIH and to ensure that women were appropriately represented in all studies supported by the NIH. Further, a Clinical Equity Provision was included in the 1993 NIH Revitalization Act to ensure that the efficacy of treatments for women would be scientifically determined and not extrapolated from data derived from male participants, as had been done previously.[3] This legislation formed the basis for the science of gender-specific research.

The new appreciation that single sex studies fail to provide a complete picture of the distinctions between men's and women's health and morbidity[4] has, simultaneously, raised concerns about women's access to safe, effective clinical treatment.[5] Viewed from a gender lens, modern medicine is predicated on a startling lack of information about how women respond to treatments tested exclusively on men.[3]

Defining Women's Health, Sex and Gender

Initially, the notion of women's health was limited to issues surrounding reproduction: childbearing, menstruation, breast health and menopause. This archaic view has been termed "Bikini Medicine." The conceptualization of women's health has evolved significantly in the past decade and encompasses far more than reproductive issues.[6] As a result of this evolution, women's health is seen to depend on complex interactions between individual biology, health behavior and the socio-economic context of women's lives.[7]

"Sex" refers to biological differences between men and women such as chromosomes (XX or XY), internal and external sex organs and hormonal profiles. "Gender" refers to the socially constructed roles, values and personality traits that vary from society to society and over time. Every cell has a sex. Whether a cell contains an XX or XY chromosome may have an impact on everything from regulation of gene expression in a cell line to efficacy or toxicity of a pharmaceutical in a living human.[8] The Institute of Medicine (IOM) has stated that "Sex, that is being male or female, is an important basic human variable that should be considered when designing and analyzing studies in all areas and at all levels of biomedical and health related research" (IOM 2001, p.3). Sex and gender are interactive. In real life, there is a continuous interaction between the two; women's health is determined by the biology of being female and the social context of gender.

Accordingly, in recent years, there has been a shift away from talking about "women" to talking about "gender." This is evident at institutions of higher education, where "women's studies" are increasingly being replaced with "gender studies." This shift signals the end of the "one size fits all" era, in which there was a male norm in biomedicine.[4] Instead, the concept of sex and gender have now been recognized as determinants of health and disease for both women and men.[10]

While some emphasis on women's health is needed to correct the imbalances created by the historical use of men as the reference point in education, research and health services, this emphasis is not meant to minimize the impact of gender on men's health. Sex- and gender-specific medicine embraces the concept that differences between men and women encompass the entire organism – not just their reproductive biology – and that these differences have significant implications that will improve the precision and quality of healthcare for both men and women.

Incorporating a Gender Perspective into Medicine

As we begin to compare data obtained from the direct study of female patients with those we had gathered from males over the years, the new science of sex- and gender-specific medicine is emerging. We now have over 20 years of research, mandated by Congress to include women. How are we doing in areas of education, research and the clinical aspect of patient care?

Education

Are the doctors of tomorrow still learning the women's health of yesterday? Surveys of medical students and residents entering practice demonstrate that their programs lack education in gender-specific women's health and their examinations are void of questions that bring a women's health perspective into the thought process.[11] A 2003 survey of U.S. medical schools indicated that fewer than half of the respondents reported that they offer a women's health curriculum.[12] While 95% of these schools cover sexual and reproductive function specific to women, only a minority taught about the women's leading causes of death and medical disorders that disproportionately affect women. More recently, a 2006 study reported that 75% of medical schools had women's health courses, but only 7% offered interdisciplinary courses that offer a solid grounding in women's health.[13]

Research

Greater awareness of sex and gender medicine – through the increased attention of government agencies, researchers, and journal editors – has helped stimulate new perspectives on conducting research. For many, gender-based research has come to mean more than simply including women and acknowledging gender as a covariate; indeed, sampling and statistical techniques that simply adjust or control for differences in men and women fail to tell us whether the outcomes are the same for men and women. Ideally, researchers will begin to routinely examine how gender modifies or mediates factors related to disease outcomes.

However, recent evidence suggests that there remain barriers to the acknowledgment of sex and gender in funded and published research. Frequently, even the relatively simple steps of gender inclusion and gender-adjusted analyses are not performed. For example, of clinical trials published in the New England Journal of Medicine (NEJM) between 1994 and 1999, 86% of 120 did not perform gender-specific analyses.[14] In a review of 239 phase I and II clinical trials, two thirds of the trials excluded women entirely, and 90% did not conduct analyses specific to gender.[15] A 2010 Women's Health Research report by the IOM identified multiple gaps in the sex and gender-related content of existing research, such as a lack of studies on the social and environmental determinants of disease in women, few investigations into high-morbidity diseases affecting women, and underrepresentation of socially disadvantaged groups of women. They also noted that study findings were not well communicated to women who might benefit from them. These examples suggest that much progress must be made before clinical research comes near to meeting the new federal recommendations regarding gender.

Clinical

Gender-based medicine can only be translated into routine clinical practice if it is well informed by advances in research and systematically included in medical school and residency curricula. Despite attempts to make women's health curricula easily accessible, recent findings confirm that only a small percentage of healthcare providers incorporate this knowledge into their clinical practices.[16] If the emerging science continues to support the fact that sex and gender is a significant factor in diagnostic reasoning and treatment decisions, all healthcare providers will need to seek a greater understanding of gender-specific research findings in order to provide patients with safe and effective care.

Incorporating a Gender Perspective into Emergency Medicine

EM has come to assume an important role in healthcare in the U.S. EDs receive 120 million visits annually; this number is projected to continue to rise in upcoming years. Like all specialists, EM providers will have to be sensitive to the impact of sex and gender differences on health care delivery; unlike most other health care providers, they must learn to incorporate these considerations in a high-acuity, high-volume care setting. Clearly-articulated information related to the practice of sex and gender medicine will be particularly critical in the practice of EM, where key decisions can lead to large differences in outcome over a short period of time.

Yet to date, the specialty of EM has not been a high performer in inclusion of women in clinical research or analysis of health outcomes by gender. A review of EM literature published in 2011 found that only 2% of the studies reported gender-specific outcomes and only 10% included gender as a covariate or independent variable in the analysis. In 21% of the studies subject gender was not reported.[17] Based on similar reviews of the scientific literature in other fields[3, 18, 19]; EM seems to be underperforming in its attention to the effect of gender on disease.

However, recent activities have suggested that gender-specific science is becoming a priority area of growth within EM. A number of recent publications have drawn attention to sex- and gender-specific topics or gaps in our knowledge about sex- and gender-specific issues.[17] In 2014, *Academic Emergency Medicine (AEM)*, the journal of the Society of Academic Emergency Medicine (SAEM), selected gender-specific emergency medicine research as the focus of its one-day consensus conference, an annual event designed to shed light on a priority area of emergency care-related research. The same journal instituted a policy to require original investigations to report a breakdown of subjects by gender. The SAEM Academy of Women in Academic Medicine (AWAEM) has established as one of its core objectives the advancement of research that relates "to our understanding of the role of sex and gender in emergency illnesses/injuries and emergency care and practice."[20]

Rhode Island is the home of one initiative to expand and sustain knowledge around sex- and gender-specific medicine related to emergency care: in 2011, the Department of Emergency Medicine at The Warren Alpert Medical School at Brown University established a Division of Sex and Gender in Emergency Medicine (SGEM) (formerly called the Division of Women's Health in Emergency Care). The division runs a two-year fellowship-training program in sex- and gender-specific medicine and women's health for EM residency graduates. Division members, who are a multidisciplinary panel of Brown faculty, perform original research focused on sex- and gender-based analyses in a variety of acute care topics including Gender Discrepancies in Time-to-ECG, Chest Pain Unit Stress Test Utilization, and Completion of Resuscitation Bundle in Severe Sepsis and Septic Shock. Educational activities include instruction of residents in a four-week clinical elective that provides rich clinical opportunities, including at the Women's Cardiac Center at The Miriam Hospital and Hasbro Children's Hospital Adolescent Clinic. A fundamental goal of SGEM is to raise regional and national awareness about sex and gender-based health issues and research by establishing a community advisory board and creating educational programs for SAEM. The intent of this division is to bring national attention to the new science of sex and gender research and ultimately contribute to the effective management of women in the acute care setting.

CONCLUSION

Health care providers are beginning to recognize the need to improve outcomes for women and the importance of understanding the role of sex and gender in clinical practice. Continued progress in research with accompanying curricular advances have the opportunity to translate into improved diagnosis and treatment of both male and female patients. The opportunity exists for emergency physicians to inform the study of sex- and gender-specific acute clinical care and translate this new data into lifesaving outcomes. Recent activities have suggested that sex- and gender-specific medicine is becoming a high priority in the field of Emergency Medicine.

For more information: www.rhodeislandhospital.org/sgem

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Concussion: A Primer for the Physician

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Concussions have garnered much attention in recent years and are recognized as having far reaching and potentially permanent consequences. They often cause significant and sustained neuropsychological impairments in information-processing speed, problem solving, planning, and memory, and these impairments are worse with multiple concussions.[1] This is best demonstrated in athletes, a population of patients at greatest risk for repeated head injuries. In fact, concussions are the most common head injury sustained by athletes; 8.9% of all high school sports injuries reported are concussions and account for 19% of all non-fatal injuries in football.[2] The incidence of concussion among American teen athletes has grown from 300,000 incidents annually 10 years ago to upward of three million cases now. The increase is likely due to the increased awareness by the sports community, leading to greater recognition and reporting. It is unclear if changes in rules and protective equipment has changed incidence.

Nonetheless, these figures underestimate the frequency of concussions, as those with minor head injuries are often unlikely to seek care. In a survey by the Associated Press in 2009,[3] it was found that at the professional level, nearly one-fifth of 160 NFL players had hidden or downplayed the effects of their concussions. Athletes fear being removed from play and letting teammates down. Coaches, sideline personnel, and athletes themselves often do not recognize their own symptoms as a concussion. According to a McGill University study, 70.4% of athletes surveyed retrospectively reported experiencing the symptoms of a concussion during the past year, but only 23.4% realized that they had sustained a concussion in real time.[4] The study also found that 84.6% of athletes with a concussion had actually experienced more than one concussion. Part of the dilemma in diagnosing concussions is that the definition itself has been evolving. At this time, the most accepted definition of concussion is a clinical one, introduced in 2001.[5]

> Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathologic and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:
>
> 1. Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an ''impulsive'' force transmitted to the head.
>
> 2. Concussion typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously.
>
> 3. Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury.
>
> 4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course; however, it is important to note that, in a small percentage of cases, post-concussive symptoms may be prolonged.
>
> 5. No abnormality on standard structural neuroimaging studies is seen in concussion.

Contrary to popular belief, loss of consciousness is not required for the diagnosis of a concussion. In fact fewer than 10% of concussions include a loss of consciousness.

Post-concussive syndrome, a constellation of symptoms seen after a head injury, is defined by the World Health Organization as starting at 3 months after the injury. Until this time, symptoms reported by the athlete are referred to as "concussive symptoms."[6]

SEQUELAE

The most feared complication of a concussion is second impact syndrome. This rare condition occurs when a second impact is sustained before the brain has recovered from the first concussion. This has only been reported in children and can be catastrophic. Those who survive are often left permanently disabled. By 2003, 21 deaths had been attributed to second impact syndrome.[7]

Psychiatric sequelae of mild traumatic brain injury include dementia, depression, and early onset of Alzheimer's and other memory-related diseases.[8] A 2005 UNC Chapel Hill survey of 2,550 retired professional football players found that 61% had experienced at least one concussion during their career, with 24% experiencing at least 3 concussions, and that this population had a significantly earlier onset of Alzheimer's disease than the general male population.[8] Another survey of 1,063 retired NFL players found that 6.1% of players age 50 and older had been diagnosed with a dementia-related condition, while age matched controls had

a rate of 1.2%. They also found that younger players (30 to 49 years) had a rate of 1.9%, 19 times the age matched control rate of 0.1%.[9]

The neuropsychological effects of sports-related concussion have been extensively documented.[6] A study comparing cognitive function and post-concussive symptoms between 183 college athletes with concussions and age-matched control subjects found impaired performance and increased headaches, concentration difficulties, and behavioral problems in the injured group. Furthermore, in a study of boxers, 100% of those studied were found to have impaired concentration, attention, and memory. The degree of cognitive dysfunction was proportional to the boxer's sparring exposure, a finding that supports the concept that multiple concussions have a cumulative adverse effect on cognitive function.[10] Athletes who suffered multiple concussions were found to perform more poorly on neuropsychological tests and were more likely to have prolonged learning difficulties than those with a single or no history of concussion.

Another postulated long-term consequence of mild traumatic brain injury is Chronic Traumatic Encephalopathy (CTE), a disease that develops as a result of multiple concussions and subconcussive blows to the head. It is associated with personality changes, memory impairment, parkinsonism, and speech and gait abnormalities. First described in 1928, it was believed to be a disease that affected only boxers but is now believed to affect a much larger population of contact athletes, military personnel, and others who sustain multiple minor brain traumas.[11]

The result of concussions is cumulative. The forces required to sustain a subsequent concussion need not be as great as those that result in an initial concussion, a finding that persists even after complete recovery. Extrapolating these long-term consequences from the NFL to the college, high school, and Pop Warner athlete is cause for concern. Early identification and proper treatment can help reduce the numbers of some of these complications and educates the athlete on the risks of head injury while playing sports.

PATHOPHYSIOLOGY

Concussions have been recognized to result from a confluence of head acceleration, sheer force, and rotational deformity.[6] The signs and symptoms of concussion are related to a metabolic dysfunction in the inferior parietal, prefrontal, and cingulate cortex. Decreased cerebral blood flow, hypermetabolic state with increases in glycolysis, glutamate-induced excitotoxicity, and abnormal cellular ionic fluxes occurring after a concussion all contribute to the dysfunction.[12] Because a concussion is a functional disturbance rather than a structural one, there are no gross changes on CT and MRI.

DIAGNOSIS AND MANAGEMENT

Acutely, a thorough neurologic exam should be done either on the sideline, in the Emergency Department, or in the primary care office. The history should probe the presence and severity of symptoms commonly seen in concussion, as well as eliciting a brief history of prior head injuries. Symptoms of a concussion usually fall in one or more of six categories: cognitive, physical, emotional, balance and vestibular, visual, and sleep.[6]

The cohort of patients that requires urgent neurologic imaging is not well defined. From the sideline, patients with a concerning physical exam or deteriorating neurologic status should be emergently transported to the Emergency Department. The goal of imaging is not to diagnose a concussion, but rather to exclude more life-threatening brain injuries, including skull fractures, intracranial hemorrhage and parenchymal contusion. The American College of Emergency Physicians has published guidelines to help identify those patients who require imaging after sustaining a blunt head injury. (http://www.acep.org/Clinical---Practice-Management/Revised-Clinical-Policy--Neuroimaging-and-Decisionmaking-in-Adult-Mild-TBI-in-Acute-Settings/)

The management of concussions continues to evolve. To date, there are over 70 definitions and grading scales for concussion, all of which have fallen out of favor. Nevertheless, the initial goal of concussion management is to protect the brain and reduce brain vulnerability. To that end, any athlete who sustains a concussion should not be allowed back on the field the same day. Based on their symptom score and threshold, instructions should recommend individualized programs of physical and cognitive rest, as well as reduced visual stimulation to hasten recovery. Given the natural pathophysiology of concussions, symptoms can worsen within the first 24-48 hours; therefore, the athlete should not be allowed to return to the field and should be observed during this time.[6]

Balance testing (such as Balanced Error Scoring System testing) and computerized neurocognitive testing have been found to be helpful adjuncts in managing the patient with a concussion.[13] For both, baseline testing plays an important role in offering a personalized point of comparison, similar to a baseline EKG. In general, computerized neuropsychological assessment employs a 30-minute online module that includes a symptom checklist and tests of memory, speed and processing time. When a baseline test is available, it can be used as a tool to guide the clinician in deciding when it is safe for a patient to return to activity. However, the computerized testing cannot serve as a substitute for a medical evaluation and is not a stand-alone assessment program.

Once the athlete is asymptomatic and clinical examination, balance and neurocognitive test scores normalize, he or she may be considered for physical reintegration. This involves a graded return to play as described in the Prague/Zurich guidelines.[14] The student athlete represents a special population that also requires cognitive reintegration. No guidelines exist regarding cognitive reintegration and often this is done in collaboration with the athlete, the parents, and the school.

THE LAW

Inspired by Zackery Lystedt, in 2011, Rhode Island, along with all of the other states, enacted a youth sports concussion-related law. While the details vary slightly from state to state, the goal of the law is to treat our high school athletes as formally and aggressively as we do our professional athletes. Patients who will be putting themselves at risk for another head injury, i.e. athletes, require documentation stating that they have recovered from their concussion. Optimally, evaluation and return to learn and play decisions should be managed by an individual with experience in managing sports-related concussions.

In June 2014, the law was expanded requiring school nurses to obtain education regarding the signs and symptoms of a concussion. Because cognitive activity can exacerbate the symptoms of a concussion, school nurses are poised to identify those who have a delayed presentation of their concussion.

For further information, visit the Heads Up program website, an online resource developed by the CDC to help educate medical professionals, coaches and parents about concussions: http://www.cdc.gov/concussion/HeadsUp/youth.html.

FUTURE DIRECTION

The area of concussion research has exploded in Rhode Island and nationally. Please refer to the May 2014 RIMJ to find out about projects being conducted in Rhode Island, available at: http://www.rimed.org/rimedicaljournal/2014/05/2014-05.pdf

Graded return to play protocol: from "Consensus statement on concussion in sport: the 3rd International Conference on Concussion in Sport."[14]

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Complete physical and cognitive rest.	Recovery
2.Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity < 70% MPHR No resistance training.	Increase HR
3.Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities.	Add movement
4.Non-contact training drills	Progression to more complex training drills e,g. passing drills in football and ice hockey. May start load progressive resistance training)	Exercise, coordination, and cognitive Restore
5.Full contact practice	Following medical clearance participate in normal training activities	confidence and assess functional skills by coaching staff
6.Return to play	Normal game play	

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The Extinction of Triage

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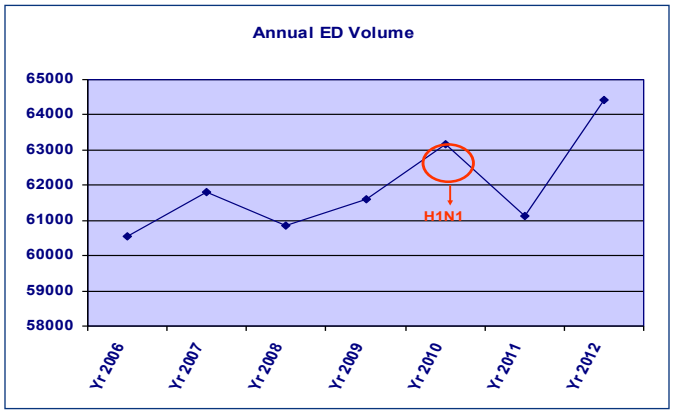
In the past few decades, the volume of patients seeking emergency department care has risen, while the number of hospitals across the U.S. has declined. This means that today's hospitals must evolve to accommodate more patients. Facilities are operating with limited staff and space resources, and seek to optimize their processes to achieve the highest efficiency, without sacrificing quality or safety. Triage is one part of emergency department management that has undergone a critical re-evaluation to enhance efficiency, while following standards of care. We describe the results of our hospital's process redesign.

The concept of triage is believed to have originated in France during the Napoleonic era. Baron Dominique-Jean Larrey, Napoleon's surgeon, was credited with both the creation of a precursor to the modern ambulance unit and a classification system for prioritizing the wounded on the battlefield.1 In its earliest medical origins, military triage placed highest value on those soldiers who could be quickly returned to battle. Arguably, however, it was not until the Vietnam era that military triage principles were brought to American soil and applied to the civilian hospital setting. During this time, civilian helicopter ambulances, paramedic services, and resources to handle mass casualties began to evolve on the home front. As hospital emergency department's grew in volume, size and sophistication, so too did the variety of triage processes nationwide.

The current comprehensive triage goal is to gather enough information about the patient to determine the acuity, or level of severity of the illness, of the patient. This level determines the rapidity of care that needs to be delivered to the patient; i.e. whether that patient has an immediate or urgent potentially life- or limb-threatening illness, or can safely wait for the care that is expected. There are many different examples of triage systems currently in use in the United States; for example, some hospitals use a two-level triage (emergent versus non-emergent), while others use up to a five level triage (Resuscitation, Emergent, Urgent, Non-urgent, Referred). The Emergency Severity Index (ESI), a five-level triage scale developed by Drs. Richard Wuerz and David Eitel, has become the most widely used system in the US.2 The ESI triage system sorts patients based both on their need for medical attention and their anticipated use of resources (lab, imaging, etc) in the emergency department. Many hospitals have developed nursing order protocols or experimented with physician or midlevel providers at triage.

Figure 1. Annual ED volume at Kent Hospital in Warwick, RI. The discrepancy in 2010 can be attributed to the increase in patients due to the H1N1 outbreak.

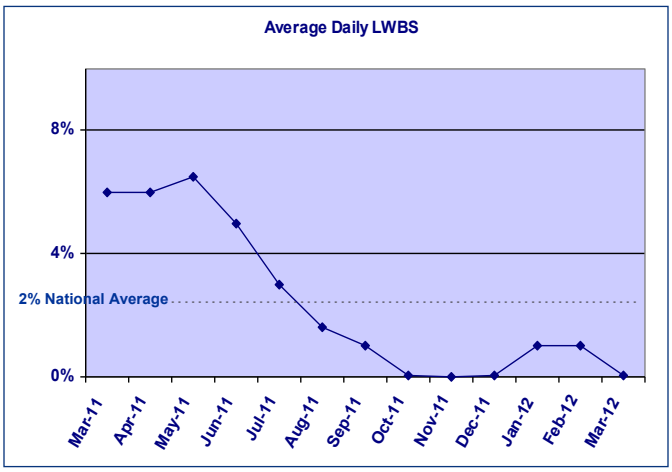


At Kent Hospital, in Warwick, RI, we report on a delivery of care model designed to rapidly and safely bring the appropriate patients to the appropriate area of the emergency department.

Before the process changes in patient triage and evaluation that were implemented in July 2011, the Emergency Department (ED) at Kent Hospital was typical of many larger-than-average-sized community hospitals across the U.S. (**Figure 1**). Patients would present at the ED entrance via private vehicle, ambulance, or other means and would be triaged by a registered nurse. Some patients arriving by ambulance would have this evaluation process completed after being placed in a patient bed. This process would involve the collection of demographic information, vital signs, and a nursing assessment of the patient's presenting complaint and current medical condition. Full registration of the patient was also frequently accomplished in this model. This process would often take 5-15 minutes, and based on the results of this triage evaluation, the patient would be placed in a patient care room where they would subsequently wait for evaluation by a medical provider, or in a chair in the ED waiting room if the patient was deemed to be medically stable and there were no available patient care rooms.

We abandoned this triage process because of its many flaws. Patients would not necessarily have rapid access to medical care, and as a result would often wait for long times before necessary treatment and testing were initiated. At our hospital, and at many emergency departments nationwide, patients would often wait up to several hours before

Figure 2. Average daily percentage of patients left without being seen at kent Hospital in Warwick, RI. The RAA was implemented in July 2011.



being evaluated by an advanced practitioner or physician, and up to ten percent of patients would become frustrated and leave without being seen by a medical provider. This "Left Without Being Seen" metric was substantially higher than the national average of 2% (**Figure 2**). This flow model inevitably created a bottleneck that hindered timely access to care.

As in most hospitals dealing with similar challenges, our hospital administration recognized these deficiencies in addressing the needs of the community. ED Leadership, front line staff, and Hospital Administration worked in collaboration to envision and redesign a new triage model that would reduce the time required to triage patients while maintaining patient safety, reduce the wait time to see a medical provider, enhance the patient experience, and improve overall throughput time to patient discharge from the ED. Typically these types of cultural and process changes are best accomplished with strong administrative support, as well as staff involvement and education.

The new model developed by this team affected clinical space, staff function, and patient flow. At Kent Hospital, the team opted to convert an area of the ED formerly used to treat low acuity patients and a portion of the existing waiting room into a new 10-bed area titled the "Rapid Assessment Area" (RAA), open from 8 AM to 1 AM each day. This model also involved a redistribution of existing nursing staff and medical providers. In the new model the triage process has evolved into a rapid intake process, during which a technician collects only basic demographic patient information and vital signs when a patient presents for care. The goal of this new process is to place every patient in a treatment bay within five minutes. The team leader nurse (TLN) in the RAA is ultimately responsible for all patients presenting to this intake area. Those patients requiring cardiac monitoring will bypass the Rapid Assessment Area and be sent to a monitored bed in the main emergency department under the direction of the TLN. If a patient is deemed appropriate for an unmonitored bed, they are placed in one of the available beds in RAA for evaluation by the nurse and licensed independent provider which may be a physician, physician assistant, or nurse practitioner. Patients arriving by EMS are evaluated by a registered nurse who determines bed placement based on the patient's chief complaint and, if assessed to be stable for evaluation in the RAA, are sent there for further care.

There are infrequent situations where the RAA provider evaluates the patient and determines the patient needs to be moved or "re-triaged" to a cardiac monitored bed, in which case an appropriate hand off communication is given to the treatment team in that area. This early provider evaluation ensures the highest quality of care for these patients. Patients with low acuity complaints have testing and treatment initiated in RAA, and are subsequently moved to a comfortable area to await disposition. Patients deemed appropriate for RAA but requiring more time-consuming testing or treatment are moved to another treatment area where they receive this ongoing care under the continued management of the RAA provider team. This ensures optimal utilization of RAA treatment bays.

The patient care process is further improved by the use of a dedicated diagnostic imaging area in RAA where patients receive basic radiological studies. This area is staffed by a diagnostic-imaging technician during the hours of operation of RAA. Point-of-care testing is done in RAA, and transport personnel dedicated to RAA transport other laboratory specimens to the main laboratory when needed. Lastly, the full registration process is completed only after the patient care process is complete. The registered nurse reviews all discharge instructions, prescriptions, and teaching with the patient. The registrar completes the full registration process in an area adjacent to the RAA next to the main exit from the ED, then provides the patient with all discharge documentation, including prescriptions.

Perhaps most crucial to the success of the entire process was the need to change the culture in which medical care was provided to patients. The traditional triage process had been in place for decades, as had the notion that patients should stay in an ED bed once placed there, as opposed to considering the overall department's need to maintain patient flow when considering where to locate patients during various components of their care. Efforts had been made previously to improve the triage process at Kent with variable success, and the environment was ripe for change. After a number of planning meetings between ED leadership and leadership of all ancillary departments, a plan was developed to include a ten-day "test for change" of the new model of care. Everyone involved in the patient care process, from technicians to nurses to physicians to registrars, needed to reevaluate their mindset about how patient care and patient flow had previously been provided.

The implementation of the Rapid Assessment Area at Kent Hospital clearly shows an improvement in average

Figure 3. Average door to provider time for all patients in minutes at Kent Hospital in Warwick, RI. The rapid assessment was implemented in 2011.

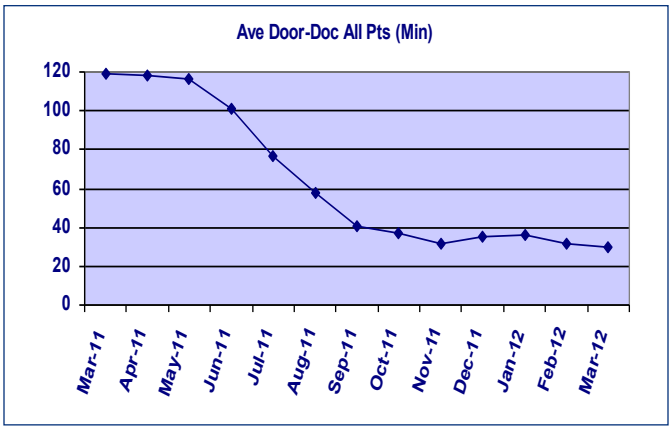


Figure 4. Average turnaround time for all patients in the emergency department at Kent Hospital and average ED daily volume. As one can see, even though the daily volume increased, the turnaround time still decreased.

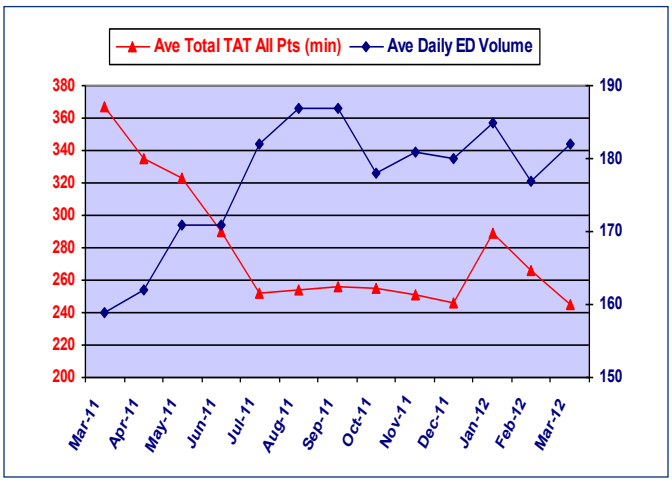
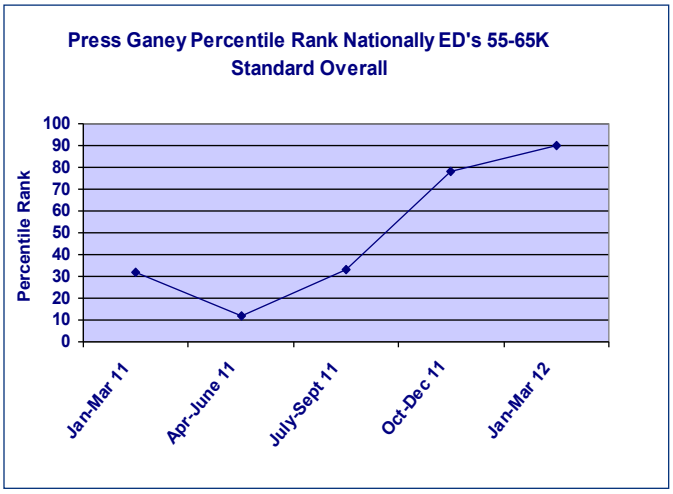


Figure 5. Percentile rank of Press Ganey scores for Kent Hospital in Warwick, RI when compared nationally to similarly sized emergency departments. The RAA was implemented in 2011.



door to doctor time (time from arrival into the ED to being evaluated by a medical provider) (**Figure 3**), a decrease in the percentage of patients leaving without being seen (patients registering to be seen by a medical provider but leaving the ED prior to this evaluation) (Figure 2), and an improvement in the turn-around time (time from arrival to the ED to disposition from the ED) for all patients in the emergency department (**Figure 4**). No additional staff were required for the first year of the process. However, because of the success of the initiative, the hours of operation have subsequently been expanded and additional physician, mid-level provider, and nursing staff has been added to accommodate those hours. Since the inception of the RAA, Kent Hospital has achieved a statistically significant improvement of 4.7 mean score points for Emergency Department Overall Satisfaction (**Figure 5**) on the official January 2012 Press-Ganey report, which is a nationally recognized patient satisfaction survey tool used by over 50% of the hospitals in the U.S.3 The process change we report exemplifies the way emergency departments need to continuously re-evaluate the way in which they deliver care to their communities. Flexibility is crucial to improving throughput. Redesigning care models is best accomplished with hospital administrative support, fostering staff interest and engagement in achieving goals in a data-driven environment.

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Scribes: Letting Doctors Do What They Do Best

BENJAMIN M. MARKS, MATTHEW A. KOPP, MD, FACEP, CPC

Delegating the chore of data entry is not a new idea. In the past, physicians have utilized dictation software and transcriptionists to document patient records. As more and more hospitals and private practitioners are transitioning to an electronic medical record to be in compliance with "meaningful use," a new class of medical professional has emerged to alleviate the burden of documentation. Many Emergency Departments and other high-volume practices have turned to medical scribes, highly trained individuals who document patient encounters and assist in a myriad of nonclinical tasks.

Typically, scribes are graduate or undergraduate students seeking clinical experience in pursuit of a career as a physician or midlevel provider. Many scribes work part-time throughout their college careers while others take advantage of a gap year while concurrently applying to professional schools.

The Joint Commission defines a scribe as an unlicensed person hired to enter health information into the electronic medical record under the direction of a licensed independent practitioner, physician assistant, or registered nurse.[1] Unlike transcriptionists, scribes work alongside physicians and are able to chart and edit the medical record in real time. Moreover, the role of a scribe is not limited to documentation. In addition to documenting the history and physical exam, scribes complete time-consuming forms, discharge paperwork, track test results, and retrieve old medical records and EKGs. They can also gather supplies for procedures and confirm medical information at outside facilities such as nursing homes and pharmacies. Their position is, in actuality, a hybrid between documentation specialist, personal assistant, and communications liaison.

Because scribes are not responsible for providing direct clinical care, they are more readily accessible to patients who rely on them to relay messages to the doctor and other clinical staff. Scribes fulfill a critical role by completing all of the necessary and increasingly tedious tasks mandated by various regulatory agencies. With the use of scribes, doctors are able to focus their attention on providing care while patients enjoy the undivided attention of the medical provider. The scribes equally appreciate this new role as they have an unparalleled experience, gaining invaluable insight into medicine and the cognitive process behind medical decision-making.

Five years ago legislators passed the American Recovery and Reinvestment Act, encouraging eligible providers to adopt an electronic health record (EHR). Incentive programs legislated rewards for early implementers who demonstrated "meaningful use" of the technology. The new laws also imposed penalties for late implementation after 2014. Beginning next year, Medicare reimbursements will decrease 1% annually for providers who are not compliant with the mandate.[2] Many physician practices anticipated negative impacts to revenue and productivity with the implementation of an EHR and subsequently piloted scribe programs to mitigate potential losses and maintain an efficient work place.

There are two practical ways to roll out a scribe program: outsource to an established medical scribe service or develop a program internally. Quotes from outside companies typically range from $20 - $25 per scribe hour,[3] a cost that includes human resources, ongoing training, scheduling and continuous management. Additionally, many companies charge significant initial assessment and start up fees when accommodating larger practices.[4]

Homegrown programs are an alternative to outsourcing and their success depends on three factors: 1) administrative oversight, 2) close proximity to colleges and universities and 3) an effective training program. Under the direction of a "physician champion," trained personnel can provide program oversight, ensure accurate documentation, and evaluate employee performance.[3] Larger practices often utilize their own human resources department to assist with scribe recruitment and hiring. Groups located around institutions of higher learning are uniquely positioned to build their own scribe program because they enjoy a renewable pool of highly qualified applicants. These applicants are typically eager, tech-savvy, and academically accomplished. However, hiring these career-oriented individuals creates an inherent obstacle for these programs; employees often leave after one or two years of service. The high rate of turnover as scribes advance to professional schools necessitates a robust recruitment and training program.

Typically, before working in a clinical setting, trainees complete approximately 100 hours of clinical and didactic training, usually incorporating a review of anatomical and medical terminology, extensive shadowing, and EHR education. Successful programs maintain a strict standard of competency before allowing scribes to work clinically. Scribes must demonstrate an understanding of medical vocabulary, proficiency with documentation software, and an accurate understanding of evaluation and management (E/M) coding.

Both internal and outsourced programs need to meticulously monitor scribe performance to ensure quality documentation and compliance with governmental standards. Metrics from billing and coding organizations provide the necessary data to measure scribe productivity. Scribes routinely attend meetings for billing and compliance updates and are well versed in the medical and legal implications

of the permanent medical record. Physicians often rely on scribes for keeping them abreast of documentation requirements; some programs train scribes to review records in a live clinical setting and alert the physician of potential documentation deficiencies. Although initially viewed with skepticism by regulators, administrators, and even some physicians, the scribe role has demonstrated financial gains and improved efficiency. These benefits, coupled with increases in both provider and patient satisfaction, justify the expenditure of time and resources needed to implement a scribe program.

Although emergency departments most frequently employ scribes, many other specialties have expressed interest and considered the logistics of integrating scribes in their own practice. In one cardiology clinic physicians using scribes saw a 59% increase in patients seen per hour and a 57% increase in relative value units (RVU) per hour.[5] A California community health clinic assessed the quality of patient chart documentation with the use of scribes. The accuracy of the ICD-9 coding increased by 10%, while the accuracy of E/M coding increased by 17%.[6] Another retrospective study of scribes in an emergency department correlated scribe use with an increase of 2.4 RVUs billed per hour.[7] In all three studies cited, scribes generated a positive margin. In addition to improvements in efficiency and accuracy, scribe programs have consistently demonstrated an increase in both physician and patient satisfaction.

Physicians in many fields have expressed frustration in response to the widespread implementation of EHRs. In a study regarding EHR satisfaction, International Data Corporation (IDC) researchers report that up to 58% of users are dissatisfied with the new technology, and providers continue to cope with decreased productivity and impeded workflow.[8] Scribe presence has helped to mitigate much of this dissatisfaction. In one recent study a urology practice saw more than a threefold increase in physician satisfaction when working with scribes.[6] The reasons for the increase in satisfaction become readily apparent when looking at the role of scribes in the ED. It is not uncommon for EM physicians to stay several hours after a shift has ended to complete their unfinished medical records. Working with a scribe can lessen the frequency with which this occurs. Because scribes complete the majority of the chart in real time, most providers make simple adjustments to the record at the end of their shift, attest to what the scribe has written, and leave work on time.

Anecdotally various institutions have reported a positive impact on patient satisfaction with the use of scribes.[6] While patients wait to see a provider, scribes can greet them and begin to document parts of the medical history. E/M guidelines published by the Centers for Medicare and Medicaid Services (CMS) permit scribes to independently obtain a review of systems as well as the past medical, social and family history.[9] Throughout the medical encounter, scribes can continue to gather information, communicate test results, inquire about response to medications, and ensure patient comfort. In this way, scribes act as a liaison between nurses and doctors, relaying patient concerns and communicating changes in the plan.

Until a few years ago, few publications addressed the use of scribes. As more physicians have begun to comply with the EHR mandate, there has been greater interest in utilizing scribes to transition from paper documentation to the use of an electronic record. Recent studies have bolstered anecdotal claims that scribes have a positive impact on overall productivity and patient/provider satisfaction. Until EHRs evolve in speed and simplicity, the use of scribes will allow doctors to do what they do best – care for patients.

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A Scribe's Reflection

KATIE BAIRD, BS, MD'17

Deciding to become a physician is by far the greatest commitment I have ever made. At the end of it all, I will have spent over 20 years in school and several hundred thousand dollars paying for my education only to graduate and spend several more years training rigorously as a resident! Yet, for a field that demands so much from its members, it offers relatively little opportunity for prospective doctors to gain insight into what lies ahead. How many premedical students truly know what they are getting into? I certainly did not. Unlike several of my premedical peers in college, I had no physicians in my family or prior exposure to the field to guide my decision. Throughout my undergraduate career, medicine was on the backburner; I only fulfilled the prerequisites because they were required courses for my biology major. By the time graduation rolled around, however, the idea of applying to medical school started to take shape. Yet I was still not comfortable with how little insight I had into what it really meant to be a physician. Most of my non-premedical friends had spent summers or semesters interning in their respective fields and were graduating into jobs that mirrored their experiences. Yet, for obvious reasons, you cannot let an untrained premed spend a summer interning as a physician! I felt that a gap year or two would be my best option to gain experience in medicine, but I was unsure how to spend this time. Fortuitously I came across the opportunity to work as a scribe and build a new scribe program for my local emergency departments and in return, received the best preparation for medical school I could have imagined.

When I started working in the Emergency Department (ED), I was the only scribe in the state of Rhode Island. To function as a scribe I needed to achieve two main goals: first, to educate myself, I needed a crash course in emergency medicine terminology and coding reimbursement standards in order to even begin to function as a scribe. Second, I hoped to convince our ED physicians that, as a scribe, I could improve the quality and efficiency of their shifts by charting on their behalf. Within a few months I had firmly decided to pursue a career in medicine, but oddly enough it was not just seeing the exciting and rewarding sides of practicing as a physician that had convinced me, but also the struggles of everyday work. Scribing is unique, not just because it gives one a front row perspective into the doctor's daily life, but it also makes one a very active member of the team. I can vividly remember shadowing several physicians while in high school and college, and always feeling as if I was an intruder – watching the healthcare team work as I viewed from the outside in. As a scribe, you are there for it all, working side by side with a physician for eight hours, and within very little time, the walls come down. The realistic perspective I gained of the rewards and the stresses of managing and caring for sick patients was invaluable to me. I was present for exciting and inspiring shifts that showcased the breadth of medical cases managed in the ED – from gunshot wounds and strokes to motor vehicle accidents. I was constantly in awe of the knowledge and skills of the attendings and residents I worked for. One moment they could be stitching up a finger, and the next intubating a new critical patient or running a code. I looked to these physicians as role models on how to deal with my own emotional responses to what I witnessed while working as a scribe. When I first started there were novel and powerful experiences in almost every shift I worked. From the first death to the first successful resuscitation, and the first laceration repair to the first thoracotomy, the nature of emergency medicine is such that no two shifts are alike.

It was not always exhilarating, however. There were also frustrating and disheartening shifts where physicians spent hours dealing with difficult and noncompliant patients, overflowing waiting rooms, conflicts within the healthcare team, and endless paperwork. I have no shame in admitting that I used to harbor a romanticized notion of what it meant to practice as a physician. If I had been asked three years ago what I thought was the greatest challenge in medicine, I would have likely have answered determining a diagnosis. My experience in the emergency department has been eye opening. I now recognize that the socioeconomic barriers to both preventative and curative patient care are an undeniable reality in modern clinical practice. Paradoxically, the more I learned about the challenges present in modern medicine, the more comfortable and confident I felt with my decision to pursue medicine.

The advantages of the experience did not end after entering medical school. Even as I wrap up my first year I can still appreciate how much support and confidence my prior exposure to the field has given me. One of the most significant features has been my comfort with the seemingly impenetrable language of medicine. I remember how, when I first began to work in the ED, I would listen to conversations between the medical staff and struggle to catch every third word. Attaining fluency in medical terminology is

analogous to learning a foreign language — there are vague and conflicting pronunciation rules, acronyms, abbreviations, redundant and overlapping terms, and even slang. Just as the best way to learn a foreign language is to spend time in the country with native speakers, I learned the language of medicine through immersion. My lexicon grew consistently with each shift I worked, with each chart I wrote, and with each patient history I reviewed and summarized. I learned the most by listening in on the conversations between consultants, analyzing how the attending or resident presented the case to their colleagues. While working, I made it a priority to become comfortable with every word I was not familiar with. Throughout shifts, I would make a list of terms to look up, and found that because I remembered the context in which they were spoken, I could learn their meaning with relatively little effort. Having a solid foundation in medical terminology has allowed me to focus just on the content taught in my medical school lectures, without the encumbrance of deciphering the language used. I have quickly learned that as a medical student you have to get used to constantly feeling uncomfortable with your inexperience – whether it is learning physical exams or interviewing patients for the first time. Thanks largely to my scribe experience, I feel confident about the use of appropriate medical language. In my first year doctoring course reading patient histories, writing up case reports, giving oral presentations, and having meaningful and informative conversations with physicians about patients has all been second nature to me because they were integral to my position as a scribe.

I once estimated that during the three years of working fulltime as a scribe I charted on close to 10,000 patients. That's 10,000 histories, chief complaints, physical exams, and diagnoses – thousands of examples I've been able to search through to help me remember the seemingly endless list of diseases and syndromes on my block exams. Scribing has provided a framework for my preclinical studies. For example, in my most recent neuroscience block, I did not struggle to imagine and memorize the sequence of events that occurs when a patient comes in which an acute head bleed and progressive herniation – I was able to draw on personal experience. Now that I am in medical school, I have the opportunity to fortify my observed medical knowledge with academic study. Learning and understanding more about things you have already witnessed is a potent motivator. It is incredibly exciting when I'm sitting in lecture and the professor mentions a disease or diagnosis I can vividly remember reading, seeing, or hearing about. Although scribing exposes you to a breadth of medical knowledge through observation, it only provides a superficial appreciation for the science behind the practice of medicine. As a medical student I have been happily able to flesh out and grasp the knowledge that lies beneath the surface. In a way, compared to the traditional student, I am learning "backwards," but having even a partial grasp on the "big picture" makes the details so much more relevant and rewarding.

Lastly, as I look forward to beginning my clinical rotations in the next few months, I know that scribing has thoroughly exposed me to clinical etiquette. On any given shift I worked as a scribe, I was part of an inter-professional team assigned to a specific treatment area within the emergency department. Effective communication is essential for a productive working environment, and most importantly patient care. Conflict is sometimes unavoidable, but time and time again I have seen that when workplace conflict is handled well, it provides an opportunity for professional growth. There are certain unspoken but critically important approaches that can best be learned from the experience of being a member of any professional team that you simply cannot learn in a classroom. The main responsibility for a medical student during our preclinical years is self-derived – performing well in classes and learning the material. Come third year, however, we transition from an observational to a functional role. We become part of a clinical team whose primary responsibility is external – the care of patients. As medical students we must learn to work cohesively with the entire medical team to accomplish that goal. I have seen firsthand observing medical students on shift while I was scribing, that it can be difficult to strike a balance between being a student whose priority is to learn and being a contributing member of the team. The unofficial mantra for every effective scribe is to "always be there when you need us, but out of your way when you do not." That simple goal was remarkably hard to accomplish in a crowded environment with diverse personalities and ever changing stressors. Yet growing into that role and learning how to be a valuable member of a team enabled me to advance both professionally and personally; I have confidence that it will ease my transition to the wards.

As my second year at the Alpert Medical School of Brown University comes to a close, I truly cannot imagine that I would have decided to go to medical school if not for my experience as a scribe. I am truly grateful.

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