The Future of Emergency Radiology

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Assistant Professor
Harvard Medical School
Boston, Massachusetts

NO FINANCIAL DISCLOSURES
Learning Objectives

♦ To consider parallels between the development and practice of Emergency Medicine and Emergency Radiology
♦ To explore economic, political and other factors currently shaping the interpretive coverage of imaging performed in emergency departments
♦ To contemplate the future of Emergency Radiology and its place within the specialty of Diagnostic Radiology
The Birth of Emergency Radiology

- Organized Emergency Medicine (1970’s)
- Emergency Medical Services Act (1973)
- The introduction of CT scanning (1972)

- Radiographic Examination in Blunt Abdominal Trauma (1966) McCort
- The Radiology of Emergency Medicine (1975) Harris and Harris
- Emergency Imaging of the Acutely Ill or Injured Child (1979) Swischuk

1980’s Emergency Radiology

- A need for radiologists interested in ER
- ER courses offered at several AMCs (BCH, MGH, UV and Stanford)
- Emergency Radiology remained in its infancy

- Society  ACEP 1968  ASER 1988
- Meeting  1969  1990
- Journal  1972  1995
- Board exam  1980  ???
1990’s Trends in Emergency Care

♦ Increased ED and CT utilization
CT – The Catalyst for Change

♦ Familiar
♦ Accurate
♦ Fast & Easy
♦ Non-invasive
♦ Readily available
♦ Surveys broadly for disease
Small Bowel Obstruction

- Complete or high grade SBO
- Accuracy 95%
- Sensitivity 94%
- Specificity 96%
- Cause 73%

Small Bowel Obstruction
Increased use of CT for Screening

- Sensitivity 99%
- X-rays miss up to 30% of sign. injuries\(^1\)
- C-spine CT is cost-effective\(^2\)

\(^2\)Blackmore et al. Radiology 1999
Renal Colic

- Sensitivity: 97%
- Specificity: 96%
- Accuracy: 97%
- PPV: 97%
- NPV: 98%

Smith et al., Radiology, 1995
Diverticulitis

- Sensitivity 97%
- Specificity 99%
- Accuracy 99%

Rao et al., Radiology, 1997
Appendicitis

- Sensitivity 98%
- Specificity 98%
- Negative PV 98%
- Positive PV 98%
- Accuracy 98%

Rao et al., Radiology, 1997
Aortic Dissection

- Sensitivity ~100%  Aortic arch vessels
- Specificity ~100%  Sens 93% Spec 97%

Sommer et al., Radiology, 1997
Blunt Aortic Injury

- Sensitivity  ~100%
- Specificity  99.7%
- Accuracy    99.7%
- NPV         ~100%
- PPV         89%

Mirvis et al. J Trauma, 1998
Pulmonary Embolus

♦ Outcome data suggests a good quality normal PE CT has a NPV of ~98%

<table>
<thead>
<tr>
<th>Study</th>
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<td>Goodman (2000)</td>
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<tr>
<td>Tille-Leblond (2000)</td>
<td>3/184</td>
<td>6 months</td>
</tr>
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</table>
CT Use in the U.S.

Radiography
Aortography
IVP/Cysto
VQ/PAgram
Clinical exam

Levatter, R. E. et al. Radiology 2005;234:968-970

Copyright ©Radiological Society of North America, 2005
BWH ED CT Utilization 1997-2001
BWH ED CT Utilization 1997-2001

A 240% increase over 5 years
Use of CT in the ED

- Increases physician’s level of certainty
- Reduces hospital admission rates by 23%
- Leads to more timely surgical intervention

Teleradiology & the ED

♦ ED Imaging in the 1990s
  – Individual local radiologist
  – Extended after-hours
  – On-call posture
  – Verbal report
  – Teleradiology via home PC and web viewer
  – Senior residents & fellows often moonlighted

♦ Residents/fellows covered AMCs
A Comprehensive Portrait of Teleradiology in Radiology Practices: Results from the American College of Radiology’s 1999 Survey

OBJECTIVE. This article presents a comprehensive portrait of the characteristics of teleradiology systems of radiology practices as of 1999. Our purposes are to help profile a rapidly evolving area of radiology that has been underexamined to date and to provide a baseline with which future findings can be compared.

MATERIALS AND METHODS. In 1999, the American College of Radiology surveyed 970 practices by mail. A response rate of 66% was achieved. Responses were weighted to represent all radiology practices in the United States. Data from nine questions specifically designed to profile the use of teleradiology were analyzed using descriptive statistical methods and multivariate regression analyses.

RESULTS. Seventy-one percent of multiradiologist practices had teleradiology systems in place, using them to interpret 5% of their studies. For solo practices, corresponding statistics were 30% and 14%. Ninety-two percent of multiradiologist practices with teleradiology systems used them for preliminary on-call interpretation. Other major uses included consultation with other radiologists (20%) and primary interpretation of studies (18%). Ninety-five percent of multiradiologist practices with teleradiology systems used them to interpret CT, 84% used them for sonography, 69% for nuclear medicine, 47% for MRI, and 43% for conventional radiographs.

CONCLUSION. Teleradiology had already become a fixture in most practices by 1999, though it was used for only a small fraction of image interpretations. Its widespread presence positioned teleradiology to become a key element of radiology practice nationwide.
Teleradiology & the ED

♦ Pre-2000 – Individual local radiologist
  – Extended after-hours, on-call, PC at home, verbal report, often senior residents & fellows

♦ 2001 – NightHawk Radiology Services
  – ED imaging (“after-hours”), outsourced at a distance (time zones), shift work, ABR-certified radiologists, written prelim reports, pay per use
The First Missed Opportunity for Academic Radiology?

Teleradiology leader TeleQuest files for bankruptcy protection
February 28, 2001

It was billed as America’s premier radiology network, offering the services of 300 radiologists from some of the most respected medical centers in the world: Bowman Gray, Emory, Brigham and Women’s, Wake Forest, and UCSF. In the end, the big names could not save this Philadelphia-based service provider. Less than five years after its founding, TeleQuest has filed for bankruptcy, the victim of a flawed business plan and a market that never met expectations.

"It was a poorly conceived venture from the beginning," said Dr. David C. Levin, radiology chair at Thomas Jefferson University, which was invited to join TeleQuest but declined the offer. "Events have borne out (the wisdom of) our decision."

TeleQuest, which has filed for Chapter 7 protection, began operations in 1995 with the ambitious goal of serving the nation’s healthcare providers with a network of subspecialty reading services. Clients would include hospitals, imaging centers, and even private practices.
Increased ED Utilization

Chart 3.7: Emergency Department Visits and Emergency Departments\(^{(1)}\) in Community Hospitals, 1991 – 2006

Source: Avalere Health analysis of American Hospital Association Annual Survey data, 2006, for community hospitals.

\(^{(1)}\) Defined as hospitals reporting ED visits in 2006 AHA Annual Survey.
Further Advances MDCT
Routine Use of MPRs
BWH ED CT Utilization 1997-2006
CT use in the ED 1996-2007

♦ Increased 330%
♦ Increased from 3.2% → 13.9% of encounters
♦ Universal increase in CT for 20 most common ED complaints
♦ Rates of growth highest for abdominal pain, flank pain, chest pain and SOB (RR 5-10).
♦ Likelihood of admission/transfer after CT (RR=0.42)

Estimated Number of CT Scans Performed Annually in the US

62M in US
18+M in ED (~30%)

ED Utilization of Imaging

- ED is overutilizing – only partially right
- Importance of NPV and specificity in modern care
- Mis-utilization is better term
  - Going to OR for appy without CT
  - Going to OR for penetrating trauma without CT
  - Getting CT because US/MR not available
  - Lack of consultation/guidance/oversight from radiology
- Must come to terms with value of imaging in all clinical care (especially 24/7 acute care)
1990’s Trends in Emergency Care

♦ Increased ED and CT utilization
♦ Maturation of Emergency Medicine specialty

Baker et al., Diagnostic Imaging, 2001
Emergency Medicine Physicians

♦ EMPs in clinical practice (2007) 42,000+
♦ EMPs certified by ABEM (2007) 29,000
♦ Members of ACEP (2010) 25,000
♦ EM Residency Programs (2010) 155
♦ ACR members (2010) 34,000

<table>
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<th>Imaging</th>
<th># of ED visits with</th>
<th>% of ED visits with</th>
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<td>X-ray</td>
<td>43,965</td>
<td>35.5</td>
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<td>Computed tomography scan</td>
<td>18,071</td>
<td>14.6</td>
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<tr>
<td>Head</td>
<td>8,966</td>
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<tr>
<td>Other than head</td>
<td>9,356</td>
<td>7.6</td>
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<tr>
<td>Ultrasound</td>
<td>3,819</td>
<td>3.1</td>
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<tr>
<td>Magnetic resonance imaging scan</td>
<td>712</td>
<td>0.6</td>
</tr>
<tr>
<td>Head</td>
<td>346</td>
<td>0.3</td>
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<tr>
<td>Other than head</td>
<td>297</td>
<td>0.2</td>
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<tr>
<td>Other Imaging</td>
<td>1,286</td>
<td>1.0</td>
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<tr>
<td>Any imaging</td>
<td>57,688</td>
<td>46.6</td>
</tr>
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</table>

- **Add X-ray, CT, US, MRI, Other** 68483 18.7

**Among 46.6% of patients imaged, 18.7% are imaged with 2+ modalities**

Inventory

- 29,000 EMPs certified by ABEM
- ~4800 EM residents in training
- Ordering 68M+ ED imaging exams/year
- 123M ED visits
Teleradiology & the ED

♦ Feb 2006 – NRS goes public
  – Market capitalization of $550M

♦ Publically-traded companies
  – must perform for shareholders
  – Valuation based on growth (new customers or acquisitions) and profitability
  – In 2007, NRS acquires Teleradiology Diagnostic Service of CA and Texas-based Radlinx
ED Throughput Is a System-Wide Issue

Tomorrow’s ED: An Emergency Diagnostic Center
Source: SG2.com – SG2 Intelligence - 2007
The Changing Landscape

Report from ARRS: Lifestyle factors drive imaging departments into wings of nighthawks

Emily Hayes
May 8, 2007

Radiologists' desire to sleep at night and avoid call is more likely to drive demand for after-hours teleradiology services than is a need for extra personnel, according to a small survey of imaging department heads presented at the American Roentgen Ray Society meeting on Tuesday.

The survey, conducted at Yale University School of Medicine, was distributed to 300 randomly selected hospitals. Of those contacted, 115 responded to the 59-question poll, which asked about utilization and rationales for using nighthawk-type services. Of the respondents, 63 (54%) reported using some degree of after-hours outsourcing.

Residency programs face sweeping changes

The Accreditation Council for Graduate Medical Education has proposed major modifications to radiology residency programs. Among other changes, the move would extend the training period required before residents can take call without supervision.

The ACGME’s Residency Review Committee (RCC) for Diagnostic Radiology began the latest revision to the specialty’s Program Requirements for Resident Education in fall 2005. Through December 2006, the RCC presented several drafts for discussion at various venues: the RSNA meeting, the Association of University Radiologists meeting, and the Association of Program Directors in Radiology meeting.
AMC – Gathering Clouds

♦ “Complex variation” on AMC coverage
♦ Not widespread adoption of Emergency Radiology in Academic Radiology
♦ Only 10% had 24/7 in-house attending
♦ Overnight attending coverage not SOC at AMCs

The Changing Landscape

- Corporate “nighthawk” teleradiology moves to daytime subspecialty and final reads
- Re-brand themselves as national radiology practices, not teleradiology practices

Teleradiology day reads shake up the specialty

BY H.A. ABELLA | October 6, 2009
Mr. Abella is associate editor of Diagnostic Imaging magazine. Senior editor James Brice contributed reporting.

10Q reports for the second quarter of 2009 from both NightHawk Radiology and Virtual Radiologic show a drop in the average price per read. This could be a result, as NightHawk’s report suggests, of increased competition in the off-hours market.

Teleradiology is helping drive the corporate growth that Dr. Robert Epstein, president of University Radiology Group, considers essential to combating the factors that challenge a successful radiology practice.
Commercial Teleradiology
Trojan Horse???
Radisphere targets community hospital radiology contracts

By Greg Freiherr | November 11, 2010

A one-time ally to local radiology groups is now trying to dislodge them, and its executives are making no bones about their newfound appetite.

Radisphere, formerly a teleradiology provider known as Franklin & Seidelmann, is targeting community hospitals that are, for one reason or another, unhappy with small radiology group practices and, therefore, open to its pitch as a national radiology group.

The Cleveland-based company puts one or even several generalists onsite, depending on the volume of procedures, then uses its national network of subspecialists to handle difficult cases. More than half the cases are read offsite, but Clayton T. Larsen, senior vice president of client and network development at Radisphere, balks at the suggestion that Radisphere is a teleradiology firm.

“To do what we do, you have to be a full-service radiology practice,” Larsen said in an exclusive interview with *Diagnostic Imaging*. “That includes daytime onsite reads and full final subspecialty reads; it is doing nighttime final reads and providing the actual dictation infrastructure so (clients) can eliminate all of their transcription. It is providing the critical findings process and doing the billing.”

Radisphere does all this and more. The company has established credentialing, licensing, and privileging practices nationally for its radiologists.
Teleradiology & the ED

◆ 2010 – NRS is acquired by VRad

Virtual Radiologic buys out NightHawk, says it’s an ideal match
By Rebekah Moan | September 25, 2010

Virtual Radiologic announced Sept. 27 it will acquire NightHawk, a publicly traded national teleradiology practice, making Virtual Radiologic the largest radiology practice in the country. However, radiologists aren’t too worried about the deal because Virtual Radiologic still has to compete with thousands of other practices.

Virtual Radiologic will acquire all of the outstanding common stock of NightHawk for $6.50 per share in cash, which is double NightHawk’s closing stock price of $3.25 per share on Sept. 24. The transaction is valued at approximately $170 million.

The combined entity will have 325 radiologists serving nearly 2700 healthcare facilities across all 50 states and reading approximately six million studies annually. Additionally, more than 75% of the affiliated radiologists will be fellowship-trained subspecialists.

In an interview with Diagnostic Imaging, Virtual Radiologic CEO Rob Kill said NightHawk was an attractive target because it has a reputation for employing exceptional radiologists who deliver demonstrated radiology outcomes. The demand for
 Outsourcing to Teleradiology Companies: Bad for Radiology, Bad for Radiologists
David C. Levin, MD\textsuperscript{a,b}, Vijay M. Rao, MD\textsuperscript{a}

Outsourcing night and weekend call to teleradiology companies has become a common practice among private radiology groups. While this may lead to an easier lifestyle, the authors discuss the serious negative consequences for radiologists and the specialty as a whole. These include the likelihood of commoditization of the field, lowering of fees, displacement from hospital contracts and outpatient reading contracts, greater encroachment by other specialties, and lowering of quality.

**Key Words:** Medical economics, diagnostic imaging, radiology and radiologists, socioeconomic issues, teleradiology

*J Am Coll Radiol 2011;8:104-108. Copyright © 2011 American College of Radiology*
A recent article in JACR is stirring controversy with its claim that teleradiology companies are contributing to the decline of radiology.

First came x-rays, and they were good. Then came digital radiology, which was also good, but brought with it challenges in use and management that led to the development of PACS. PACS, too, was a beneficial thing, increasing the efficiency and accuracy of radiology reads and reports. But it turns out PACS also had a downside, one that is just starting to be recognized now as a factor leading to the commoditization of radiology. And then came teleradiology.

Teleradiology made use of technologies, such as PACS, that had been developed for radiology, and many radiologists considered it a godsend. “It drove the group crazy to be on call all night, and teleradiology was something that was very, very attractive,” said Leonard Berlin, MD, professor of radiology for Rush University in Chicago.

Teleradiology’s well-publicized origins lie in a trip to Asia by US physician William G. Bradley, MD, PhD, FACR, now chair of the department of radiology at the University of California at San Diego (UCSD). While visiting China as a lecturer, Bradley received a call from a neurosurgeon dealing with a nighttime emergency case, relates Samir S. Shah, medical advisor of client services for Virtual Radiologic (vRad) in Eden Prairie, Minn. Bradley downloaded the image from the Internet and provided a quick diagnosis.

“His thought was that he was wide awake because it was the middle of the day in China. So the origin of teleradiology was based on improving patient care, having a fresh set of eyes looking at an image rather than having a tired, bleary-eyed, overwhelmed person taking call,” Shah said.

And this all seemed good, but as with most innovations, there has also been a downside, one not only having an impact on the process of radiology but causing its business practices to evolve as well. There were early warning signs, but they were tempered by the temptation of a full night’s sleep. However, as teleradiology companies have begun to enter a more competitive stage and target the market previously dominated by private radiology practices and groups, the debate about its advantages and disadvantages has heated up.

David C. Levin, MD, professor emeritus of radiology, and Vijay M. Rao, MD, chair in the department of radiology, both at the Thomas Jefferson University Hospital/Jefferson Medical College in Philadelphia, felt the time had come to make a statement and bring the debate to the fore. Their paper, “Outsourcing to teleradiology companies: bad for radiology, bad for radiologists,” published in the Journal of the American College of Radiology earlier this year, laid down the gauntlet on the topic, generating significant discussion from supporters and critics.
Radiology Practices’ Use of External Off-Hours Teleradiology

Fig. 1—Bar graph shows use of external teleradiology, by practice size (number of radiologists), in 2003 (light gray bars) and 2003 (dark gray bars). Whiskers show 95% confidence intervals.

Fig. 2—Bar graph shows use of external teleradiology, by practice type, in 2007 (light gray bars) and 2003 (dark gray bars). Whiskers show 95% confidence intervals.

Fig. 3—Bar graph shows use of external teleradiology, by practice location, in 2003 (light gray bars) and 2003 (dark gray bars). Whiskers show 95% confidence intervals.

Fig. 4—Bar graph shows use of external teleradiology, by setting’s practices serve, in 2007 (light gray bars) and 2003 (dark gray bars). Whiskers show 95% confidence intervals.

1Lewis et al. AJR: 193, November 2009.
Trends in Emergency Care

♦ Increased ED and CT utilization
♦ Maturation of Emergency Medicine specialty
♦ Changing US demographics
U.S. Population Demographics

Rapidly Changing US Demographics

U.S. Census Bureau
Population growth

~100M 65+

SOURCE: CDC/NCHS, *Health, United States, 2009*, Figure 1A. Data from the U.S. Census Bureau.
Trends in Emergency Care

- Increased ED and CT utilization
- Maturation of Emergency Medicine specialty
- Changing US demographics
- Care reorganization around clinical pathways
Financial Opportunities Can Expand Across a Continuum of CARE

In response to earlier market forces, the ideal organizational infrastructure for hospitals evolved from discrete departments to integrated clinical service lines. However, optimal performance in the future will require further transformation, toward synchronized systems that align core clinical areas and elevate resource effectiveness.

Health Care’s Evolving Business Models

Source: SG2.com – the EDGE – Proving Performance: Systems of Care 2008
Trends in Emergency Care

♦ Increased ED and CT utilization
♦ Maturation of Emergency Medicine specialty
♦ Changing US demographics
♦ Care reorganization around clinical pathways
♦ Increased volume, complexity and reliance on imaging for medical decision-making
Emergency Indications For CT*
Will Continue to Increase

♦ Extremity CTA for trauma
♦ Neuro CTA for stroke
♦ Coronary CTA for chest pain
♦ Perfusion imaging
♦ Interactive 3-D visualizations (APP)

*Also much greater use of MR in ED
BWH %ED Visits by Time of Day

Time of Day

- 12-4 a.m.
- 4-8 a.m.
- 8-12 a.m.
- 12-4 p.m.
- 4-8 p.m.
- 8-12 p.m.

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<tr>
<th>Time of Day</th>
<th>Percentage</th>
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<td>4-8 a.m.</td>
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<td>8-12 a.m.</td>
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<tr>
<td>12-4 p.m.</td>
<td>22.7%</td>
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<tr>
<td>4-8 p.m.</td>
<td>18%</td>
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<tr>
<td>8-12 p.m.</td>
<td>19.8%</td>
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BWH %ED Visits by Time of Day

- 14.8% visits between 12a-8a
- 50.6% visits between 8a-5p
- 34.6% visits between 5p-12a
% ED Imaging M-F “Business Hrs”

Time of Day

- 8a-5p M-F
- After-hours

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<td>25.9</td>
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<td>74.1</td>
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Are Residents “Qualified?”

♦ Studies of low “signif./major” miss rates rely on
  – large denominator of negative imaging exams
  – high tolerance for radiology errors that don’t “kill” pts.

♦ Posit outcomes not adversely effected by over-read
  – Relies on patient’s ability to survive up to 24h
  – Argues for our irrelevance in the care of patients
  – Fails to consider impact on systems of care (e.g.,
    resident confidence, patient inconvenience, potential
    harm, delays in care, resource use and downstream costs)

♦ Are underpinned (and biased) by physician-centric
  concerns masked as educational value for trainees
Change is Required/Inevitable!

- Increased ED and CT utilization
- Maturation of Emergency Medicine specialty
- Changing US demographics
- Care reorganization around clinical pathways
- Increased volume, complexity and reliance on imaging for medical decision-making
- Easy access to imaging and expectation of 24/7 attending radiology coverage are here!
The Perfect Storm???

- Rising ED visits, matured EM specialty
- Advances / greater use of CT imaging
- Advances / deployment of PACS & SW apps
- Advances in network structure and speed
- Widespread use and acceptance of teleradiology
- Diverging expectations (for Rads – lifestyle & compensation; for referrers – dependence on imaging and acceptance of outsourcing)
- Competitive, consolidating, commercial radiology
ED Imaging
Radiology’s Achilles Heel
Why Academic Radiology Failed

- Development of ER was insidious
- Unable to see big picture b/c fragmentation
- Enabled by the subsidy provided by trainees
- Early adopter of technology – got burned
- Economic barriers
- Political barriers
A Consideration for Academic Radiology

- Widespread AMC adoption of ERad
- Move toward 24/7 ED coverage
- Begin to offer ER teleradiology to gain economy of scale needed for night coverage
Quality Indicators for ED Imaging

- Does coverage/operation vary by time of day?
- Are reads provided by ABR-certified Rad 24/7?
- Is Rad available 24/7 for consultation on best test, appropriateness, safety, triage, management?
- Is every study reviewed, approved & protocolled by a Rad contemporaneously?
- Does Rad oversee study acquisition, when appropriate (e.g., trauma, dissection)
- Are policies/procedures defined/available/consistent
- Are ED-specific metrics tracked (appropriateness, imaging access, TAT, errors, EM/pt. satisfaction)

ED is a Complex Environment

- Acute care (trauma, stroke, PE, AD)
- Outside imaging on patient transfers
- Volume generally unpredictable
- Limited patient information
- Patient/Communication hand-offs abound
- Frequent interruptions
- 24/7 requirements for high intensity


Would We Design this System?

- Provide primary coverage with trainees
- Deprive them of sleep with long, overnight shifts
- Fatigue them by doing this many nights in a row
- Ignore that everything is more difficult at night
- Pretend the volume/issues are manageable (IP, CD)
- Fail to resolve widespread systems issues
- Create a culture where attendings aren’t consulted
- Package this as patient-centric and educational
What Should ASER Do?

♦ ASER needs to help Academic Radiology understand the need for E-Rad
A Call to ARMS in this decade

♦ Action on Aims & Advocacy
♦ Representation & Recognition
♦ Mentoring & Membership
♦ Solidarity & Scholarship
Action on Aims & Advocacy

Within 1 Year
- Create “white paper” on why every AMC should have E-Rad (and roadmap)
- Significantly expand ASER website content

Within 5 Years
- A dedicated ER section in all major AMCs
- Triple the number of ER fellowships
- Double ASER membership
- Double ER journal circulation
Emergency Radiology Profile

♦ Level 1 trauma center
♦ Tertiary referral center – patient transfers
♦ AMC with radiology residency program
♦ Large group covering hospitals with EDs
♦ > 75K ED visits within your network
♦ E-Rad specialty within your group
# Emergency Radiology Fellowships

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<thead>
<tr>
<th>Fellowship Training Positions in Emergency Radiology</th>
<th>Count</th>
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<tr>
<td><strong>Emergency Radiology Fellowship at Brigham and Women’s Hospital</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Massachusetts General Hospital</strong> Emergency Radiology Fellowship</td>
<td>2</td>
</tr>
<tr>
<td><strong>Harborview Medical Center, Seattle, WA</strong> University of Washington Department of Radiology Emergency and Trauma Radiology Fellowship</td>
<td>2</td>
</tr>
<tr>
<td><strong>Mayo School of Graduate Medical Education, Rochester, MN</strong> Hospital and Emergency Radiology Fellowship</td>
<td>1*</td>
</tr>
<tr>
<td><strong>University of Ottawa, Ontario, Canada</strong> ER Trauma Imaging Fellowship</td>
<td>1-2</td>
</tr>
<tr>
<td><strong>The University of Texas Medical School at Houston</strong> Department of Diagnostic &amp; Interventional Imaging Sports, Orthopedic and Emergency Imaging Fellowship</td>
<td>2</td>
</tr>
<tr>
<td><strong>University of Maryland Medical Center</strong> Department of Diagnostic Radiology and Nuclear Medicine Trauma/Critical Care Fellowship</td>
<td>1-2</td>
</tr>
<tr>
<td><strong>VGH/UBC Emergency/Trauma Radiology Fellowship</strong></td>
<td>2</td>
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**Total:** 13-15
Representation & Recognition

- Dispose of the terms “nighthawk,” “call,” and “moonlighting” for those reading ED imaging
- Brand work as “emergency radiology”
- Differentiate general radiology from E-Rad
- Lobby ABR for inclusion of E-Rad in core, certifying and MOC exams
- Increase activity at SCARD/AUR to bring greater awareness of need for E-Rad
- Create E-Rad “champions” on national stage
PubMed Search for Title/Abstract “Emergency Radiology”

ABR’s Exam of the Future

♦ Core Exam – 18 categories (all required)
  – 10 Organ systems (neuro, thoracic, breast, cardiac, GI, GU, MSK, vascular, repro/endo)
  Peds
  – 6 Modalities (Nucs, IR, CT, MR, CR/fluoro, US)
  – 2 “Fundamentals” (patient safety, physics)

Exam of the Future Timeline

<table>
<thead>
<tr>
<th>Clinical Year, PGY1</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>Fellowship or Practice</th>
<th>MOC</th>
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<tbody>
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<td>12 mos</td>
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<td>12 mos</td>
<td>12 mos</td>
<td>12 mos</td>
<td>12 mos</td>
<td>3 mos</td>
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</tbody>
</table>
ABR’s Exam of the Future

- **Certifying Exam – 5 modules**
  - 2 Required for all (Non-interpretive skills, Essentials of Diagnostic Radiology)
  - 3 Selected among 13 Clinical Practice Areas (neuro, thoracic, breast, cardiac, GI, GU, MSK, vascular, repro/endo, peds, Nucs, IR, general radiology)

### Exam of the Future Timeline

<table>
<thead>
<tr>
<th>Clinical Year, PGY1</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>Fellowship or Practice</th>
<th>MOC 3 mos</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 mos</td>
<td>12 mos</td>
<td>12 mos</td>
<td>12 mos</td>
<td>12 mos</td>
<td>12 mos</td>
<td>3 mos</td>
</tr>
</tbody>
</table>

sledbetter@partners.org
Mentoring & Membership

♦ Workshops on how to start an ER section
♦ Create talking points for new section heads
♦ Create a business plan for ER teleradiology
♦ Formulate dedicated E-Rad teaching curriculum at your institution
♦ Encourage teleradiologists covering ED imaging to join our society
♦ Encourage trainees to join society and consider E-Rad as profession
Solidarity & Scholarship

♦ Create on-going venues for networking
  – Social networking (Twitter, Facebook, etc.)
♦ Seek official EM endorsement for E-Rad
♦ Encourage rad groups to choose AMC providers
♦ Research E-Rad as innovative model of care
  – Erad improves quality? timeliness? outcomes?
♦ Disseminate findings at national meetings, grand rounds and in publication
CD import for ED transfers reduces rates of all subsequent imaging utilization by 17%, CT by 16%

Massachusetts ED Visits/Level 1

Western: 106,234 406,315
Central: 118,049 335,972
Eastern: 388,836 2,175,047
Emergency Radiology Systems-based Practice

- DOR <-> hospital <-> network <-> region
- Regionalization of acute care makes sense
The Future of Emergency Radiology

Thank You

Stephen Ledbetter, M.D.
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Brigham & Women’s Healthcare
Assistant Professor
Harvard Medical School
Boston, Massachusetts

NO FINANCIAL DISCLOSURES