Appropriateness as a Component of Quality Implications for Nuclear Medicine

Peeyush Bhargava M.D, FACNM

www.nuclearmd.com
Outline

- Quality / Cost of Healthcare in US
- Cost and Utilization of Imaging
- Precertification / Preauthorization
- Common Nuclear Medicine Studies
- Appropriateness in Nuclear Medicine
- Challenges and Opportunities
What is Appropriateness

- Patient with h/o thyroid cancer, s/p total thyroidectomy (78014 vs 78018)
- Patient with dementia (78815 vs 78608)
- Patient with hydrocephalus (70540 vs 70450)
- Patient with RUQ pain and non diagnostic US (78227 vs 78226)
- Patient lung cancer s/p definitive surgery, 4 yrs ago, for surveillance (78816 vs 71260)
The Business Model of Healthcare

- Product – Healthcare Services
- Vendor – Healthcare Provider
- Consumer – Patients (not a direct customer)
- Customer – Payors (not a direct consumer)
- Quality – Customer vs Consumer
- Cost – Customer vs Consumer
# Quality of Healthcare in US

<table>
<thead>
<tr>
<th>Country Rankings</th>
<th>1.00-2.33</th>
<th>2.34-4.66</th>
<th>4.67-7.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUS</td>
<td>CAN</td>
<td>GER</td>
<td>NETH</td>
</tr>
<tr>
<td>OVERALL RANKING (2010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality Care</td>
<td></td>
<td></td>
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<tr>
<td>Effective Care</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Safe Care</td>
<td></td>
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<tr>
<td>Coordinated Care</td>
<td></td>
<td></td>
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<tr>
<td>Patient-Centered Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cost-Related Problem</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeliness of Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long, Healthy, Productive Lives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Expenditures/Capita, 2007</td>
<td>$3,357</td>
<td>$3,895</td>
<td>$3,588</td>
</tr>
</tbody>
</table>

* Estimate. Expenditures shown in $US PPP (purchasing power parity).
Source: Calculated by The Commonwealth Fund based on 2007 International Health Policy Survey; 2008 International Health Policy Survey of Sicker Adults; 2009 International Health Policy Survey of Primary Care Physicians; Commonwealth Fund Commission on a High Performance Health System National Scorecard; and Organization for Economic Cooperation and Development, OECD Health Data, 2009 (Paris: OECD, Nov. 2009).
Quality of Healthcare in US
Quality of Healthcare in US

Houston, we have a problem
Quality of Healthcare in US

Overall, how would you rate the quality of health care in this country - as excellent, good, only fair, or poor?

- Excellent: 16%
- Good: 37%
- Only fair: 32%
- Poor: 14%

Source: Gallup 11/06
Quality of Healthcare in US

For each specific item I name, please tell me whether you are very satisfied with it, somewhat satisfied, somewhat dissatisfied or very dissatisfied... the quality of the health care you receive?

- Very satisfied: 52%
- Somewhat satisfied: 37%
- Somewhat dissatisfied: 5%
- Very dissatisfied: 5%

Source: ABC News/Kaiser/USA Today 9/06
The Business Model of Healthcare

Product – Healthcare Services
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Cost – Customer vs Consumer
Cost of Healthcare in US

Growth in Total Health Expenditure Per Capita, U.S. and Selected Countries, 1970-2008

Notes: Data from Australia and Japan are 2007 data. Figures for Belgium, Canada, Netherlands, Norway and Switzerland, are OECD estimates. Numbers are PPP adjusted. Break in series: CAN(1995); SWE(1993, 2001); SWI(1996); UK (1997). Numbers are PPP adjusted. Estimates for Canada and Switzerland in 2008.
Cost of Healthcare in US

Healthcare Spending as % GDP

Note: For countries not reporting 2006 data, data from previous years is substituted.
Cost of Healthcare in US

Exhibit 1. International Comparison of Spending on Health, 1980–2009

Average spending on health per capita ($US PPP)

Total expenditures on health as percent of GDP

Note: PPP = Purchasing power parity—an estimate of the exchange rate required to equalize the purchasing power of different currencies, given the prices of goods and services in the countries concerned.

Source: OECD Health Data 2011 (Nov. 2011).
Cost of Healthcare in US

Houston, we have a problem
Cost of Healthcare in US

Figure 1
*Trends in the U.S. healthcare system (public and private)*

- United Kingdom
- Sweden
- Norway
- Denmark
- Japan
- France
- Finland
- Germany
- Italy
- Canada
- United States

*2004 data
Source: OECD health data, 2005*
The Business Model of Healthcare

Product – Healthcare Services
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Focus on Imaging
Cost of Imaging

Average costs

- PET scan: $2,000
- MRI: $800
- CT scan: $700
- X-ray: $100

SOURCE: NATIONAL IMAGING ASSOCIATES AND OTHERS
Cost of Imaging

Medicare Part B Spending 1996-2004

- Other
- Lab Tests
- Chemotherapy and Other Drugs
- Imaging
- Procedures-Other
- Procedures-Major
- E & M
Utilization of Imaging

MedPAC Evaluation of Growth in Physician Services From 1999 to 2000
The average growth of physician services during this period was 22%. Adapted from MedPAC Analysis of Medicare Claims Data, March 17, 2005, Executive Director, Medicare Payment Advisory Commission, Mark Miller.
Growth of Imaging

Which imaging technologies are growing fastest?
Percentage of Medicare beneficiaries using each technology

- **CT**: 16.0% in 2000, 22.2% in 2006
- **MRI**: 6.8% in 2000, 12.0% in 2006
- **Nuclear medicine**: 9.4% in 2000, 11.6% in 2006
- **Ultrasound**: 27.7% in 2000, 32.7% in 2006
- **X-ray and other standard imaging**: 55.8% in 2000, 57.0% in 2006
- **Procedures that use imaging**: 5.7% in 2000, 8.7% in 2006
- **Total for advanced imaging**: 25.0% in 2000, 33.0% in 2006
- **Total for standard imaging**: 61.0% in 2000, 64.0% in 2006
- **Overall total**: 63.2% in 2000, 66.4% in 2006

Growth of Imaging

Growth of in-office imaging
Percentage of physicians' total Medicare Part B revenue

- Primary care: 2000 - 4.1, 2006 - 5.9
- Urology: 2000 - 3.4, 2006 - 5.4

Imaging Cost and Utilization in the US

Houston, we have a problem
Factors in Imaging Utilization

- Advancements / Complexity
  - CT (with, without, with and without), MR: (with, without, with and without), CTA, MRA (8)
  - Head, neck, chest, abdomen, pelvis, upper extremity, lower extremity, cervical, thoracic, lumbar spine (10)

- Ignorance / Autonomy / Ego / Error / Fear

- “Might as well” / “Just to make sure” attitude

- Excessive Laboratory Testing

- Conflict of Interest
“In this imaginary world no one cares enough to create and enforce imaging use policies to help patients, physicians, and society in general. Why? Because in this bizarre world, doctors feel entitled to function as isolated, noncommunicating, disconnected cottage-industry prima donnas, are used to being above question, are unreasonably sure of their competence in areas where they have none, are accountable to nobody, and experience no downside for bad (ie, irrationally expensive) behavior. “
Precertification / Preauthorization

- Radiology Benefits Management Program
- Out Patient / High Cost - Advanced Imaging
- Evidence Based Criteria / Published Online
- NCQA / URAC/ State Approved
- Telephone / Web Algorithms – CPOE / DS
- Favorable vs Adverse Determination
- Challenge / Appeal Process
Curtailing the Cost of Imaging

The appropriateness of medical imaging is under intense scrutiny, partly because of an unsustainable national health care spending trajectory, as well as remote disproportionate growth in the utilization of radiologic services. Although unit cost reduction mechanisms have traditionally been used to contain costs, UM approaches are becoming increasingly prevalent. Radiology benefits managers and DS systems have both demonstrated success in curtailing imaging growth, but both currently have intrinsic limitations.
An unsustainable national health care spending trajectory has focused considerable scrutiny on medical imaging as a potential cost driver. Radiology benefits managers and DS systems have both been successful in slowing imaging volume growth, but their promulgation, in the absence of active radiologist involvement in UM, risks further commoditization of radiologists’ services. Evolving trends suggest the potential for increased convergence of these historically competing approaches to control imaging volume. The ultimate role of practicing radiologists in this evolution is uncertain and will likely hinge less on technological developments than the ability of radiologists to adapt to ongoing cultural and structural changes in health care payment systems.
“These best practice guidelines for RBMPs were developed through a joint effort of the ACR Managed Care Committee and the RBMA Payor Relations Committee and are intended to provide guidance to payors, RBMs, and radiology providers on best practices to consider when implementing an RBMP.” (2012)
Precertification / Preauthorization

Spending = Price x Volume
Utilization of Imaging

- Computed tomography
- Magnetic resonance imaging
- Nuclear medicine
- Positron emission tomography
Precertification / Preauthorization

What a preauthorization program can do

Preauthorization programs cut expenditures by 37 percent, compared with projected unmanaged expenditures, according to data from one of MedSolutions’s commercial HMO clients. Meanwhile, 20 percent of the total savings from preauthorization programs comes from utilization management denials. As a preauthorization program progresses and providers learn the rules, the value of requested services declines, the actual expenditures decline, and the value of denied services also declines.

Estimated savings, per patient, per month

Savings from utilization management denials

Source: MedSolutions
Common Nuclear Medicine Studies

- CPT - 78452 – MPI SPECT / Multiple Studies
- CPT - 78815 – PET/CT Skull base to mid thigh
- CPT - 78306 – Bone Scan, Whole Body
- CPT - 78227 – Hepatobiliary Imaging with Interv.
- CPT - 78014 – Thyroid Imaging and Uptake
- CPT - 78071 – Parathyroid Imaging with SPECT
APPROPRIATE USE CRITERIA

ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2009

Appropriate Use Criteria for Cardiac Radionuclide Imaging

A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the American Society of Nuclear Cardiology, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the Society of Cardiovascular Computed Tomography, the Society for Cardiovascular Magnetic Resonance, and the Society of Nuclear Medicine

Endorsed by the American College of Emergency Physicians
Table A. Pretest Probability of CAD by Age, Gender, and Symptoms*

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Gender</th>
<th>Typical/Definite Angina Pectoris</th>
<th>Atypical/Probable Angina Pectoris</th>
<th>Nonanginal Chest Pain</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;39</td>
<td>Men</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Very low</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>40–49</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Intermediate</td>
<td>Very low</td>
</tr>
<tr>
<td>50–59</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>&gt;60</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

*High: Greater than 90% pretest probability. Intermediate: Between 10% and 90% pretest probability. Low: Between 5% and 10% pretest probability. Very low: Less than 5% pretest probability. *Modified from the ACC/AHA Exercise Testing Guidelines to reflect all age ranges (14).

Table 1. Detection of CAD: Symptomatic

<table>
<thead>
<tr>
<th>Indication</th>
<th>Appropriate Use Score (1–9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low pretest probability of CAD, ECG interpretable AND able to exercise</td>
<td>I (3)</td>
</tr>
</tbody>
</table>
78815 – PET/CT Skull base to mid thigh

Decision Memo for Positron Emission Tomography (FDG) for Solid Tumors (CAG-00181R4)

Effective for claims with dates of service on and after June 11, 2013, the chart below summarizes national FDG PET coverage for oncologic conditions:

<table>
<thead>
<tr>
<th>FDG PET for Solid Tumors and Myeloma</th>
<th>Initial Treatment Strategy (formerly “diagnosis” &amp; “staging”)</th>
<th>Subsequent Treatment Strategy (formerly “restaging” and “monitoring response to treatment”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Esophagus</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Head and Neck (not thyroid or CNS)</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Non-small cell lung</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Ovary</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Brain</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Cervix</td>
<td>Cover with exceptions *</td>
<td>Cover</td>
</tr>
<tr>
<td>Small cell lung</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Cancer Type</td>
<td>Coverage</td>
<td>Coverage</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Soft tissue sarcoma</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Testes</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Prostate</td>
<td>Non-cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Breast (male and female)</td>
<td>Cover with exceptions *</td>
<td>Cover</td>
</tr>
<tr>
<td>Melanoma</td>
<td>Cover with exceptions *</td>
<td>Cover</td>
</tr>
<tr>
<td>All other solid tumors</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Myeloma</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>All other cancers not listed</td>
<td>Cover</td>
<td>Cover</td>
</tr>
</tbody>
</table>

*Cervix: Nationally non-covered for the initial diagnosis of cervical cancer related to initial anti-tumor treatment strategy. All other indications for initial anti-tumor treatment strategy for cervical cancer are nationally covered.*

*Breast: Nationally non-covered for initial diagnosis and/or staging of axillary lymph nodes. Nationally covered for initial staging of metastatic disease. All other indications for initial anti-tumor treatment strategy for breast cancer are nationally covered.*

*Melanoma: Nationally non-covered for initial staging of regional lymph nodes. All other indications for initial anti-tumor treatment strategy for melanoma are nationally covered.*
“The rate of positive bone scans depends on the PSA value and Gleason score. Patients with PSA $\leq 20$ ng/mL and Gleason Score $<8$ have a 1% to 13% rate of positive bone scans. For this reason only patients with a PSA $\geq 20$ ng/mL (with any T stage or Gleason score), locally advanced disease (T3 or T4 with any PSA or Gleason score), or Gleason score $\geq 8$ (with any PSA or T stage) should be considered for a radionuclide bone scan.”
### Evaluation of Acute Abdominal Pain in Adults

SARAH L. CARTWRIGHT, MD, and MARK P. KNUDSON, MD, MSPH  
*Wake Forest University School of Medicine, Winston-Salem, North Carolina*

<table>
<thead>
<tr>
<th>Location of Pain</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right upper quadrant</td>
<td>Ultrasonography</td>
</tr>
<tr>
<td>Left upper quadrant</td>
<td>CT</td>
</tr>
<tr>
<td>Right lower quadrant</td>
<td>CT with IV contrast media</td>
</tr>
<tr>
<td>Left lower quadrant</td>
<td>CT with oral and IV contrast media</td>
</tr>
<tr>
<td>Suprapubic</td>
<td>Ultrasonography</td>
</tr>
</tbody>
</table>
# ACR Appropriateness Criteria®

**Clinical Condition:** Right Upper Quadrant Pain

**Variant 1:** Fever, elevated WBC, positive Murphy's sign.

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US abdomen</td>
<td>9</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>CT abdomen with or without contrast</td>
<td>6</td>
<td>Generally should follow US of the RUQ based on US findings. With IV contrast preferred.</td>
<td>0</td>
</tr>
<tr>
<td>Cholescintigraphy</td>
<td>6</td>
<td>Generally should follow US of the RUQ based on US findings.</td>
<td>0</td>
</tr>
<tr>
<td>MRI abdomen with or without contrast</td>
<td>6</td>
<td>Generally should follow US of the RUQ based on US findings. See statement regarding contrast in text under &quot;Anticipated Exceptions.&quot;</td>
<td>O</td>
</tr>
</tbody>
</table>

**Rating Scale:** 1, 2, 3 Usually not appropriate; 4, 5, 6 May be appropriate; 7, 8, 9 Usually appropriate

*Relative Radiation Level*
78014 – Thyroid Imaging and Uptake

Revised American Thyroid Association Management Guidelines for Patients with Thyroid Nodules and Differentiated Thyroid Cancer

The American Thyroid Association (ATA) Guidelines Taskforce on Thyroid Nodules and Differentiated Thyroid Cancer
WORKUP OF THYROID NODULE DETECTED BY PALPATION OR IMAGING

Low TSH

\[ ^{123}\text{I} \text{ or } ^{99}\text{Tc Scan} \]

Hyperfunctioning

Evaluate and Rx for Hyperthyroidism

History, Physical, TSH

Normal or High TSH

Not Functioning

Diagnostic US

Nodule on US
Do FNA (See R5a–c)

RESULTS of FNA

Elevated TSH

Normal TSH

No Nodule on US
Primary hyperparathyroidism is characterized by increased synthesis and release of parathyroid hormone, which produces an elevated serum calcium level and a decline in serum inorganic phosphates.
Parathyroid scintigraphy is used 1) to identify and localize parathyroid tissue prior to surgery and 2) to facilitate and expedite surgical excision. It may also be used in postoperative patients with persistent or recurrent hyperparathyroidism to detect persistent, aberrant or ectopic parathyroid tissue, and to help reduce surgical time.
"The diagnosis of PHPT is confirmed by demonstrating persistent hypercalcemia (or high-normal serum calcium levels) in the presence of inappropriately normal or elevated PTH concentrations. “

Serum Calcium: Normal values range from 8.5 to 10.2 mg/dL
PTH: Normal values are 10 - 55 picograms per milliliter (pg/mL)
Challenges are Opportunities

- Know your CPT codes / customer service
  - strengths, weakness, competing modalities, when indicated, when NOT indicated

- Educate your staff and providers

- Start a Quality Program in your dept.

- Keep yourself current
  - updates to CPT codes, medicare announcements, new guidelines and appropriateness criteria, new treatments/ trends

- Be an advocate of your specialty
Concerns Regarding Pre-Certification and Prior Notification

- No evidence for improved quality of care
- Favors indiscriminant volume reduction
- Lack of transparency
- Not firmly based on appropriateness criteria
- Inconsistent processes, with confusion and inefficiency
- Reduced timeliness
- Labor intensive
- Negative economic impact
- Steerage to the test of least resistance
- Scant data available for feedback/education
- No opportunity to refine process
- No correlation with imaging results or outcome
- No mechanism to understand practice variation or local expertise
Question 1: What is the most appropriate imaging exam to evaluate thyroid nodules?

1. Ultrasound
2. CT Scan
3. MRI
4. I-123 Scan
Question 1: What is the most appropriate imaging exam to evaluate thyroid nodules?

1. Ultrasound
2. CT Scan
3. MRI
4. I-123 Scan

Correct answer: 1

Question 2: In a patient with cancer, which of the following is not an appropriate indication for doing a Whole Body Bone Scan?

1. Rising tumor markers
2. Bone pain
3. Elevated alkaline phosphatase
4. Post traumatic fracture on x-ray
Question 2: In a patient with cancer, which of the following is not an appropriate indication for doing a Whole Body Bone Scan?

1. Rising tumor markers
2. Bone pain
3. Elevated alkaline phosphatase
4. Post traumatic fracture on x-ray

Correct answer: 4 – Post traumatic fracture on x-ray

http://interactive.snm.org/docs/pg_ch34_0403.pdf
Question 3: Which cancer does Medicare not cover for initial treatment strategy?

1 Lung
2 Lymphoma
3 Prostate
4 Colon
Question 3: Which cancer does Medicare not cover for initial treatment strategy?

1 Lung
2 Lymphoma
3 Prostate
4 Colon

Correct answer: 3 (prostate cancer not covered for initial staging)

Question 4: A patient has elevated serum calcium level. What is the most appropriate level of parathyroid hormone to do a parathyroid scan? (Normal blood level of parathyroid hormone is 10-55 pg/ml)

1. 4 pg/ml
2. 25 pg/ml
3. 40 pg/ml
4. 60 pg/ml
Question 4: A patient has elevated serum calcium level. What is the most appropriate level of parathyroid hormone to do a parathyroid scan? (Normal blood level of parathyroid hormone is 10-55 pg/ml)

1. 4 pg/ml
2. 25 pg/ml
3. 40 pg/ml
4. 60 pg/ml

Correct answer: 4

Reference: http://interactive.snm.org/docs/Parathyroid_Scintigraphy_V4_0_FINAL.pdf
Question 5: A patient just had a treadmill stress test. Which of the following is an appropriate indication to follow up with a Nuclear Stress Test?

1. Patient achieved 85% of predicted maximum
2. Patient had chest pain
3. EKG does not show any changes
4. Blood pressure increased with exercise
Question 5: A patient just had a treadmill stress test. Which of the following is an appropriate indication to follow up with a Nuclear Stress Test?

1. Patient achieved 85% of predicted maximum
2. Patient had chest pain
3. EKG does not show any changes
4. Blood pressure increased with exercise

Correct answer: 2 – Patient had chest pain

Reference: http://content.onlinejacc.org/article.aspx?articleid=1139755#tbl1
Thank You!!

Peeyush Bhargava M.D, FACNM

www.nuclearmd.com