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Avoidable Imaging Wave II

Renal Colic (Clinical Topic)

PE CT (Clinical Topic)

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Presenters

Chris Moore MD

Jeff Kline MD

Avoidable imaging in renal colic?

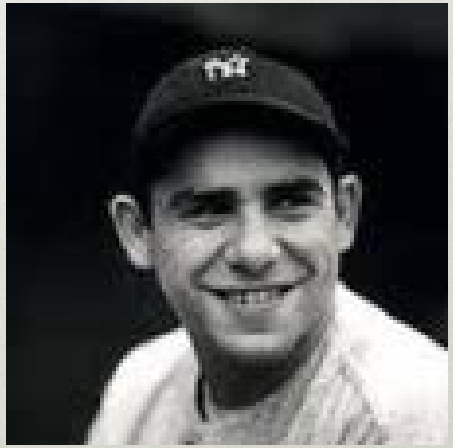
E-QUAL Webinar

May 25th 2017
Chris Moore MD
Associate Professor, Department of Emergency Medicine

Disclosures

- I am currently funded by the Agency for Healthcare Research and Quality (AHRQ) under R18HS023778 "Minimizing unnecessary irradiation from renal colic CT scans in the United States"
- I am currently consulting with Philips Healthcare on automated image recognition of ultrasound images
- I am collaborating on research with support via equipment loans from GE Healthcare and BK Medical

“You can observe a lot by just watching”



Yogi Berra 1925-2015

Case

- 37 y.o. white male, no past medical history, presents with acute onset of right flank pain and vomiting. Urine is clear but dip shows hematuria. He is getting fluids, toradol, morphine, and zofran.

Imaging?

Urinary Stone Disease

- Common: 1 in 11 people, increasing in U.S. and worldwide
- Recurrent: >50% will recur within 5y
- Is an ED dx: >1M dx per year; >2M visits per year for flank pain concern for renal colic
- Painful: “worse than labor”
- Expensive: ~$10B in annual costs
- Lots of CT: 70% of USD get CT
- Controversial: dx and management

CT for Kidney Stone

Diagnosis of Acute Flank Pain:
Value of Unenhanced Helical CT

Robert C. Smith[1]
Marco Verga
Shirley McCarthy
Arthur T. Rosenfield

AJR 1996;166:97–101

Received August 7, 1995; accepted after revision September 6, 1995.

Supported in part by the Society of Uroradiology.

[1]All authors: Department of Diagnostic Imaging, Yale University School of Medicine, 333 Cedar St., New Haven, CT 06510. Address correspondence to R. C. Smith.

0361–803X/96/1661–97

CONCLUSION. Unenhanced CT is a valuable technique for examining patients with acute flank pain in whom a clinical diagnosis is uncertain. It can accurately determine the presence or absence of ureteral stones as well as extraurinary causes of acute flank pain. In most cases, other imaging studies are not required.

“First Time” renal colic

IMPACT OF CT SCAN IN PATIENTS WITH FIRST EPISODE OF SUSPECTED NEPHROLITHIASIS

Michael Ha, MD* and Russell D. MacDonald, MD, MPH, CCFP, FRCPC†‡

The Journal of Emergency Medicine, Vol. 27, No. 3, pp. 225–231, 2004

Patients presenting with a first episode of clinically suspected nephrolithiasis should undergo CT scanning because it enhances diagnostic certainty by identifying alternate diagnoses not suspected on clinical grounds alone.

National Trends in Use of Computed Tomography in the Emergency Department

Keith E. Kocher, MD, MPH, William J. Meurer, MD, MS, Reza Fazel, MD, MSc, Phillip A. Scott, MD, Harlan M. Krumholz, MD, SM, Brahmajee K. Nallamothu, MD, MPH

Smith article, 1996

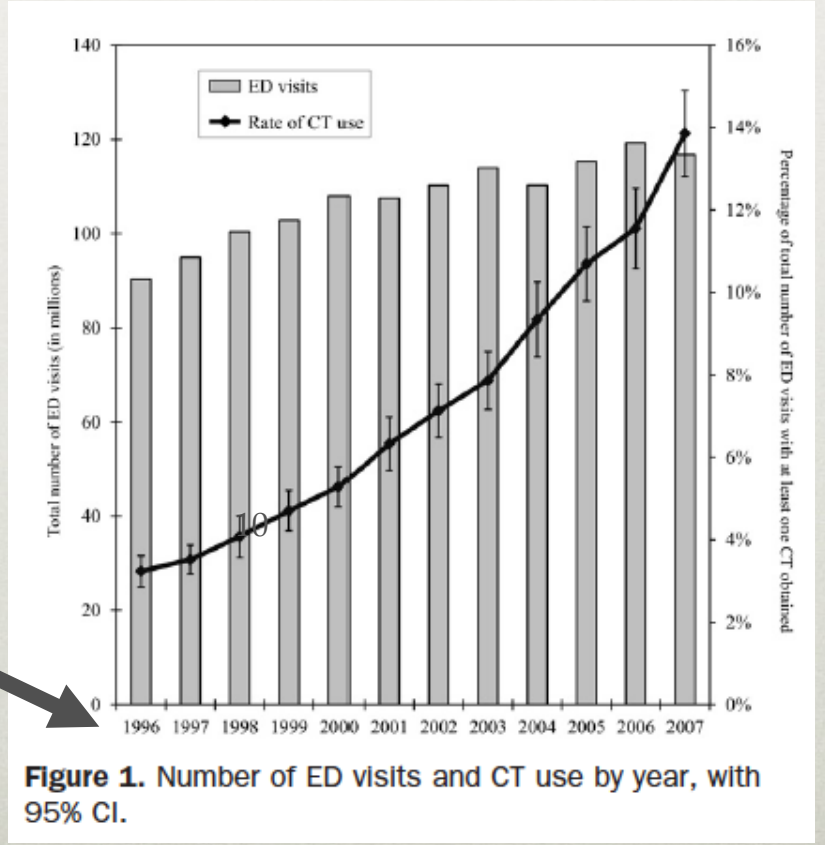
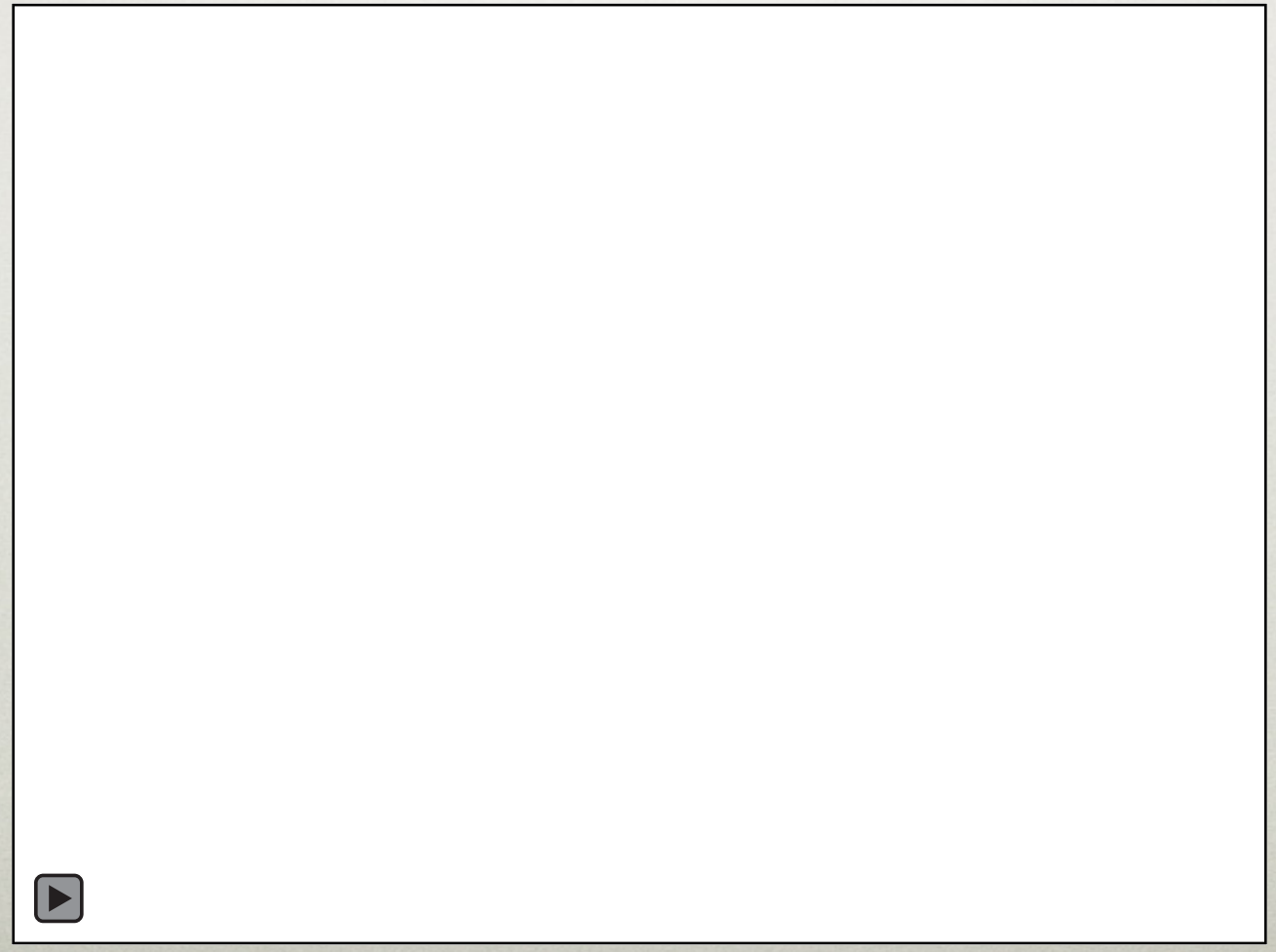


Figure 1. Number of ED visits and CT use by year, with 95% CI.

Ann Emerg Med. 2011;58:452-462

“Bad Things”



“First Time” renal colic

IMPACT OF CT SCAN IN PATIENTS WITH FIRST EPISODE OF SUSPECTED NEPHROLITHIASIS

Other significant pathology
Mesenteric and retroperitoneal lymphadenopathy, possible lymphoma
Right adrenal adenoma
Right ovarian neoplasm with liver mass
Enlarged prostate
Right adrenal mass
Multiple liver lesions, possibly metastatic
Left renal cell carcinoma, abdominal aortic aneurysm
Splenomegaly, cause not yet determined
Right adrenal adenoma
Mesenteric lymphadenopathy, possible lymphoma
Possible ulcerative colitis
Left periureteric mass with hydronephrosis, liver metastasis
Right renal cysts, possible malignancy
Right adrenal adenoma
Right renal mass, possible malignancy
Retrocecal lymphadenopathy, possible metastatic testicular cancer
Left ovarian cancer
Lesion in right hepatic lobe
Splenomegaly, cause not yet determined

“Bad things”

Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

ORIGINAL RESEARCH CONTRIBUTION

Prevalence and Clinical Importance of Alternative Causes of Symptoms Using a Renal Colic Computed Tomography Protocol in Patients With Flank or Back Pain and Absence of Pyuria

Chris L. Moore, MD, Brock Daniels, MD, Dinesh Singh, MD, Seth Luty, MS, and Annette Molinaro, PhD

Back pain or flank pain and no pyuria

Diagnosis	All (n = 5,383)	All CTs: % of all	All CTs: % of all
No cause of pain seen on CT	2,331	43.3	39.6
Kidney stone as cause of pain	2,569	47.7	54.9
Small stone (5 mm or less)	1,834	34.1	42.3
Large stone (>5 mm)	492	9.1	7.7
CT signs of passed stone	243	4.5	4.9
Non–kidney stone cause of pain	4,83	9.0	5.4
Acutely important cause	329	6.1	2.8
Follow-up recommended	119	2.2	2.0
Unimportant cause	35	0.7	0.7

Moore et al. Acad Emerg Med 2013;5:470-8.

Is CT helping?

Radiological Imaging of Patients With Suspected Urinary Tract Stones: National Trends, Diagnoses, and Predictors

ACADEMIC EMERGENCY MEDICINE 2011; 18:700–707

Conclusions: From 1996 to 2007, there was a 10-fold increase in the utilization of CT scan for patients with suspected kidney stone without an associated change in the proportion of diagnosis of kidney stone, diagnosis of significant alternate diagnoses, or admission to the hospital.

CT in Detecting Urinary Tract Calculi: Influence on Patient Imaging and Clinical Outcomes[1]

Radiology 2002; 225:441–449

CONCLUSION: Use of imaging for suspected UTC has increased markedly since the introduction of unenhanced CT, with little effect on acute care of patients in the ED.

“Bad things”

Acutely important alternate causes	*n*	%
Diverticulitis	55	16.7
Appendicitis	23	7.0
Mass concerning for new malignancy	34	10.3
Ovarian/adnexal/uterine	21	6.4
CT evidence pyelonephritis	95	28.9
Peri/intrarenal hemorrhage	9	2.7
Hydronephrosis w/o stone	22	6.7
Biliary (cholecystitis or choledocholithiasis)	8	2.4
Pneumonia	15	4.6
Bowel perforation	3	0.9
Bowel obstruction	9	2.7
Retroperitoneal pathology	5	1.5
Colitis or enterocolitis (treated)	3	0.9
Pancreatitis	10	3.0
Other (renal vein thrombosis, large mesenteric cyst, foreign body)	3	0.9
Aneurysm or dissection	4	1.2
Abscess (thoracoabdominal)	3	0.9
Traumatic injury	5	1.5
Post-operative findings (urgent)	2	0.6
Total acutely important alternate causes (% of all CTs):	329	(6.1%)

2.8% with BP/FP no pyuria

Moore et al. Acad Emerg Med 2013;5:470-8.

Incidental Findings

- Prevalence of 12.7% (95% CI 11.8-13.6%)
- 1 in 8 CT Renal Colic will have in incidental finding with follow-up imaging recommended

Incidental Findings on CT for Suspected Renal Colic in Emergency Department Patients: Prevalence and Types in 5,383 Consecutive Examinations

SA-CME

Mohammad Samim, MD, MRCS[a], Sarah Goss, MD[b], Seth Luty, MS[b], Jeffrey Weinreb, MD[a], Christopher Moore, MD[b]

Conclusions: Important IF occurred in 12.7% of non-enhanced CT scans performed for suspected renal colic in the emergency department and are more common in older individuals. Prospective studies that use radiographic recommendations to characterize IF and examine the outcome and cost of their workup are encouraged.

Key Words: Incidental findings, CT, renal colic

J Am Coll Radiol 2015;12:63-69.

Incidental Findings

- "Incidentalomas"

LESS IS MORE

Better Off Not Knowing

Improving Clinical Care by Limiting Physician Access to Unsolicited Diagnostic Information

VOMIT (victims of modern imaging technology)—an acronym for our times

BMJ 2003; 326 doi: 10.1136/bmj.326.7401.1273 (Published 5 June 2003)

cancer risk

- The estimated risk of a future malignancy from the CT scan in this 37 year-old patient is estimated to be:

1) About 1 in 100

- 2) About 1 in 1000[18]
- 4) About 1 in 10,000
- 5) About 1 in 100,000

cancer risk

Table 4. Estimated Number of Patients Undergoing Computed Tomography (CT) That Would Lead to the Development of 1 Radiation-Induced Cancer, by Type of CT Examination and Age at the Time of Exposure, Based on the Median and Interquartile Radiation Dose Observed

Anatomic Area, Type of CT Study	Patients, Median (Interquartile Range), No.					
	Age, 20 y		Age, 40 y		Age, 60 y	
	Female	Male	Female	Male	Female	Male
Head and neck						
Routine head	4360 (3290-5110)	7350 (5540-8620)	8100 (6110-9500)	11 080 (8350-12 990)	12 250 (9230-14 360)	14 680 (11 070-14 680)
Routine neck	2390 (1640-3540)	4020 (2770-5970)	4430 (3050-6580)	6058 (4170-8990)	6700 (4620-9940)	8030 (5530-8030)
Suspected stroke	660 (460-980)	1120 (770-1650)	1230 (850-1820)	1682 (1170-2490)	1860 (1290-2750)	2230 (1550-2230)
Chest						
Routine chest, no contrast	390 (290-630)	1040 (770-1670)	720 (540-1160)	1566 (1170-2520)	1090 (820-1760)	2080 (1550-2080)
Routine chest, with contrast	380 (270-650)	1020 (710-1740)	720 (500-1210)	1538 (1070-2620)	1070 (750-1830)	2040 (1420-2040)
Suspected pulmonary embolism	330 (230-460)	880 (610-1220)	620 (420-850)	1333 (920-1840)	930 (640-1280)	1770 (1220-1770)
Coronary angiogram	150 (130-230)	390 (350-610)	270 (250-420)	595 (540-920)	420 (370-640)	790 (710-790)
Abdomen and pelvis						
Routine abdomen-pelvis, no contrast	500 (380-770)	660 (510-1024)	930 (710-1430)	1002 (770-1540)	1400 (1080-2160)	1330 (1020-1330)
Routine abdomen-pelvis, with contrast	470 (380-700)	620 (510-930)	870 (710-1300)	942 (770-1400)	1320 (1080-1960)	1250 (1020-1250)
Multiphase abdomen-pelvis	250 (180-370)	330 (240-490)	460 (330-680)	498 (360-730)	700 (500-1030)	660 (480-660)
Suspected aneurysm or dissection	320 (210-390)	420 (280-510)	590 (390-710)	636 (420-770)	890 (580-1080)	840 (550-840)

Arch Intern Med. 2009;169(22):2078-2086

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Ultrasonography versus Computed Tomography for Suspected Nephrolithiasis

R. Smith-Bindman, C. Aubin, J. Bailitz, R.N. Bengiamin, C.A. Camargo, Jr., J. Corbo, A.J. Dean, R.B. Goldstein, R.T. Griffey, G.D. Jay, T.L. Kang, D.R. Kriesel, O. J. Ma, M. Mallin, W. Manson, J. Melnikow, D.L. Miglioretti, S.K. Miller, L.D. Mills, J.R. Miner, M. Moghadassi, V.E. Noble, G.M. Press, M.L. Stoller, V.E. Valencia, J. Wang, R.C. Wang, and S.R. Cummings

RESULTS

A total of 2759 patients underwent randomization: 908 to point-of-care ultrasonography, 893 to radiology ultrasonography, and 958 to CT. The incidence of high-risk diagnoses with complications in the first 30 days was low (0.4%) and did not vary according to imaging method. The mean 6-month cumulative radiation exposure was

CONCLUSIONS

Initial ultrasonography was associated with lower cumulative radiation exposure than initial CT, without significant differences in high-risk diagnoses with complications, serious adverse events, pain scores, return emergency department visits, or hospitalizations. (Funded by the Agency for Healthcare Research and Quality; ClinicalTrials.gov number, NCT01451931.)

N ENGL J MED 371;12 NEJM.ORG SEPTEMBER 18, 2014

An ultrasound is performed

- The following ED US is performed. Patient is improving but still some pain. Would you order further imaging in the ED?

- 1) No further ED imaging
- 2) KUB
- 3) CT
- 4) Other

An ultrasound is performed

- The following ED US is performed. Patient is improving but still has pain. Would you order further imaging in the ED?

- 1) No further ED imaging
- 2) KUB
- 3) CT
- 4) Other

NEJM US vs. CT Study

Ultrasound:

- Reduced radiation
- No increase in adverse outcomes
- But… urologists[23] are not happy with referrals to their clinic without a CT

Why Get a CT?

- Concerned this is not a kidney stone, may be something "bad"

- Pretty sure it is a kidney stone/ not something "bad", but want to know how big the stone is, where it is located

What can help you with this?

S.T.O.N.E. Score

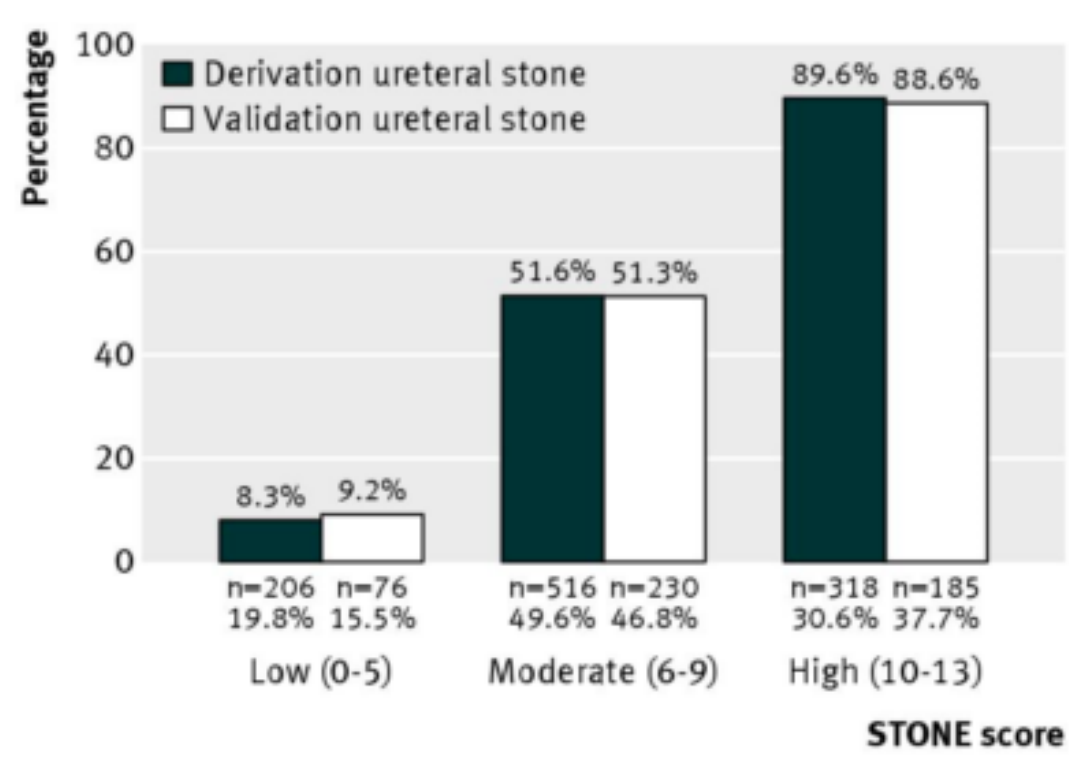
Table 3| **STONE score, factors, and categories**

STONE score by factors and categories	Odds ratio (95% CI)	Points
Sex		
Sex:		
Female	1	0
Male	4.31 (3.13 to 5.98)	2
Timing		
Duration of pain to presentation:		
>24 hours	1	0
6-24 hours	1.85 (1.27 to 2.70)	1
<6 hours	6.34 (4.26 to 9.33)	3
Origin		
Race:		
Black	1	0
Non-black	6.77 (3.79 to 12.64)	3
Nausea		
Nausea and vomiting:		
None	1	0
Nausea alone	1.98 (1.38 to 2.86)	1
Vomiting alone	5.26 (3.53 to 7.93)	2
Erythrocytes		
Hematuria (on urine dipstick):		
Absent	1	0
Present	5.61 (3.96 to 8.04)	3
Total		0-13

- Sex
  - Male +2
- Timing
  - <6h +3
  - 6-24h +1
- Origin
  - non-black +3
- Nausea
  - Nausea alone +1
  - With vomiting +2
- Erythrocytes
  - any blood on UA dip +3

Moore et al. BMJ 2013;5:470-8.

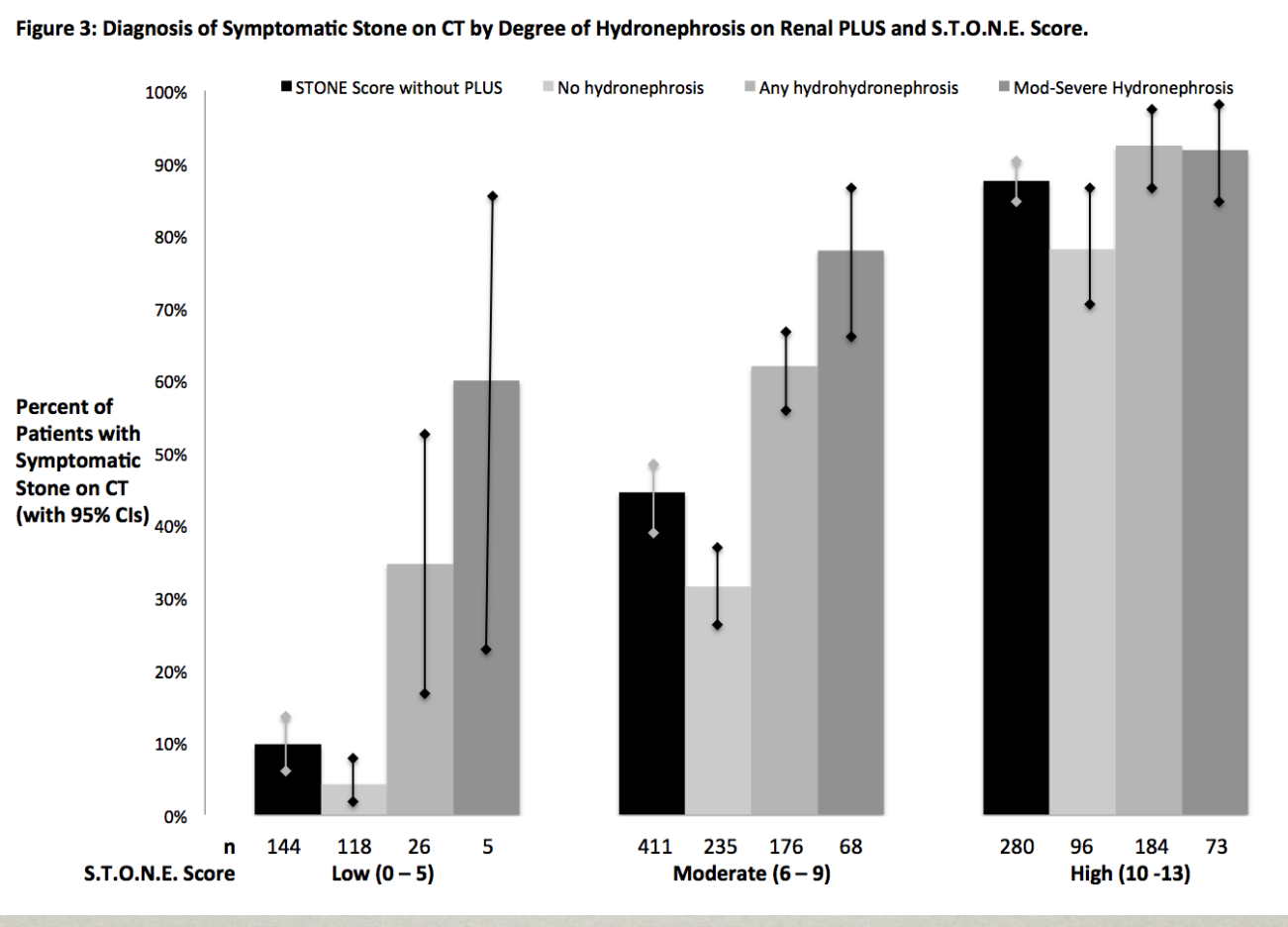
S.T.O.N.E. Score



- Sex
  Male +2
- Timing
  <6h +3
  6-24h +1
- Origin
  non-black +3
- Nausea
  Nausea alone +1
  With vomiting +2
- Erythrocytes
  any blood on UA dip +3

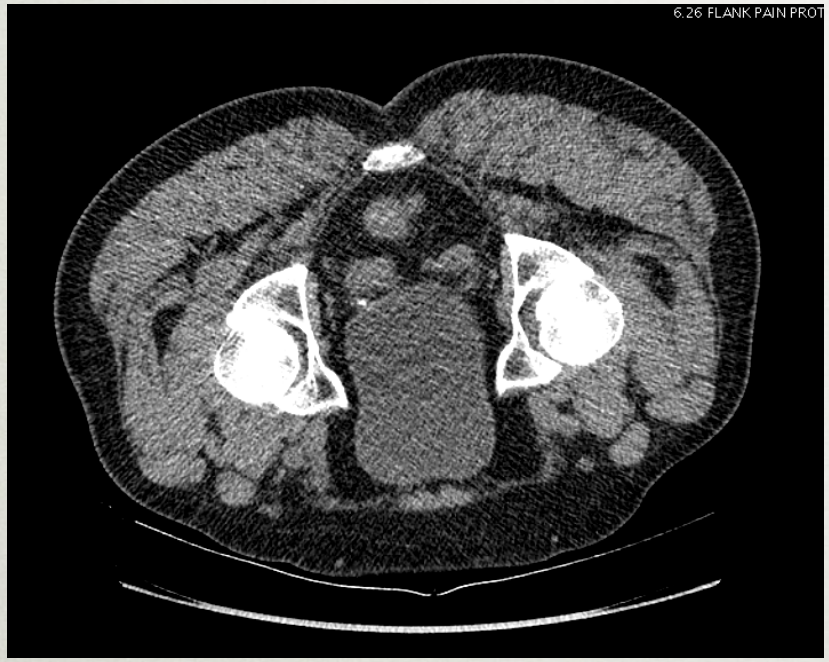
Moore et al. BMJ 2013;5:470-8.

S.T.O.N.E. PLUS
(point-of-care limited ultrasound)



Accepted, in revision, Ann EM.

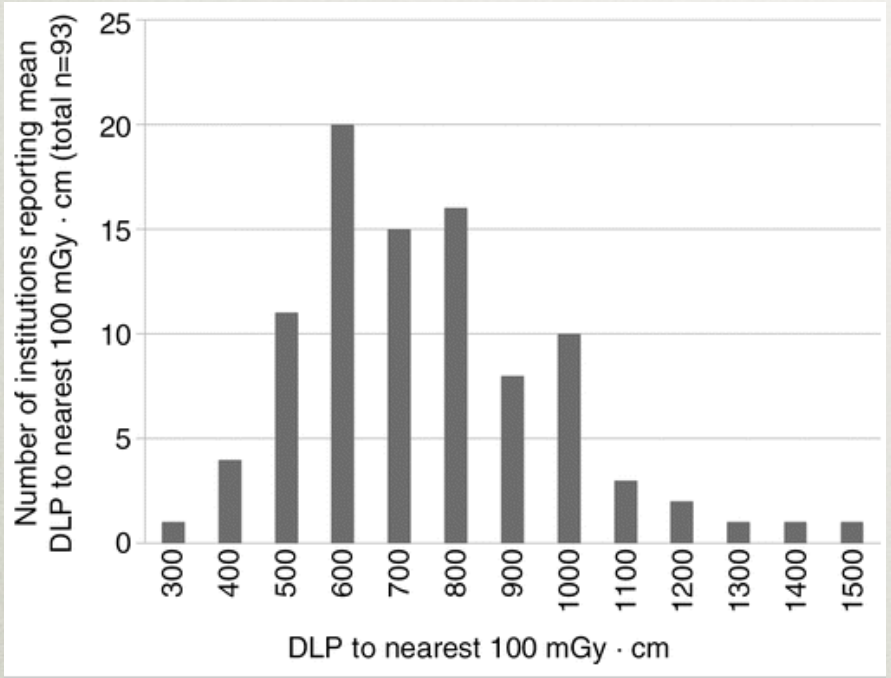
low dose ct



- ~85% CT radiation dose decrease (~11mSv to ~1.5mSv)
- Overall sensistivity 90.2%; specificity 98.9%
- 96.0% sensitive for stones requiring 90d intervention

Moore et al. Ann Emerg Med 2015;65:189-198.

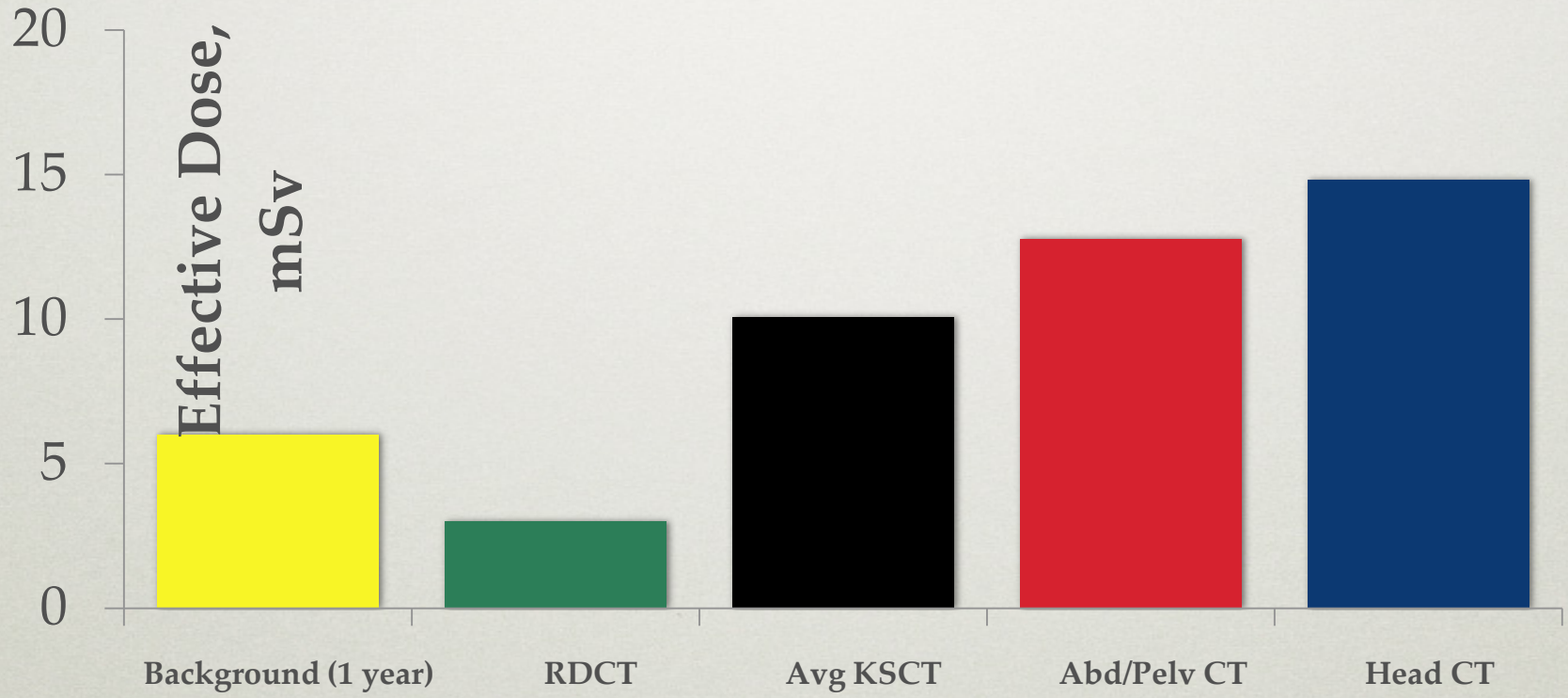
Dose Variation in Renal Colic CT 2011-2012



- 49,903 CTs from Dose Index Registry
- "Low dose" defined as <3mSv
- 2% of CT Renal Colic "low dose" (DLP ~200mGy*cm)
- Average 11.2mSv

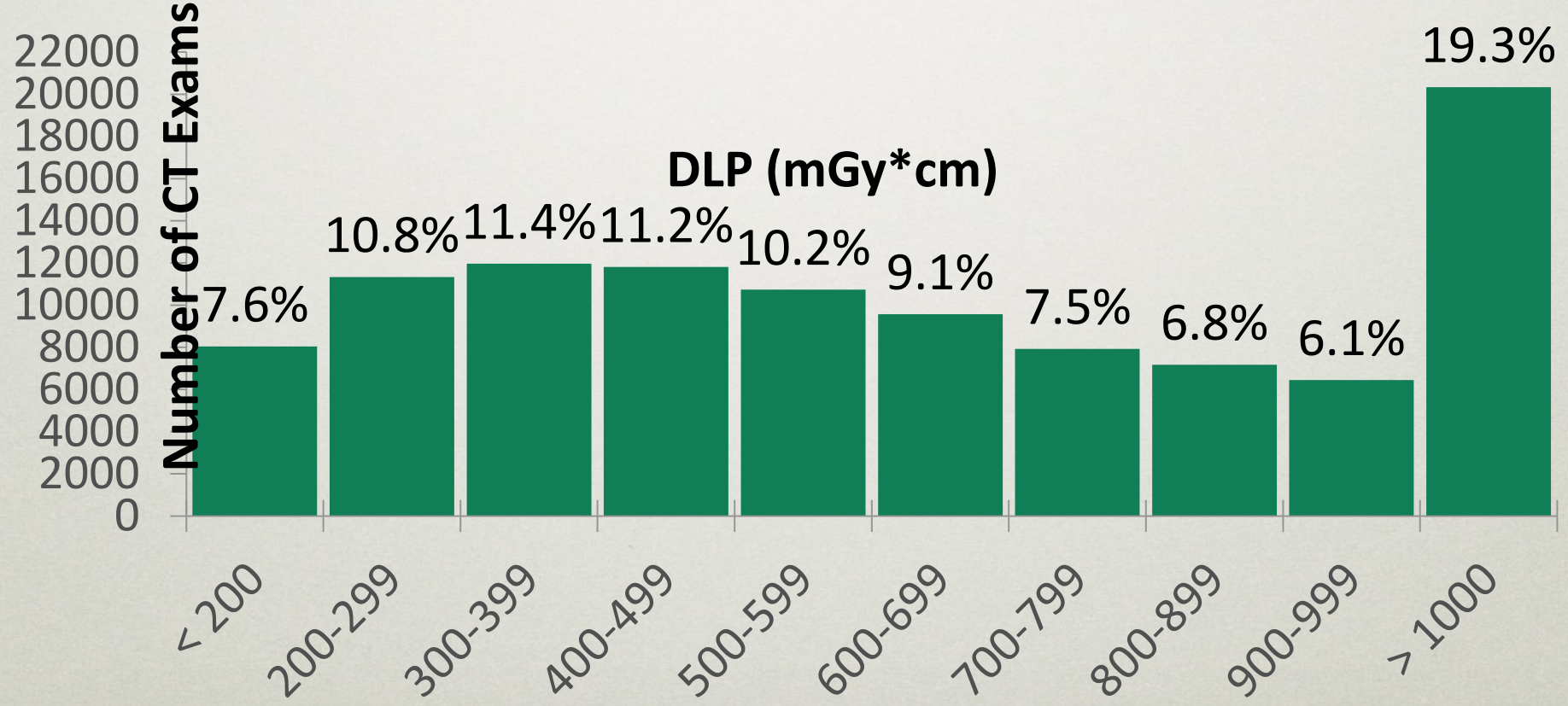
Lukasiewicz et al., Radiology 2014;271:445-451.

low dose ct

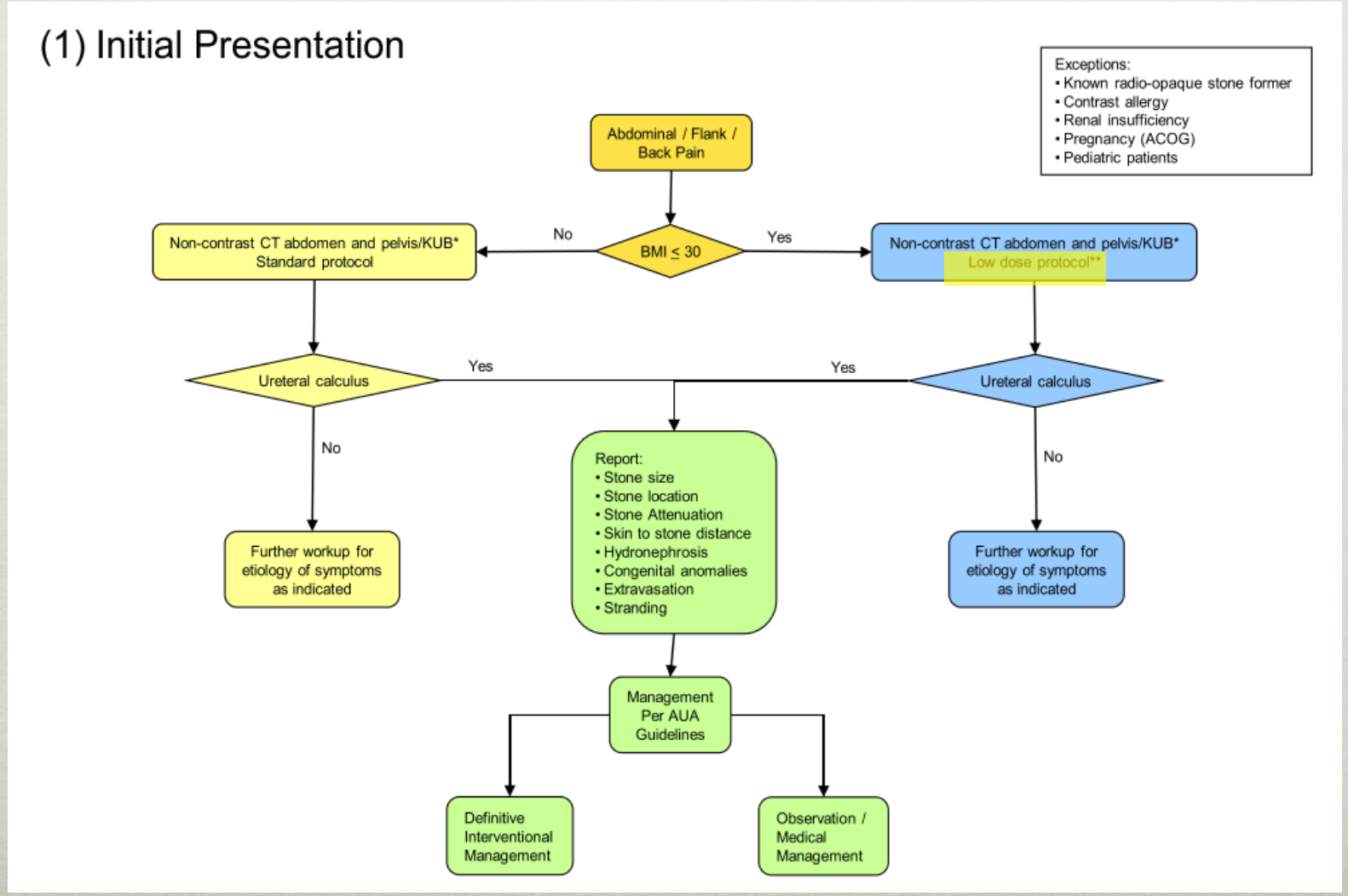

Effective Dose, mSv
20
15
10
5
0
Background (1 year)
RDCT
Avg KSCT
Abd/Pelv CT
Head CT

low dose ct

2015-2016



AUA


(1) Initial Presentation
Exceptions:
• Known radio-opaque stone former
• Contrast allergy
• Renal insufficiency
• Pregnancy (ACOG)
• Pediatric patients
Abdominal / Flank / Back Pain
BMI ≤ 30
No
Yes
Non-contrast CT abdomen and pelvis/KUB*
Standard protocol
Non-contrast CT abdomen and pelvis/KUB*
Low dose protocol**
Ureteral calculus
Yes
Yes
Ureteral calculus
No
No
Report:
• Stone size
• Stone location
• Stone Attenuation
• Skin to stone distance
• Hydronephrosis
• Congenital anomalies
• Extravasation
• Stranding
Further workup for etiology of symptoms as indicated
Further workup for etiology of symptoms as indicated
Management Per AUA Guidelines
Definitive Interventional Management
Observation / Medical Management

ACR

ACR Appropriateness Criteria® Acute Onset Flank Pain–Suspicion of Stone Disease

TABLE 1. Clinical Condition: Acute Onset Flank Pain — Suspicion of Stone Disease

Variant 1: Suspicion of Stone Disease.

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen and pelvis without contrast	8	Reduced-dose techniques preferred.	☢☢☢☢
CT abdomen and pelvis without and with contrast	6	If CT without contrast does not explain pain or if without has abnormality that should be further assessed with contrast (ex. stone versus phleboliths).	☢☢☢☢
US kidneys and bladder retroperitoneal with Doppler and KUB	6	Preferred examination in pregnancy, in patients who are allergic to iodinated contrast, and if NCCT is not available.	☢☢
X-ray intravenous urography	4		☢☢☢
MRI abdomen and pelvis without contrast (MR urography)	4		O
MRI abdomen and pelvis without and with contrast (MR urography)	4	See statement regarding contrast in text under "Anticipated Exceptions."	O
CT abdomen and pelvis with contrast	2		☢☢☢☢
X-ray abdomen and pelvis (KUB)	1	Most useful in patients with known stone disease.	☢☢

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

ACEP and ACR

Table 2. ACEP and American College of Radiology approaches to acute onset of flank pain.

Acute Onset Flank Pain—Suspicion of Stone Disease

Imaging section

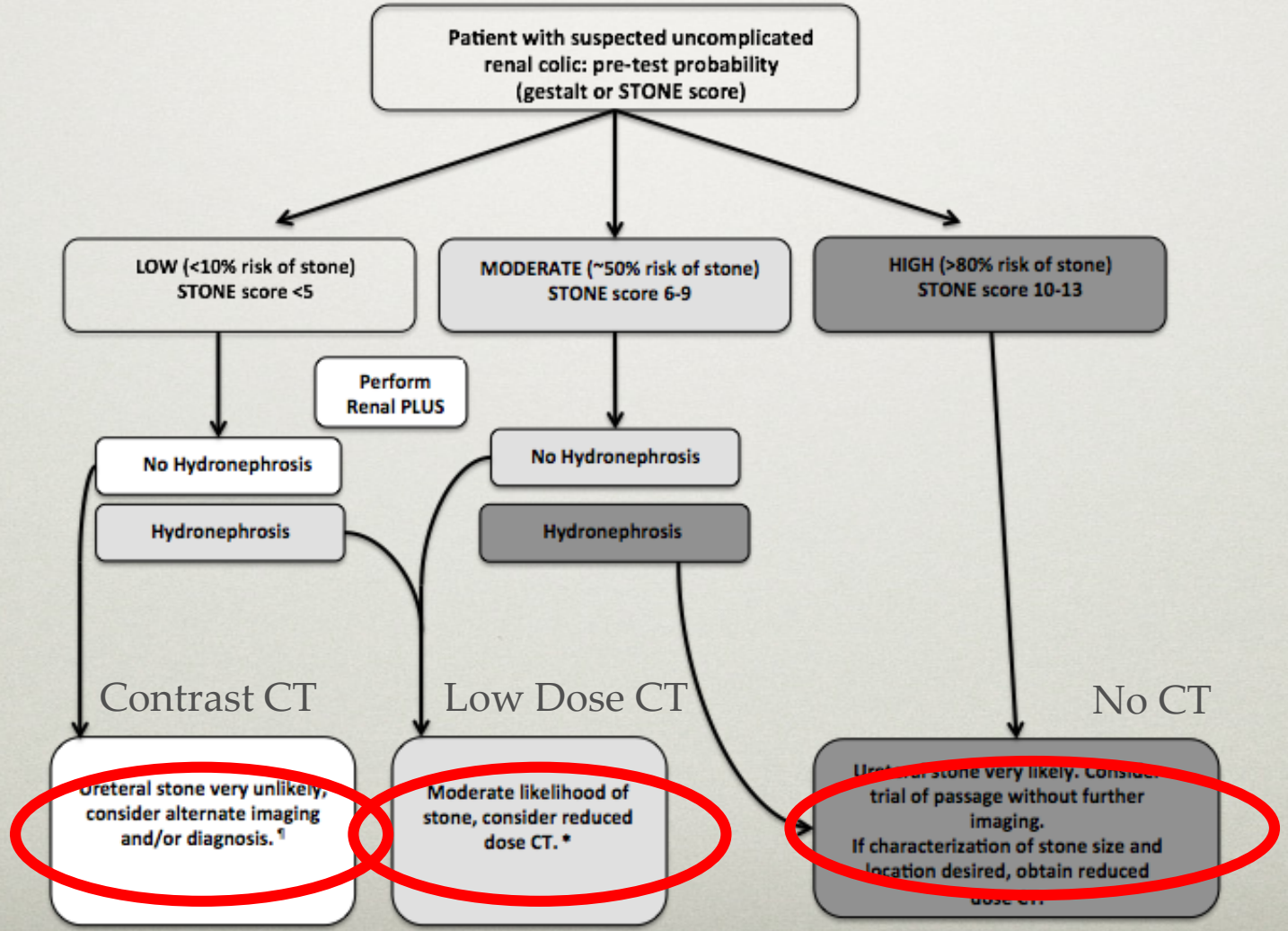
Radiologic procedures ranked ≥5	Rating	Comments	Relative radiation level
CT abdomen/pelvis wo contrast	8	Use reduced dose	☢☢☢☢
CT abdomen/pelvis w/wo contrast	6	Contrast helps assess cause of pain if noncontrast CT does not show stone	☢☢☢☢
US kidneys/bladder and KUB	6	Good combination for pts with known stone disease	☢☢

Clinical section

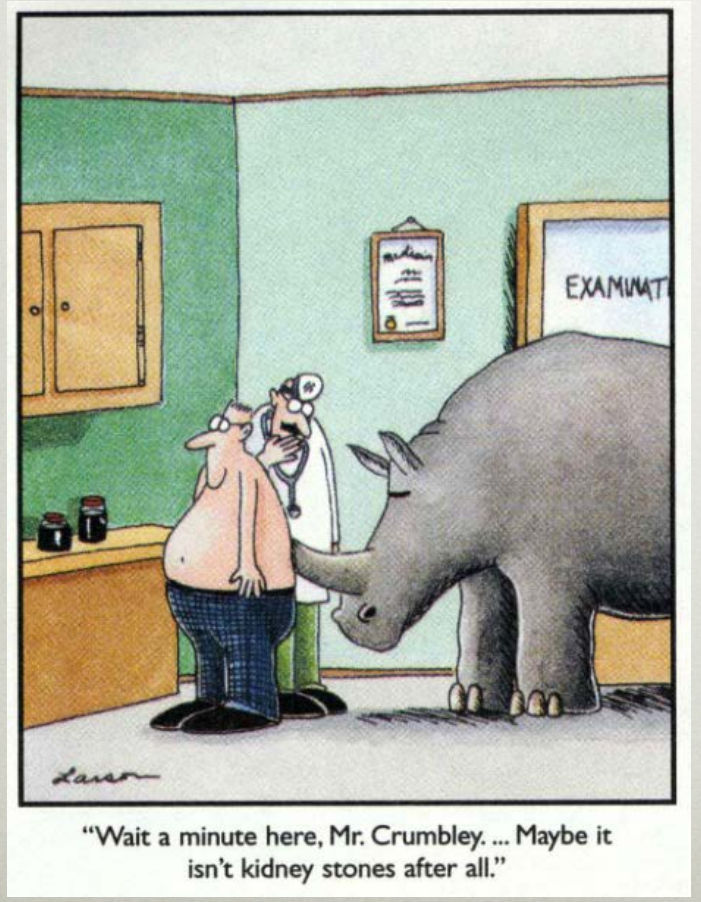
Clinical presentation	Imaging recommended	Comments
First stone passage (suspected)	NCCT	Benefit in establishing diagnosis exceeds radiation risk
Recurrent stone passage (similar clinical presentation to initial)	US kidneys/bladder plus/minus KUB Complicated clinical cases (consider NCCT)	KUB may show size and location of stone; US will typically show degree of hydronephrosis and can confirm ureteral urine flow into bladder; radiation exposure eliminated or reduced

KUB, kidneys, ureters, and bladder; *NCCT*, non-contrast CT.

An Imaging Algorithm



Take Home…



"Wait a minute here, Mr. Crumbley. ... Maybe it isn't kidney stones after all."

- First time renal colic with classic presentation does **NOT** *require* a CT
- Be aware of the benefits (?) and downsides of CT (IF, radiation, $)
- An objective clinical prediction rule (the STONE score) and bedside US may help determine need for CT
- Be aware of the challenges of diagnosing hydro on ultrasound
- If you do a CT, consider reduced dose; understand what your institution does, and offers (email me if you don't have)

The risk of avoiding all risk

Jeffrey A. Kline
Indiana University School of Medicine
@Klinelab

INDIANA UNIVERSITY

DEPARTMENT OF EMERGENCY MEDICINE

School of Medicine

Case

- 29 year old presents with palpitations, tight chest, increases with breathing, post long-haul flight
- HR 99
- No PMH
- Physical exam normal except VS

*Date: 11/07/2013 2007 Status: Modified

Subject: Chest pain

History of Present Illness

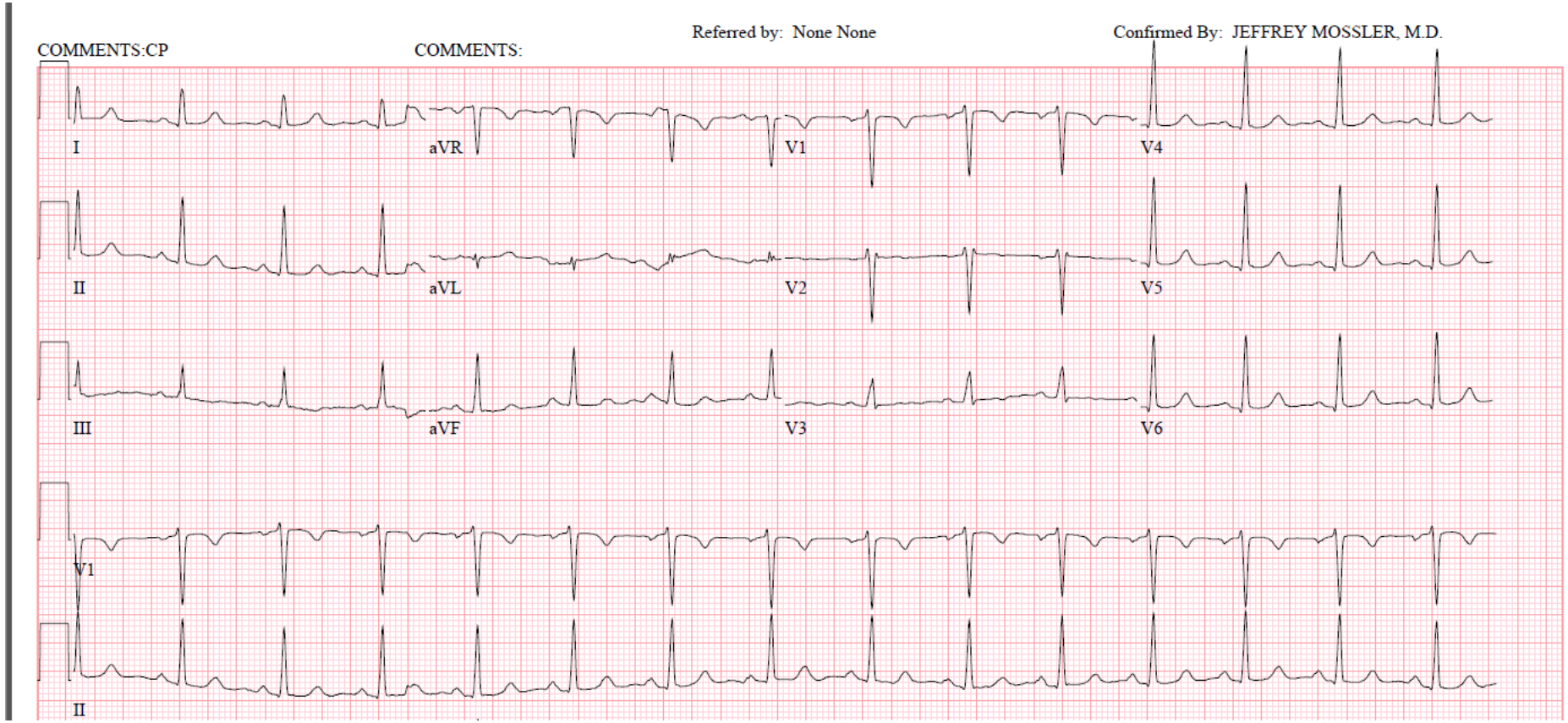
palpitations, chest discomfort and dyspnea since last night, "tightness in chest," acute onset
went to work today, symptoms off/on, felt like she couldn't take a deep breath, described as
+nausea this am, BP high before coming to ED (SBP 170), "everything went black", denies L
intermittent palpitations all morning with some dizziness
denies similar priors, no chest pain
PE red flags: recently got back from honeymoon in italy 2 days ago, has been taking OCPs
no abdominal symptoms, no fevers
no h/o blood clots
took two ASA 81mg pta

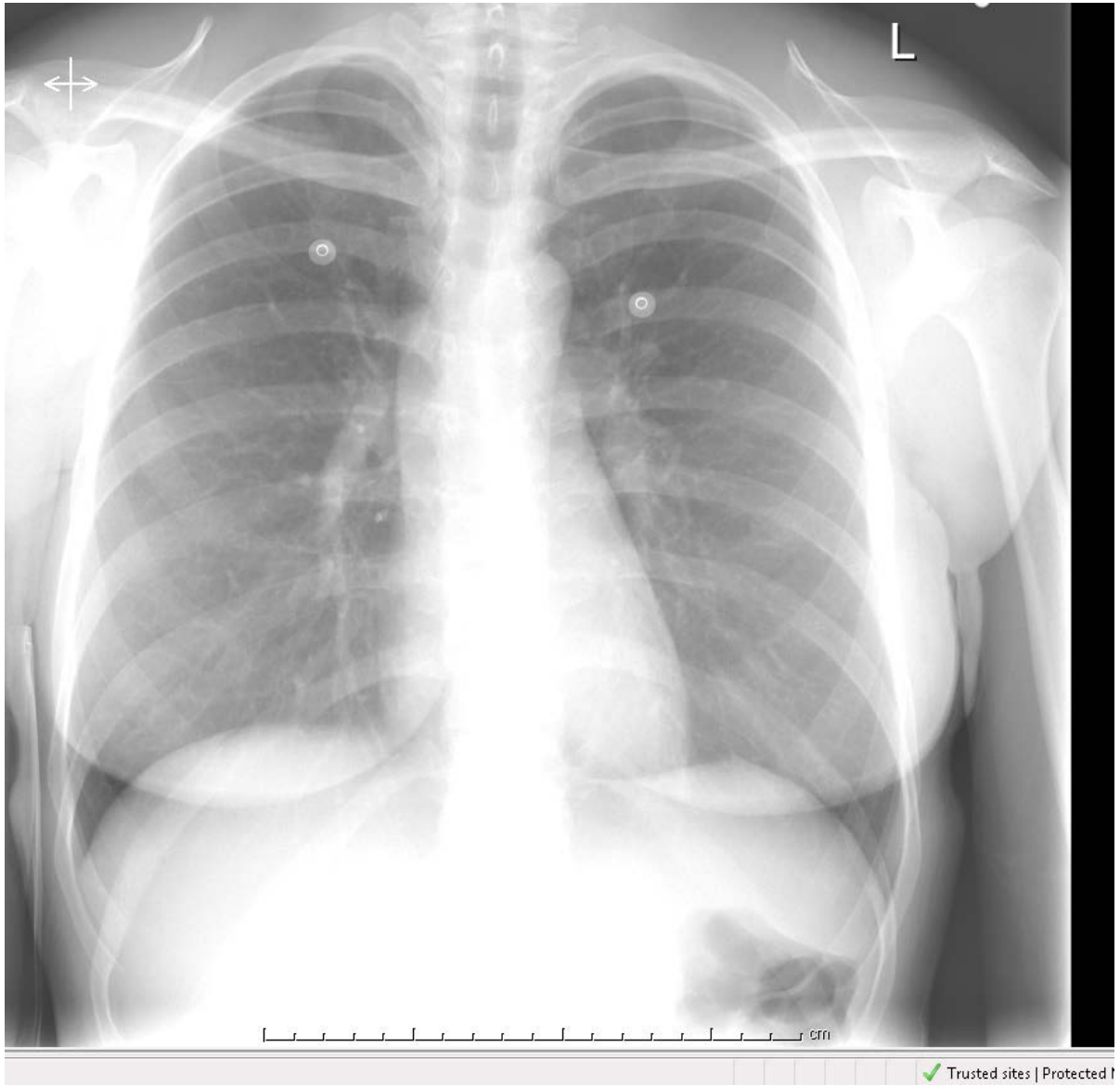
Review of Systems

Constitutional symptoms: Decreased activity, no fever, no chills, no sweats.
Eye symptoms: No recent vision problems,

Vital Signs

Vital Signs Flowsheet	11/08/13 00:05	11/07/13 23:00	11/07/13 22:00	11/07/13 20:42	11/07/13 20:06	11/07/13 19:53
Vital Signs						
Temperature Cel						36.4 DegC
Temperature Far Calculated						L 97.5 DegF
Temperature Method						Oral
Heart Rate	85 bpm	87 bpm	82 bpm	92 bpm		94 bpm
Respiratory Rate	17 br/min	16 br/min	16 br/min	16 br/min		15 br/min
SpO2	97 %	98 %	98 %	99 %		100 %
O2 Delivery Device	Room air					Room air
Pain Score	0	0		0		0
Blood Pressure #1						
Systolic Blood Pressure #1	127 mmHg	H 145 mmHg	130 mmHg	H 141 mmHg		H 144 mmHg
Diastolic Blood Pressure #1	90 mmHg	H 95 mmHg	H 98 mmHg	H 108 mmHg		H 100 mmHg
BP # 1 MAP	99 mmHg					
BP #1 MAP Calculated	102 mmHg	112 mmHg	109 mmHg	119 mmHg		
BP # 1 Position						
BP # 1 Location						
BP # 1 Method	Automatic/Non Invasi	Automatic/Non Invasi	Automatic/Non Invasi	Automatic/Non Invasi		Automatic/Non Invasi
Body Measurements						
Weight for Calculation						
Weight						58 kg
Height						167.6 cm
BSAM2						


COMMENTS:CP
COMMENTS:
Referred by: None None
Confirmed By: JEFFREY MOSSLER, M.D.
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II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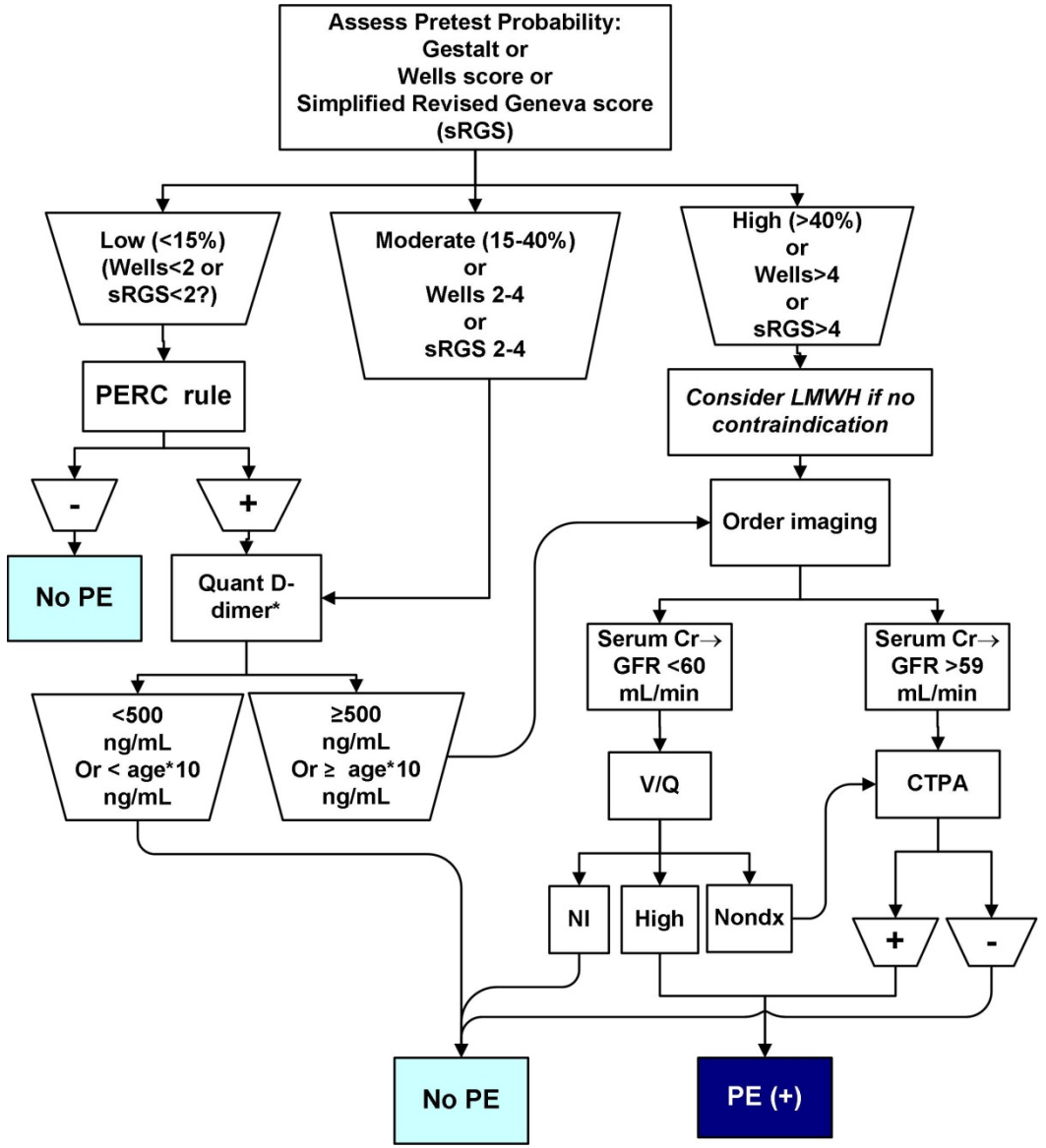
Trusted sites | Protected

Non-pregnant PE exclusion algorithm



The PERC rule

Gestalt low suspicion and:

- Age < 50
- Heart rate < 100
- No hemoptysis
- No estrogen use
- No recent surgery
- No prior PE or DVT
- No unilateral leg swelling
- Room air pulse oximetry ≥ 95%

Kline JA, et al, *J Thromb Haemost 2:1247-1255, 2004*

Initial assessment

- Awareness growing about the problem of overtesting
- When can we do nothing?
- Which bedside variables have predictive power?

Risk Factors for PE

- Epidemiological studies vs. symptomatic ED patients

Years → OUTCOME

6-8 weeks → PE or not

Kline JA and Kabhrel *J Emerg Med*. 2015, (part 1) 48:771-80

Doubts and Certainties

Certain increased risk IN ED

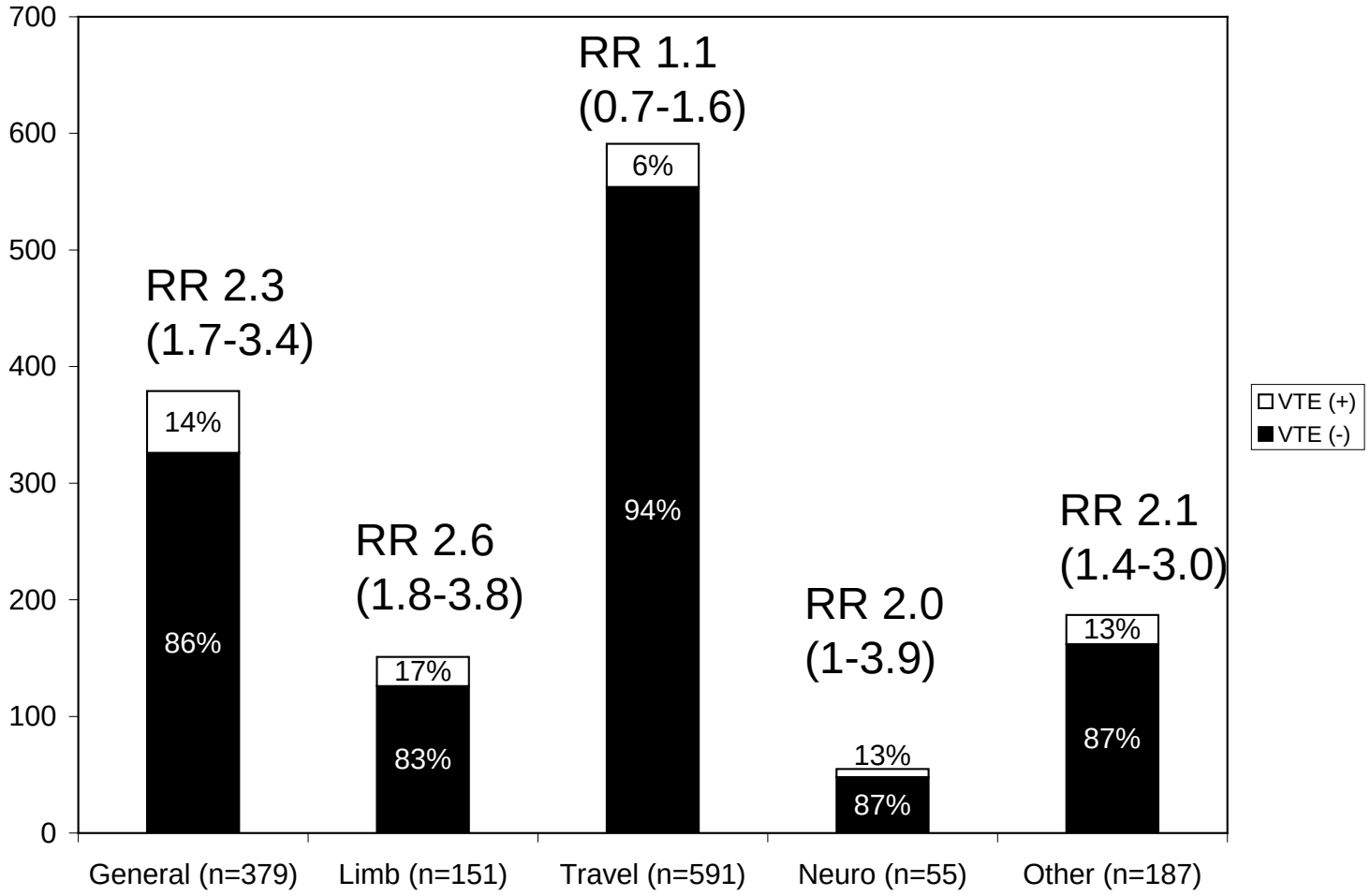
- Recent surgery (GETA or epidural)
- Prior VTE
- **Estrogen use**
- Non-O blood type
- Extremity immobility
- Post-partum (<5 days)
- Active cancer

Not a risk or uncertain IN ED

- **Travel**
- Smoking
- Obesity
- Family history
- Pregnancy
- Lines, infection, nursing home
- Heart failure and a-fib

Kline JA and Kabhrel *J Emerg Med*. 2015, (part 2) 48:771-80

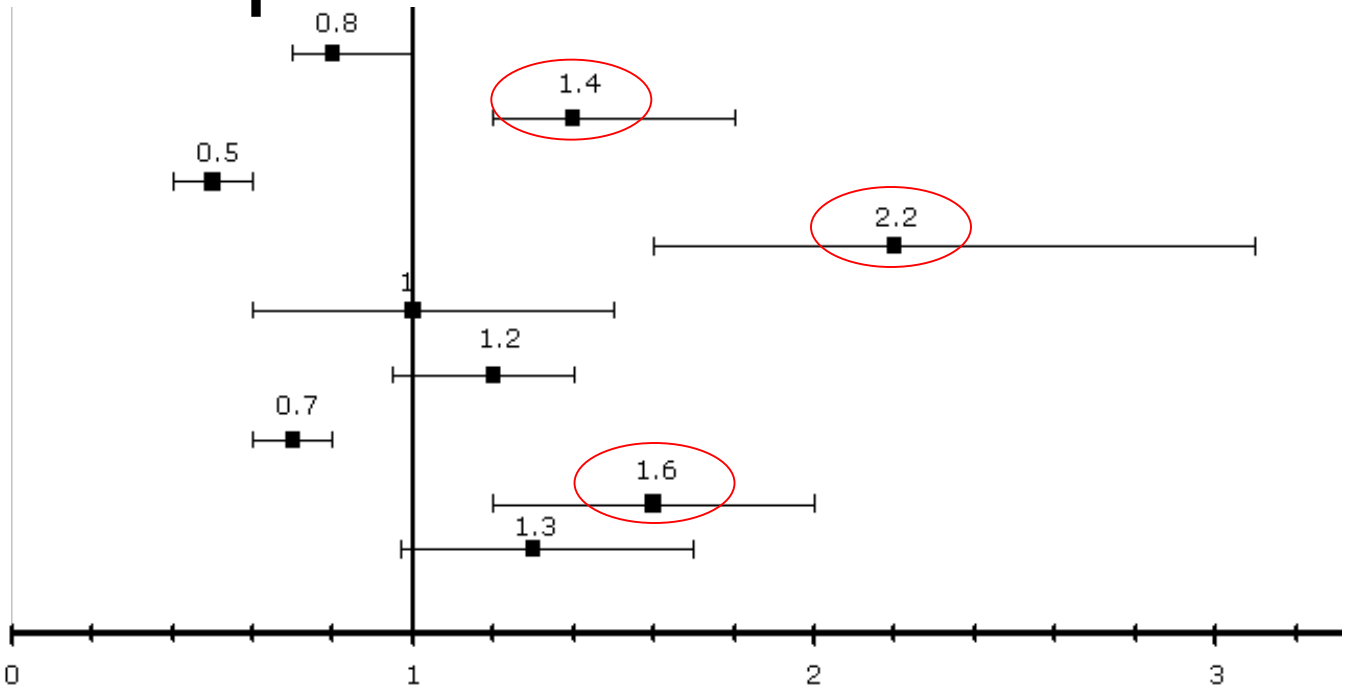
Immobility



Ann Emerg Med. 2009 Aug;54(2):147-52

Comparison of risks

- Sudden onset
- Pleuritic CP
- Substern. CP
- Estrogen
- Inactive CA
- Obesity
- Smoking
- Dyspnea
- Family Hx VTE

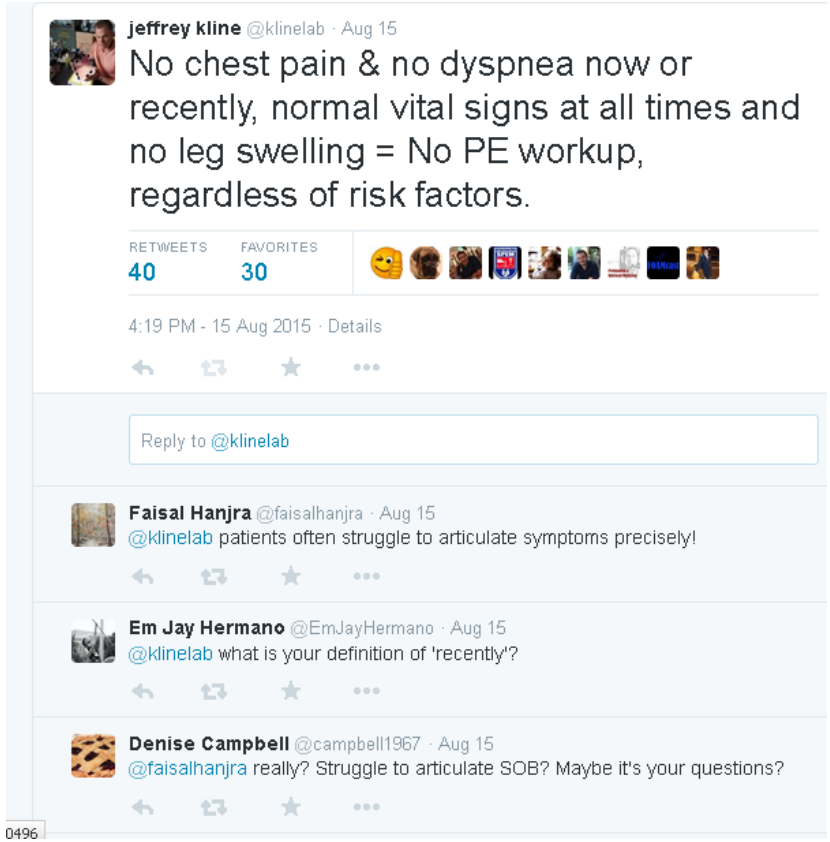


Courtney DM et al. *Ann Emerg Med*. 2010 55:307-315

Effecting change in overtesting

1. Knowledge creation- create rules
2. Translating the knowledge into practice-validate, prove effectiveness
3. Implementation- Guidelines, endorsements and systems adoption
4. Individual level behavior change- Influenced by personal experience and values.

"Don't start"?



jeffrey kline @klinelab · Aug 15

No chest pain & no dyspnea now or recently, normal vital signs at all times and no leg swelling = No PE workup, regardless of risk factors.

RETWEETS 40 FAVORITES 30

4:19 PM - 15 Aug 2015 · Details

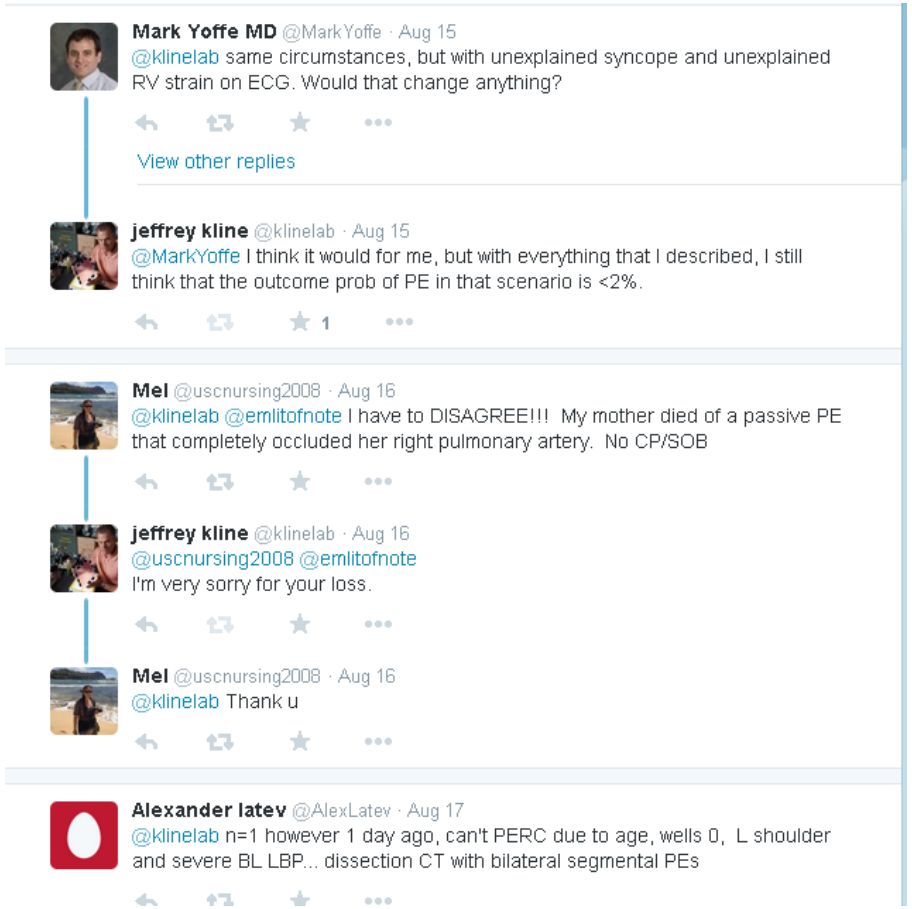
Reply to @klinelab

Faisal Hanjra @faisalhanjra · Aug 15
@klinelab patients often struggle to articulate symptoms precisely!

Em Jay Hermano @EmJayHermano · Aug 15
@klinelab what is your definition of 'recently'?

Denise Campbell @campbell1967 · Aug 15
@faisalhanjra really? Struggle to articulate SOB? Maybe it's your questions?

0496



Mark Yoffe MD @MarkYoffe · Aug 15
@klinelab same circumstances, but with unexplained syncope and unexplained RV strain on ECG. Would that change anything?

View other replies

jeffrey kline @klinelab · Aug 15
@MarkYoffe I think it would for me, but with everything that I described, I still think that the outcome prob of PE in that scenario is <2%.

1

Mel @uscnursing2008 · Aug 16
@klinelab @emlitofnote I have to DISAGREE!!! My mother died of a passive PE that completely occluded her right pulmonary artery. No CP/SOB

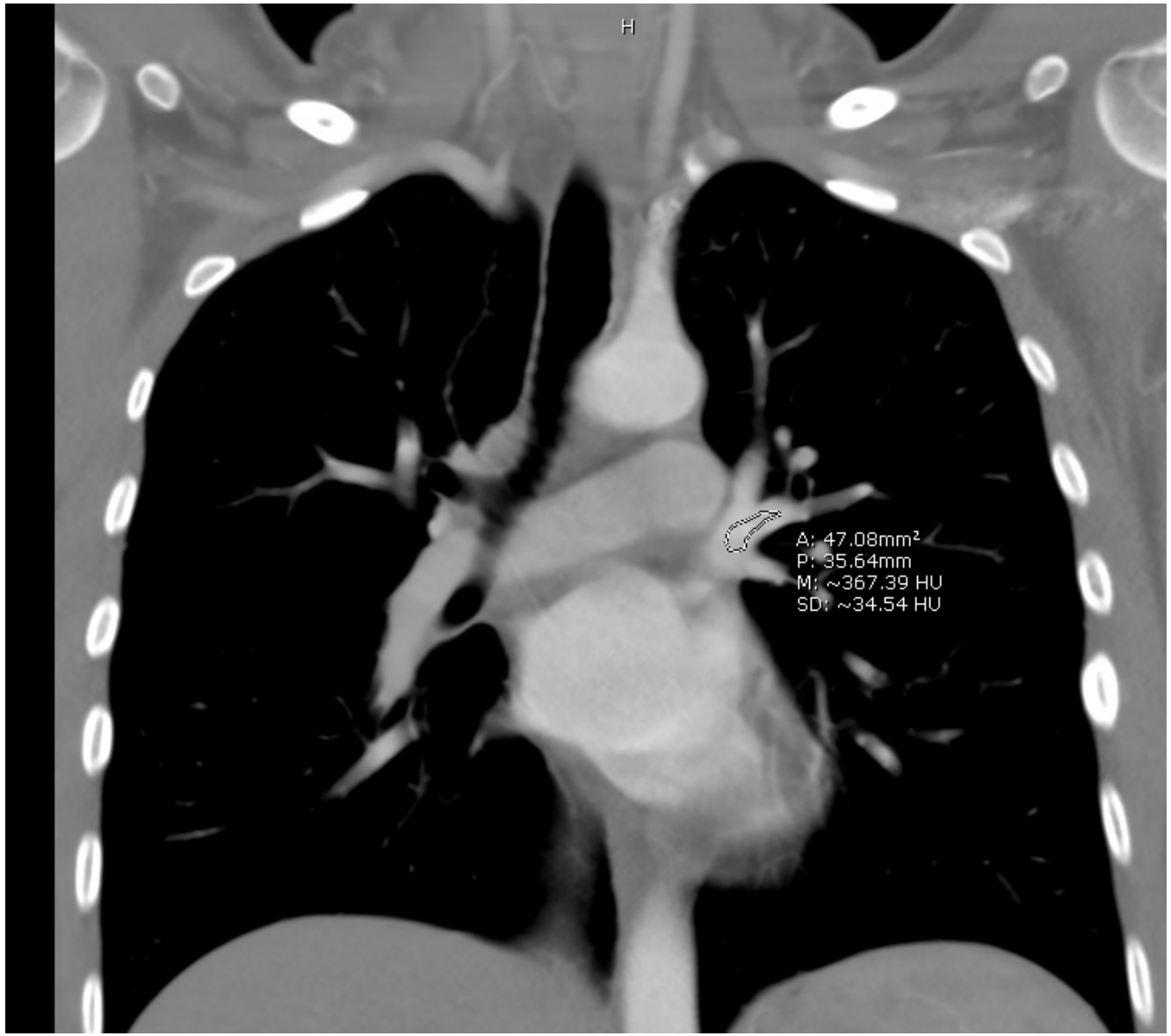
jeffrey kline @klinelab · Aug 16
@uscnursing2008 @emlitofnote
I'm very sorry for your loss.

Mel @uscnursing2008 · Aug 16
@klinelab Thank u

Alexander Iatev @AlexLatev · Aug 17
@klinelab n=1 however 1 day ago, can't PERC due to age, wells 0, L shoulder and severe BL LBP... dissection CT with bilateral segmental PEs

Case, continued

– D-dimer was 2,913 ng/mL→ CT scan


H
A: 47.08mm²
P: 35.64mm
M: ~367.39 HU
SD: ~34.54 HU

- IMPRESSION: CT chest with intravenous contrast.
- 1. Somewhat limited examination secondary to timing of the contrast bolus. No large central pulmonary artery filling defect to suggest
- pulmonary embolism.
- 2. No acute cardiopulmonary abnormality.

Case, continued

- LMWH, prescribed rivaroxaban, referred to KLOT clinic
- I recommended no anticoagulation
- Internist later restarted and referred to a hematologist→thrombophilia panel→APS, FVL, F2, Proteins C, S, AT normal, but found 4G/5G gain of function mutation in PAI-1
- Tried to get pregnant

More follow-up

- Has had 7 repeat CT scans, all negative
- Has had >10 D-dimer tests, all highly elevated
- Has been on and off of every oral anticoagulant known
- Still not pregnant
- Has suffered severe psychological stress as a direct result

Issues raised by this case

- Unintended consequences of testing
- Population risks may not equate to emergency care risks
- Diagnostic testing often in the grey zone
- Thrombophilia testing

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What's Next?

- Complete portal activities
- Register for the June Webinar
  www.acep.org/equal
- Questions? Contact the E-QUAL team at equal@acep.org

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