Avoidable Imaging Learning Collaborative:
2008 Mild Traumatic Brain Injury Clinical Policy Success Story – BWH Head and PE CTs with Clinical Decision Support Using the Canadian CT Head Rule to Reduce Unnecessary Imaging
Presenters

Michael D. Brown, MD, MSc
Ali S. Raja, MD, MBA, MPH
Ian Stiell, MD, MSc, FRCPC
2008 Mild Traumatic Brain Injury Clinical Policy

Michael D Brown, MD, MSc
Chair, ACEP Clinical Policies Committee
2008 Mild TBI Clinical Policy

- Provide historical context
  - Developed by ACEP in collaboration with CDC
  - Search and grading conducted 10 years ago

- Critical Question 1 most relevant to “avoidable imaging”
  - Who needs head CT?

- Critical Q 2 & 3 address roles of MRI and biomarkers
  - Lack of evidence for Level A or Level B recommendations

- Critical Q 4 addresses disposition following negative CT
  - Yes, may be discharged….except inadequate data for bleeding disorders, anticoagulation, antiplatelets, previous neurosurgery
Guideline intended for adults with blunt head trauma

- Present to ED within 24 hours of injury
- GCS 14 or 15
- 16 years or older

Exclusions

- Penetrating trauma
- Multisystem trauma
- Age < 16
- GCS < 14

Primary outcome: acute traumatic intracranial lesion on CT
Level A Recommendation

- Head CT indicated with LOC or amnesia only if one or more of the following is present:
  - Headache
  - Vomiting
  - Age > 60 years
  - Drug or alcohol intoxication
  - Deficits in short-term memory
  - Trauma above the clavicle
  - Post-traumatic seizure
  - GCS < 15
  - Focal neurologic deficit
  - Coagulopathy
Level B Recommendation

- Head CT should be considered with no LOC or amnesia if any of the following:
  - Focal neurologic deficit
  - Vomiting
  - Severe headache
  - Age $\geq$ 65 years
  - Signs of basilar skull fracture
  - GCS $< 15$
  - Coagulopathy
  - Dangerous mechanism of injury*
Class I Study by Smits et al

- GCS 13–14 or 15 with a “risk factor”
- N = 3,181 in Netherlands
- Primary outcome: any traumatic finding on CT
  - New Orleans Criteria adapted
    - Se = 99% (98 to 100%)
    - Sp = 3% (1 to 5%)
    - LR+ = 1; LR− = 0.3
  - Canadian Rule adapted
    - Se = 85% (81 to 89%)
    - Sp = 40% (37 to 42%)
    - LR+ = 1.4
    - LR− = 0.4

JAMA. 2005;294(12)
Class II Study by Stiell et al

- Enrolled 2,707 with GCS 13–15
- Subgroup analysis with GCS = 15 (n = 1822)
- Secondary outcome: **clinically important injury**
  - New Orleans Se = 100%; **Sp = 13%** (11 to 14%)
    - LR+ = 1
    - LR – = 0.1
  - Canadian Rule Se = 100%; **Sp = 51%** (48 to 53%)
    - LR+ = 1.7
    - LR – = 0.3

JAMA. 2005;294(12)
Success Story – BWH Head and PE CTs with Clinical Decision Support

Ali S. Raja, MD, MBA, MPH

Vice Chairman - Department of Emergency Medicine, Massachusetts General Hospital
Senior Faculty - Brigham and Women’s Hospital Center for Evidence-Based Imaging
Associate Professor of Emergency Medicine and Radiology - Harvard Medical School
Executive Director, Harvard Medical School Library of Evidence

@AliRaja_MD
Financial Conflicts of Interest:
None
3-fold inter-physician variation (21.2%-60.1%) remained after multivariable adjustment

Pertinent History/Reason for Exam:
wrong place, wrong time

Contraindications:
Comments:
Physician Name/Pager: ed

Diabetic: Not Diabetic
Latex Allergy: None Known- No Latex Allergy
CREAT: 64 UMOL/L 2013-07-31
EGFR: >120 ML/MIN 2013-07-31
Clinical Decision Support for
*Adaptive* Data Collection

Please answer both questions below:

1. Did your patient experience loss of consciousness?
   - Yes
   - No
   - Unknown

2. Does any of the following apply to your patient:
   - Post traumatic seizure
   - Glasgow coma scale < 15 at presentation
   - Glasgow coma scale deterioration >= 2 points (1 hour after presentation)
   - Transfer from another hospital
   - Bleeding disorder/anti-coagulant therapy
   - Vomiting >= 1 episode
   - Postraumatic amnesia >= 4 hour
   - Clinical signs of skull fracture

   - Yes
   - No

This information is presented to assist you in providing care to your patients. It is your responsibility to exercise your independent medical knowledge and judgment in providing what you consider to be in the best interest of the patient.
Lesson One

One Specialty Cannot Implement Imaging CDS Alone
The CT-PE Problem

Life-threatening diagnosis +
Low-threshold for missed diagnosis +
Readily available definitive diagnostic test +
No physician consequences for over-testing =

Rapidly increasing PE-protocol CT ordering

Solutions?

Emergency Medicine Interventions:
- Failed
  - Not integrated into imaging requests
  - Education only, Not point-of-care

Radiology Interventions:
- Failed
  - Presented novel information at the point-of care, halting flow
  - No internal champions
Effect of Computerized Clinical Decision Support on the Use and Yield of CT Pulmonary Angiography in the Emergency Department

Purpose:
To determine the effect of evidence-based clinical decision support (CDS) on the use and yield of computed tomography (CT) pulmonary angiography in the emergency department.
Figure 3: Graph shows CT pulmonary angiography (CTPA) use and yield before and after CDS implementation. CY = calendar year, Q1 = first quarter, Q2 = second quarter, Q3 = third quarter, Q4 = fourth quarter.
### Decision Support

To accurately assess the probability of pulmonary embolism in this patient based on Wells Criteria you **MUST** check all that apply below.

- [ ] Clinical Signs and Symptoms of DVT
- [ ] PE is #1 Diagnosis, or Equally Likely
- [ ] Heart Rate > 100
- [ ] Immobilization at least 3 days, or Surgery in the Previous 4 weeks
- [ ] Previous, objectively diagnosed PE or DVT
- [ ] Hemoptysis
- [ ] Malignancy with Treatment within 6 months, or Palliative
- [ ] None of the Above

**Please see "More Info" for references.**

This information is presented to assist you in providing care to your patients. It is your responsibility to exercise your independent medical knowledge and judgment in providing what you consider to be in the best interest of the patient.
**Decision Support**

Based on the information you have provided, your patient is not at high risk for Pulmonary Embolism. Published guidelines suggest measuring a D-Dimer to aid in the decision to obtain a CT. A negative D-Dimer result in combination with the absence of high risk as defined by the Wells Criteria, may safely exclude PE in a large proportion of patients with suspected PE.

This information is presented to assist you in providing care to your patients. It is your responsibility to exercise your independent medical knowledge and judgment in providing what you consider to be in the best interest of the patient.

<table>
<thead>
<tr>
<th>Decision Support</th>
<th>More Info</th>
<th>Feedback</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Patient Name: Oates, Carol</th>
<th>PERCIPIO MRN: M0652089</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Date: February 2, 1974</td>
<td>Age: 36 years</td>
</tr>
<tr>
<td>Ordering Provider: Khorasani, Ramin, MD MPH</td>
<td>Gender: Unknown</td>
</tr>
<tr>
<td>Exam: CT Chest Pulmonary Embolism</td>
<td>Phone Number:</td>
</tr>
<tr>
<td>Created By: N/A</td>
<td>Payor: BWH - Medicare</td>
</tr>
<tr>
<td></td>
<td>Order ID: 14450931</td>
</tr>
<tr>
<td></td>
<td>Ordering Site: Brigham ED</td>
</tr>
</tbody>
</table>
Inpatient CTPA USE


No significant increase or decrease in CTPA use trends, p=0.52

Month 31
26.0 per 1000 admissions

Month 32
22.8 per 1000 admissions

Relative reduction 12.8% p=0.008
Impact of effective CDS on “Choosing Wisely” Initiatives

• CT for suspected pulmonary embolism: (ACEP)
  – ED use ↓ 20%; yield up 69% over 2 years
  – Inpatient use ↓ 13% over one month, then stable

• MRI for low back pain: (ACP)
  – Outpatients: MRI use ↓ 30% on day of PCP visit;
    ↓ 12.3% within 30 days of index PCP visit

• CT for minor traumatic brain injury (ACEP)
  – 13.4% ↓ in use of CT in ED

All above now published or in press in peer reviewed journals
Lesson Two

CDS Must be Based on High Quality Evidence
CMS

• Designed as an alternate to preauthorization, MID assessed impact of CDS based on a broad set of professional society guidelines
• Evidence was limited to ONLY these MID guidelines
• BWH used same ‘syringe’ as used in prior CDS
MID: BWH Convenership
83,064 orders in the intervention period

<table>
<thead>
<tr>
<th>Alert/Behavior</th>
<th>Control</th>
<th>Intervention</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actionable alerts</td>
<td>7.9%</td>
<td>5.7%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Alerts ignored</td>
<td>---</td>
<td>98.9% (n=82,188)</td>
<td>N/A</td>
</tr>
<tr>
<td>Exams modified</td>
<td>---</td>
<td>1.07% (n=903)</td>
<td>N/A</td>
</tr>
<tr>
<td>Exams cancelled</td>
<td>---</td>
<td>0.03% (n=23)</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Protecting Access to Medicare Act (2014)

Ordering professionals advanced imaging services must be exposed to evidence-based Appropriate Use Criteria (AUC) via CDS

- Consequence for failure—imaging provider will not be paid
PAMA rules: Key provisions

• Specified AUC will be developed and published by “qualified provider-led entities”

  – qPLE must have rigorous processes to assess and grade the evidence using a multidisciplinary team, and then publish evidence-based criteria online

  – Implementation date initially January 2017, now delayed
Lesson Two

CDS Must be Based on High Quality Evidence
Harvard Medical School Library of Evidence

THE FUTURE OF CLINICAL DECISION SUPPORT CONTENT

Tell Me More

ABOUT THE LIBRARY OF EVIDENCE

The effective use of a clinical decision support system means: patients get the right test, the right medications, and the right treatment, particularly for chronic...
Harvard Medical School Library of Evidence

• A national public domain repository of objectively scored, health IT consumable evidence from any source designed to
  – Accelerate adoption of CDS for imaging
  – Highlight high priority clinical conditions where strong evidence is lacking to stimulate discovery
Sample piece of clinical logic:

<table>
<thead>
<tr>
<th>Dx/Symptom</th>
<th>Source Type</th>
<th>Publisher</th>
<th>Choosing Wisely</th>
<th>Endorsed by Professional Society</th>
<th>Imaging Modality</th>
<th>Body Region</th>
<th>Contrast</th>
<th>Final Oxford Grade</th>
<th>Strength of Evidence</th>
<th>Final USPSTF</th>
<th>Select All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Head Trauma</td>
<td>Local best practice</td>
<td>N</td>
<td>CT</td>
<td>Head</td>
<td>N/A</td>
<td>1a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source Title: BWH Percipio
- Minor Head Trauma Source Type: Local best practice

Source Link: Piece of Clinical Logic:

- **NOT** (LOC) OR (Post-Traumatic Amnesia) AND **NOT** (Focal neurologic deficit) OR (Coagulopathy) OR (Vomiting) OR (GCS<15) OR (Headache) OR (Physical evidence of trauma above the clavicles) OR (Deficits in short-term memory) OR (Post-traumatic seizure) OR (Drug) OR (Alcohol intoxication) OR (Trauma more than 24h ago) OR (Hemodynamically unstable) AND **NOT** (Age <65) THEN **NOT** (CT Head)
Lesson Three

CDS is only the First Step
Effects of Performance Feedback Reports on Adherence to Evidence-Based Guidelines in Use of CT for Evaluation of Pulmonary Embolism in the Emergency Department: A Randomized Trial

OBJECTIVE. The purpose of this study was to assess whether implementing emergency department (ED) physician performance feedback reports improves adherence to evidence-based guidelines for use of CT for evaluation of pulmonary embolism (PE) beyond that achieved with clinical decision support (CDS) alone.

SUBJECTS AND METHODS. This prospective randomized controlled trial was conducted from January 1, 2012, to December 31, 2013, at an urban level 1 adult trauma center ED. Attending physicians were stratified into quartiles by use of CT for evaluation of PE in
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group</th>
<th>Period(^a)</th>
<th>Value(^b)</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence to evidence-based guidelines (%)</td>
<td>Control</td>
<td>Before</td>
<td>78.8 (476/604)</td>
<td>0.5235</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>After</td>
<td>77.2 (421/545)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>Before</td>
<td>78.3 (426/544)</td>
<td>0.0043</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>After</td>
<td>85.2 (404/474)</td>
<td></td>
</tr>
</tbody>
</table>
Use
(# PE CTs / 1,000 ED pts seen)

Use of CT (#/1,000)

Avg 20.9
Adherence to Evidence-Based Guidelines
(Using Wells +/- D-dimer)

Adherent to EBG

Avg 79.8%
% Yield
(Positive PE CTs/All PE CTs)

Avg 10.5%
# Impact of CDS-enabled Interventions on Documented Adherence to Evidence

<table>
<thead>
<tr>
<th>Imaging/Condition</th>
<th>Reference</th>
<th>Type</th>
<th>Control</th>
<th>Intervention</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head CT/ ED minor trauma (ACEP)</td>
<td>Gupta JAMIA 2014</td>
<td>Education only</td>
<td>49%</td>
<td>76%</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Chest CT/ED PE (NQF)</td>
<td>Raja Acad Rad 2014</td>
<td>Education only</td>
<td>57%</td>
<td>76%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Chest CT/ED PE (NQF)</td>
<td>Raja AJR 2015</td>
<td>Add MD feedback</td>
<td>78%</td>
<td>85%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>LS MRI/ambulatory (ACP)</td>
<td>Ip American J Med 2013</td>
<td>Add peer to peer, MD feedback</td>
<td>78%</td>
<td>96%</td>
<td>&lt;0.005</td>
</tr>
</tbody>
</table>
Lessons Learned

1. One Specialty Cannot Implement Imaging CDS Alone

2. CDS Must be Based on High Quality Evidence

3. CDS is only the First Step
Success Story – BWH Head and PE CTs with Clinical Decision Support

Ali S. Raja, MD, MBA, MPH

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Executive Director, Harvard Medical School Library of Evidence

@AliRaja_MD
Using the Canadian CT Head Rule to Reduce Unnecessary Imaging
Ian Stiell MD MSc FRCPC

› Professor, Dept of Emergency Medicine, U of Ottawa
› Distinguished Professor and Clinical Research Chair, U of Ottawa
› Senior Scientist, Ottawa Hospital Research Institute
› Disclosures: none
Canadian CT Head Rule: Learning Objectives

➢ To understand the evidence behind the Canadian CT Head Rule
➢ To review how to use the CCHR on your patients
Minor Head Injury: The Clinical Problem

- 6,000,000 head injury cases / year in Canadian and U.S. EDs
- Classic minor head injury:
  - Transient neurological impairment
  - GCS 13-15
- <1% risk of epidural hematoma and need for intervention
- Yield of CT very low in North America
Minor Head Injury: Case Study #1

- 45 y.o. male knocked out x 1 minute with baseball bat
- headache, no amnesia, no vomiting
- Pmh = 0; Meds = 0
- Alert, contusion forehead, GCS=15, neuro = N

What do you do?
- CT head
- Observe
- Discharge with no imaging
Minor Head Injury: Case Study #2

- 75 y.o. female walked into door, no loss of consciousness
- Laceration eyebrow, no amnesia, no vomiting
- Pmh = HTN; Meds = diuretic
- Alert, 2 cm laceration eyebrow, GCS=15, neuro = N

What do you do?
- CT head
- Observe
- Discharge with no imaging
Canadian CT Head Rule

Variation (N=1,699)  
*Annals EM* 1997

Derivation (N=3,121)  
*The Lancet* 2001

Validation (N=2,707)  
*JAMA* 2005

Implementation (N=4,531)  
*CMAJ* 2010

CT head is only required for minor head injury patients with any one of these findings:

**High Risk (for Neurological Intervention):**
1. GCS score < 15 at 2 hrs after injury
2. Suspected open skull fracture
3. Any sign of basal skull fracture
4. Vomiting ≥ 2 episodes
5. Age ≥ 65 years

**Medium Risk (for Brain Injury on CT):**
6. Amnesia before impact ≥ 30 min
7. Dangerous mechanism *(pedestrian, blunt object, fall from elevation)*
Comparison of the Canadian CT Head Rule and the New Orleans Criteria in Patients With Minor Head Injury

Ian G. Stiell, MD, MSc, FRCPC
Catherine M. Clement, RN
Brian H. Rowe, MD, MSc
Michael J. Schull, MD, MSc
Robert Brison, MD, MPH

Context  Current use of cranial computed tomography (CT) for minor head injury is increasing rapidly, highly variable, and inefficient. The Canadian CT Head Rule (CCHR) and New Orleans Criteria (NOC) are previously developed clinical decision rules to guide CT use for patients with minor head injury and with Glasgow Coma Scale (GCS) scores of 13 to 15 for the CCHR and a score of 15 for the NOC. However, uncertainty about the clinical performance of these rules exists.
<table>
<thead>
<tr>
<th>Result of Assessment</th>
<th>Canadian CT Head Rule</th>
<th>New Orleans Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Injury</td>
<td>No Injury</td>
</tr>
<tr>
<td>Neurosurgical Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>8</td>
<td>430</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>1384</td>
</tr>
<tr>
<td>Sensitivity, %</td>
<td>100 (95% CI, 63-100)</td>
<td>100 (95% CI, 63-100)</td>
</tr>
<tr>
<td>Specificity, %</td>
<td>76.3 (95% CI, 74-78)</td>
<td>12.1 (95% CI, 11-14)</td>
</tr>
<tr>
<td>Clinically Important Brain Injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>97</td>
<td>853</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>872</td>
</tr>
<tr>
<td>Sensitivity, %</td>
<td>100 (95% CI, 96-100)</td>
<td>100 (95% CI, 96-100)</td>
</tr>
<tr>
<td>Specificity, %</td>
<td>50.6 (95% CI, 48-53)</td>
<td>12.7 (95% CI, 11-14)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; CT, computed tomography.
<table>
<thead>
<tr>
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<th>Canadian CT Head Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Injury</td>
</tr>
<tr>
<td><strong>Neurosurgical Intervention</strong></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>41</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Sensitivity, %</td>
<td>100 (95% CI, 91-100)</td>
</tr>
<tr>
<td>Specificity, %</td>
<td>65.6 (95% CI, 64-67)</td>
</tr>
<tr>
<td><strong>Clinically Important Brain Injury</strong></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>231</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Sensitivity, %</td>
<td>100 (95% CI, 98-100)</td>
</tr>
<tr>
<td>Specificity, %</td>
<td>41.1 (95% CI, 39-43)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; CT, computed tomography.
A prospective cluster-randomized trial to implement the Canadian CT Head Rule in emergency departments

Ian G. Stiell MD MSc, Catherine M. Clement RN, Jeremy M. Grimshaw MBChB PhD, Robert J. Brison MD MPH, Brian H. Rowe MD MSc, Jacques S. Lee MD MSc, Amit Shah MD, Jamie Brehaut PhD, Brian R. Holroyd MD, Michael J. Schull MD MSc, R. Douglas McKnight MD, Mary A. Eisenhauer MD, Jonathan Dreyer MD, Eric Letovsky MD, Tim Rutledge MD, Iain MacPhail MD, Scott Ross MD, Jeffrey J. Perry MD, Urbain Ip MD, Howard Lesiuk MD, Carol Bennett MSc, George A. Wells PhD

Previously published at www.cmaj.ca

- 4,531 patients in 12 EDs
- No missed injuries
- Barriers to KT
Conclusions: Canadian CT Head Rule

Accurate and reliable for CT imaging in minor head injury patients

Could safely limit use of imaging

Also ensures that patients at risk receive CT in a timely manner
How to Use the Canadian CT Head Rule

CT head is only required for minor head injury patients with any one of these findings:

**High Risk (for Neurological Intervention)**
1. GCS score < 15 at 2 hrs after injury
2. Suspected open skull fracture
3. Any sign of basal skull fracture
4. Vomiting ≥ 2 episodes
5. Age ≥ 65 years

**Medium Risk (for Brain Injury on CT)**
6. Amnesia before impact ≥ 30 min
7. Dangerous mechanism (pedestrian, blunt object, fall from elevation)
The Canadian CT Head Rule Should Only be Used for these Patients:

- Minor head injury with one of:
  - Witnessed loss of consciousness
  - Amnesia for the injury
  - Confusion after the injury
  - GCS 13-15 on ED arrival
  - Injury < 24 hours

---

**Canadian CT Head Rule**

CT head is only required for minor head injury patients with any one of these findings:

**High Risk (for Neurological Intervention)**
1. GCS score < 15 at 2 hrs after injury
2. Suspected open skull fracture
3. Any sign of basal skull fracture
4. Vomiting > 2 episodes
5. Age ≥ 65 years

**Medium Risk (for Brain Injury on CT)**
6. Amnesia before impact ≥ 30 min
7. Dangerous mechanism (pedestrian, blunt object, fall from elevation)
The Canadian CT Head Rule Should Not be Used for these Patients:

- < 16 years of age
- Minimal head injury without:
  - Loss of consciousness
  - Amnesia
  - Confusion
- GCS < 13
- Major trauma (head, chest, abdomen, # femur, hypotension)
- Oral anticoagulants
### Canadian CT Head Rule

CT head is only required for minor head injury patients with any one of these findings:

#### High Risk (for Neurological Intervention)

1. GCS score < 15 at 2 hrs after injury
2. Suspected open skull fracture
3. Any sign of basal skull fracture
4. Vomiting ≥ 2 episodes
5. Age ≥ 65 years

#### Medium Risk (for Brain Injury on CT)

6. Amnesia before impact ≥ 30 min
7. Dangerous mechanism (pedestrian, occupant ejected, fall from elevation)
### Dangerous Mechanism of Injury

- 1. Pedestrian struck by a vehicle
- 2. Occupant ejected from motor vehicle
- 3. Fall from elevation ≥ 3 feet or 5 stairs
Minor Head Injury: Case Study #1

- 45 y.o. male knocked out x 1 minute with baseball bat
- headache, no amnesia, no vomiting
- Pmh = 0; Meds = 0
- Alert, contusion forehead, GCS=15, neuro = N

What do you do?

- Discharge with no imaging
Minor Head Injury: Case Study #2

- 75 y.o. female walked into door, no loss of consciousness
- Laceration eyebrow, no amnesia, no vomiting
- Pmh = HTN; Meds = diuretic
- Alert, 2 cm laceration eyebrow, GCS=15, neuro = N
- **What do you do?**
  - **Discharge with no imaging**
The Rule can be safely used for patients who have been drinking if they are cooperative.

- Patients without a history of loss of consciousness, amnesia, or confusion rarely need a CT scan.
- Patients >65 do not need a scan just based on their age if they do not have this history.
The Canadian CT Head Rule: Learning Aids

Canadian CT Head Rule by Dr. Ian Stiell
The Canadian CT Head Rule: Learning Aids

The Ottawa Rules
By Ottawa Hospital Res
Open iTunes to buy and downl
High Risk (for Neurological Intervention)

1. GCS score < 15 at 2 hrs after injury
2. Suspected open skull fracture
3. Any sign of basal skull fracture
4. Vomiting ≥ 2 episodes
5. Age ≥ 65 years

Medium Risk (for Brain Injury on CT)

6. Amnesia before impact ≥ 30 min
7. Dangerous mechanism (pedestrian, occupant ejected, fall from elevation)
Emergency Medicine Research:

Good Patient Care Requires Good Evidence
Avoidable Imaging Webinar:
Thursday, September 15
1:00pm-2:00pm EST

ACEP E-QUAL Network Resources and More Information:
www.acep.org/equal

Contact Nalani Tarrant (Project Manager):
ntarrant@acep.org