DIFFERENT PERCEPTIONS EXIST BETWEEN PROVIDERS AND THE GENERAL POPULATION REGARDING THE IMPORTANCE OF FINDINGS ON ADDITIONAL IMAGING FOR TRAUMA CONSULTS.

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Abstract

Background
Prior research demonstrated approximately 1/3 of additional imaging for trauma consults results in discovery of new injuries. No studies have addressed the perception of these findings in non-healthcare providers. Our hypothesis was that significant differences in perception of the importance of injuries would exist between health care providers and the general population.

Material and Methods
Six standardized scenarios were developed detailing common injury findings on additional imaging in trauma consults. Demographic information as well as information regarding the significance of findings, potential for a change in care and the importance of patient notification for each scenario were collected. Surveys were electronically distributed to all employed providers in our healthcare system. A similar survey was distributed to members of the public. Data analysis was performed with generalized linear modeling.

Results
A total of 339 public and 129 provider surveys were returned. Health care providers included attending staff, residents and Advanced Care Providers from a variety of specialties. Responses to specific scenarios are detailed in table 1. Differences in perception of the importance of imaging findings were found in some aspects of most scenarios, with providers rating most findings as less clinically important than the general population, but at the same time rating patient notification of the findings as more important. A trend towards perceiving less importance was found with increasing age in the general population, with significant differences in some scenarios including traumatic brain injury and spinal fractures and rib fractures. Increasing provider age or length in practice did not significantly affect perception of clinical importance, with the exception of rib fractures.

Discussion
Differences in perception exist regarding the significance of additional injuries between health care providers and the general population, with health care providers overall considering injuries less clinically relevant but rating patient notification of the findings more important. Perceptions of the general population also change with age. Decisions to pursue additional imaging in trauma patients should include consideration of these differences in perception to help provide quality patient-centered care.
**Introduction**

In the progressively complex model of modern healthcare, the opinions and decisions of the patients themselves are becoming increasingly important in the setting of patient-centered care and shared decision making [1, 2]. Physicians are encouraged to see themselves as coaches and partners, rather than the sole authority regarding their patients’ care [3, 4]. This approach has been shown to produce more cohesive sharing of information, keeping patients and physicians more knowledgeable and capable of making informed, joint decisions [5, 6].

With shared decision-making becoming mainstream, it becomes necessary to investigate if patients come to the same decisions as their physicians, when equipped with the proper information. Reasons have been given why physicians and patients often have differing opinions when it comes to treatment [7, 8]. In the current study we hypothesize that patients will tend to find more injuries clinically significant and worth treating than health care providers, given that they are answering for their own bodies or for those of their loved ones.

This is intended to be a follow-up investigation of our findings in the previous study: “An Evaluation of the Utility of Additional Imaging of Trauma Consults after initial Imaging in the ED [9].” That work explored the benefit of additional CT imaging for mild to moderately-injured patients following trauma consultation, as significant controversy exists regarding extensive radiologic imaging [10-12]. New injuries were discovered in approximately a third of those who underwent additional imaging. The ISS (Injury Severity Score) increased in 16 of these patients, and the clinical significance of these new injuries and if they altered the treatment plan were determined by a panel of three trauma surgeons. Patient input was not obtained as part of that work, and results did not explore patient contributions in the decision-making process.

The current study evaluated both broader health care provider opinion as well as seeking patient opinion on whether new traumatic injuries found on additional scans are significant and if they would want them treated. This was done with a survey sent out to both providers and patients. In the survey, 6 scenarios were listed, each having a brief HPI with initial ED imaging findings and then additional imaging with new findings. Differences were found between the public and providers regarding the significance of additional injuries, with health care providers overall considering injuries less clinically relevant but rating patient notification of the findings more important. Perception of the clinical importance of injuries in the general population also tended to decrease with age.

**Materials and Methods**

A study protocol was submitted to the IRB (Carilion Clinic, Roanoke Virginia), which determined the research to be exempt from IRB review under DHHS regulatory category 2, providing strict adherence to the outlined protocol. Demographic data collected for the public inquired age, state of residence, if the patient had ever been treated for traumatic injuries in the ED, and if they had ever had to make medical decisions for family members with traumatic injuries. For providers, demographics recorded were age, state of residence, provider type, specialty, and years in training or practice.

The general population was considered our patient population. An anonymous survey was distributed electronically (Amazon Turk®, Amazon, Seattle, WA), with data automatically stored on a secure system
REDCap®, Vanderbilt University, Nashville, TN. Survey takers were reimbursed $0.20 per survey. The survey asked the individual to answer as though they were the patient or immediate family member to the patient. For physicians, the survey was distributed via email to the entire physician body at our institution. All available specialties were included, as well as mid-level providers and residents. They were asked to answer as a provider in their own respective field, and their specialty and length in training and/or practice was documented as part of the anonymous demographic data.

The same scenarios were provided to both patients and physicians, with wording set at a standard 8th grade reading and comprehension level to accommodate as many participants as possible. The scenarios were based on actual common encounters from our prior study;

1) 65 year-old woman with a headache after fall from standing, initial head CT shows subdural bleeding with no midline shift, follow-up CT shows 7mm subdural hematoma and midline shift.

2) 70 year-old man with chest and abdominal pain after fall from standing, initial X-ray shows fractured 6th, 7th ribs, later chest CT shows compression fractures of 4th, 5th thoracic vertebrae.

3) 34 year-old man with chest pain after fall from ladder, chest X-ray shows fractured 7-10th right ribs, later chest CT shows right 6th and 11th ribs are also fractured.

4) 46 year-old man in ED after struck by car going 25 mph. X-rays show left humeral fracture and multiple left rib fractures. CT of abdomen and pelvis then shows left hip fracture.

5) 80 year-old man with left chest and back pain after fall in shower. Chest X-ray shows no fractures, chest CT later shows right-sided fractures of ribs 7, 8.

6) 25 year old woman with chest pain after crashing car at 60 mph. Chest X-ray shows no fractures or soft-tissue injury. Chest CT later shows asymptomatic small left pneumothorax.

In the patient survey, three questions followed each of the scenarios, based on the newfound injuries from additional CT imaging;

A. Do you consider the additional findings to be significant?
B. Do you think these additional findings would change the care received from the treating doctor?
C. Would you wish to be informed of these new injuries regardless of their significance and even if they did not change treatment?

The same survey with the following questions was distributed to medical providers;

A. Do you consider the additional findings clinically significant
B. Would these additional findings significantly change the treatment plan for this patient?
C. Do the additional findings warrant revisiting the patient to inform them of the new injuries?

Using R® (R Foundation for Statistical Computing, University of Auckland, Auckland, NZ), responses from the two groups were compared using generalized linear modeling to obtain relative risk ratios of positive responses for the public vs providers, public vs age, provider vs age, and provider by length in practice. Confidence intervals were obtained for all risk ratios with corresponding p values (Table).

Results

A total of 339 general population surveys from 43 states, representing patients, and 129 health care provider surveys from 2 states were returned. Of these, 310 (91.4%) of the patient surveys and 116 (89.9%) of the provider surveys were complete. Age of participants was 31.5 years, [Interquartile range
(IQR) of 28, 40.75] for the public and 43.7 years, (IQR 34, 50) for providers. The public indicated 55%(186) had required treatment in the ED for traumatic injuries, and 45.3%(153) had made medical decisions for family members with traumatic injuries. Providers were divided amongst Attendings 62.8% (81), Residents and Fellows 19.4% (25), Nurse Practitioners (NPs) 10.1% (13), Physician Assistants (PAs) 6.2% (8), and Certified Registered Nurse Anesthetists (CRNAs) 1.6% (2). Specialties were categorized as follows; Emergency Medicine (EM) 17.8% (23), Surgical 23.3% (30), Family, Internal Medicine (IM), and IM subspecialities 27.1% (35), Obstetrics/Gynecology (OB/GYN) 7.0% (9), Pediatrics 4.7% (6), and Other 20.2% (26). Years in practice for providers was as follows; Postgraduate Year (PGY) 1-4 19.4% (25), PGY 5-7 1.6% (2), practicing 1-5 years 15.5% (20), practicing 6-10 years 20.2% (26), practicing 11-20 years 18.6% (24), practicing 21-30 years 13.2% (17), practicing 30 or more years 11.6% (15).

Responses to specific scenarios from both groups are detailed in the table. Differences in perception of the importance of imaging findings were found across most scenarios. Four out of the six scenarios revealed significant differences between patient and physician positive responses.

A trend towards perceiving less importance was found with increasing age in the general population, with four out of six scenarios yielding at least one statistically significant ($p \leq 0.05$) inverse correlation between age and likelihood of positive responses to questions. Corresponding scenarios included traumatic brain injury, spinal and rib fractures, and pneumothorax.

Providers found most injuries less clinically important than the general population, but at the same time rated patient notification higher (Table and Graph). Increasing provider age or length in practice did not significantly affect perception of clinical importance, with the exception of rib fractures, where older physicians rated new additional rib fractures more likely to change treatment as compared to younger physicians.

The graph compares the relative risk ratios of the positive response rates for the public vs providers by question, with each of the six scenarios groups under each question. For questions A (Are the injuries significant?) and B (Do the injuries change clinical treatment?) all ratios that are statistically significant are greater than 1.0, indicating more positive responses from patients. Conversely, for question C. (Should the patient be revisited to be notified of the new injuries?), the only significant ratio is less than 1, with two others showing an upper limit of 1.01, indicating more positive responses from providers.

Discussion

This study explored the views of providers and patients being informed of the same injuries, and their initial decisions based on that information. While it is not surprising that providers and patients answered differently, it is important to note how the public differs from the medical community in interpreting medical reports. Patients agreed with providers more than half of the time, with seven questions out of 18 showing differing opinions. Interestingly, disagreement varied in terms of which group placed positive answers. Looking at the graph, patients showed more likely than providers to consider injuries both significant and likely to change their clinical care. Contrarily, providers were more likely than patients to feel updating the patient on newfound injuries was indicated. Importantly, half of the general population taking the survey had been trauma patients themselves (55%), and almost half had participated in decision-making for a family member with traumatic injuries (45.3%, Table).
Patient-centered care is “care that is respectful of and responsive to individual patient preferences, needs, and values,” as defined by the Institute of Medicine [3, 13]. This term was first introduced in 1988 by the Picker Institute (then the Picker/Common-wealth Program for Patient-Centered Care) as a redirecting of attention back to patients themselves rather than their diseases and ailments. Recognizing a progressively complex medical system, the Picker Institute identified eight core traits that could help combat isolating patients while increasing quality and safety from their perspective. These recommendations were: “Respect for the patient’s values, preferences, and expressed needs; coordinated and integrated care; clear, high quality information and education for the patient and family; physical comfort, including pain management; emotional support and alleviation of fear and anxiety; involvement of family members and friends, as appropriate; continuity including through care-site transition; and access to care [3, 8].

With increasing availability of multiple reasonable treatments for the same condition, engaging patients is more important than ever before [5, 14]. Previously, our work had suggested an increased number of injuries found on additional imaging ordered by trauma surgeons during evaluation of trauma patients believed to have mild to moderate initial injuries at time of trauma consult [9]. While the results of that work were primarily interpreted by and relayed to the health care provider community, it was evident that the inclusion of patient opinion and role in decision-making was also important.

The current study suggests that patients are more likely to consider new injury findings as clinically important and should be addressed with medical treatment, but also don’t feel as strongly as providers regarding the desire to be informed about the injuries. In reality, providers would generally find these injuries, and inform the patients of the findings as part of either treatment plans or reasons why they are ready for discharge from the hospital. Recognizing this, it is imperative that providers recognize delivery of information is only the first step, and patients must also be made aware of the ramifications and whether treatment is indicated and the risks and benefits of each. From our results, most differences in opinion stemmed from whether the injuries would change the clinical treatment plan. Obviously, providers had more information and experience to draw on in answering this question as compared to the public, and the latter tended to err on the side of caution more frequently as a result.

Our proposed solution is following the steps initially laid out by the Picker Institute [8]. Delivery of the high-quality information on diagnoses must be followed up with education regarding the ramifications of injuries, what treatments are indicated, and what each treatment hopes to achieve and what it risks, including the treatment of “doing nothing”. While intuitive, practice of these concepts is challenging, particularly in emergency and critical-care services [15, 16]. There are times when there is a single standard of care and time is of the essence, in these situations patient involvement has little immediate significance in treatment, but these are the exception rather than the rule [14]. In the remainder of medicine, the patient should actively participate in decision-making. This study suggests that patients might not even feel they need to be informed of the new injuries prior to the medical team taking action, but for the former to be part of their care they need knowledge of their condition. This also helps avoid the situation where a patient believes action needs to be taken on injuries that are known but require no intervention.

The previous study weighed on the existing body of knowledge regarding the benefits [10, 17] and disadvantages [11, 12, 18] of obtaining additional imaging for mild to moderately injured patients. This study investigated scenarios based on patients from that prior work. The fact that patients were more
likely than providers to find injuries significant should also be taken into account when considering whether or not to obtain additional imaging. To be clear, we are not advocating that patients should receive scans that have no clinical indication. Rather, patient opinion should be included in the final decision when weighing increased radiation exposure vs the chance of missed injuries, as the patient’s input may be the crossing of the threshold one way or the other.

Limitations of the current study are those associated with a survey study. Specifically, provider surveys were originally intended to be distributed nation-wide, but an application for distribution to a nationally-recognized surgical association was denied, as a result provider survey distribution was limited to our own medical network, which although large, is primarily based in 1 state. The public was reimbursed for their participation, which could encourage false entries simply to obtain payment. We believe this risk is low though based on very low compensation at $0.20. Attempts were made to limit public survey takers to one survey per person via MTurk® account ID, but there was no way to fully prevent individuals with multiple accounts from taking the survey more than once, introducing weighting towards their answers. This is most likely a minority though based on the wide range of demographic data. Finally, while the scenarios were identical in wording, the wording of questions required minor changes to retain relevance between providers versus the public, please see Methods section for exact question wording. While these changes were small and felt to be necessary, there is the potential for altered responses due to these differences.

As patient-centered care and shared decision-making continue to become the standard for medical practice, involvement of patients in their care through effective informing and education are essential. Understanding how providers differ from patients in the reception, interpretation, and expectations derived from results of tests will allow for better collaboration between these two parties in delivering optimal care. Our study suggests patients will find new injuries significant and requiring intervention, whether this is actually the case or not per current medical guidelines. Recognizing this can help providers remember to not only deliver injury information but also take the time to educate on treatments with their indications and risks. In turn this will enable the patient to better take a role in voicing desires for their care that align with their own values and goals. Lastly, unique to our study, decisions to pursue additional imaging in trauma patients should include consideration of these differences in perception to help provide quality patient-centered care. Further research with broader samples and additional questions will greatly benefit the understanding of differences between patients and providers, and allow for greater cooperation in care.
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Population Positive Responses</th>
<th>Provider Positive Responses</th>
<th>RR of Population vs Provider Positive Responses</th>
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<tbody>
<tr>
<td></td>
<td>Complete Responses 319</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td>1. Repeat Head CT with Worsening TBI – Patient Asymptomatic</td>
<td>Significant? 308 (96.6%)</td>
<td>116 (95.9%)</td>
<td>1.21</td>
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<td></td>
<td>Change Care? 274 (85.9%)</td>
<td>101 (83.5%)</td>
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<td>Notification? 294 (92.2%)</td>
<td>118 (97.5%)</td>
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<td>2. CT Thoracic Spine with New Thoracic Compression Fracture</td>
<td>Complete Responses 315</td>
<td>121</td>
<td>1.04</td>
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<tr>
<td></td>
<td>Significant? 290 (92.1%)</td>
<td>111 (91.7%)</td>
<td>1.85</td>
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<td>Change Care? 260 (82.5%)</td>
<td>87 (71.9%)</td>
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<td></td>
<td>Notification? 284 (90.2%)</td>
<td>118 (97.5%)</td>
<td>0.23</td>
</tr>
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<td>3. CT Chest with additional Rib Fractures vs Initial Chest X-ray</td>
<td>Complete Responses 315</td>
<td>119</td>
<td>4.12</td>
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<tr>
<td></td>
<td>Significant? 251 (79.7%)</td>
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<td>4.33</td>
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<td></td>
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<td>Notification? 271 (86.0%)</td>
<td>96 (80.7%)</td>
<td>4.23</td>
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<td>4. CT Abdomen and Pelvis with New Hip Fracture vs Initial X-ray</td>
<td>Complete Responses 313</td>
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<td>Change Care? 258 (82.4%)</td>
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<td></td>
<td>Notification? 271 (86.6%)</td>
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<td>5. CT Thoracic Spine with new Thoracic Compression Fracture</td>
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<td>6. CT Chest with New Occult Pneumothorax vs Initial Chest X-ray</td>
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<td>Notification? 266 (85.8%)</td>
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Table – Summary of public and provider positive response rates, responses are compared across groups using relative risk ratios (RR) and categorized by scenario. * = p<0.05
Graph – Comparing patient and provider relative risk ratios for positive responses to scenarios, compiled by each question. The dashed line represents a null value of 1. Scenario 4 had completely positive responses to all questions by physicians and high positive response rate from patients, thus the CI runs from 0-Infinity.
References


