

RESEARCH ARTICLE

Is It “Fractured” or “Broken”? A Patient Survey Study to Assess Injury Comprehension after Orthopaedic Trauma

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Abstract

Background: Patients who sustain orthopaedic trauma in the form of fractures commonly ask treating providers whether the bone is “fractured” or “broken”. While orthopaedic surgeons consider these terms synonymous, patients appear to comprehend the terms as having different meanings. Given the commonality of this frequently posed question, it may be important for providers to assess patients’ level of understanding in order to provide optimal care. The purpose of this study is to evaluate patients’ comprehension and understanding regarding the use of the terms fractured and broken.

Methods: A survey was administered as a patient-quality measure to patients, family members and/or other non-patients presenting to an orthopaedic outpatient clinic at an academic teaching hospital.

Results: 200 responders met inclusion criteria. Only 45% of responders understood the terms fractured and broken to be synonymous. Age, gender, nor ethnicity correlated with understanding of terminology. Responders described a “fractured” bone using synonyms of less severe characteristics for 55.7% of their answers and chose more severe characteristics 44.3% of the time, whereas responders chose synonyms to describe a “broken” bone with more severe characteristics as an answer in 62.1% of cases and chose less severe characteristics 37.9% of the time. The difference for each group was statistically significant ($P=0.0458$ and $P\leq 0.00001$, respectively). There was no correlation between level of education nor having a personal orthopaedic history of a previous fracture with understanding the terms fracture and broken as synonymous. Having an occupation in the medical field (i.e. physician or physical/occupational therapist) significantly improved understanding of terminology.

Conclusion: The majority of people, regardless of the age, gender, race, education or history of previous fracture, may not understand that fractured and broken are synonymous terms. Providers need to be cognizant of the terminology they use when describing a patient’s injury in order to optimize patient understanding and care.

Keywords: Broken bone, Communication, Fracture, Patient care, Patient-physician relationship, Patient understanding, Treatment plan

Introduction

Patients who present with orthopaedic trauma often are diagnosed with new injuries they have never sustained before. Terms such as fracture, broken, displaced, and comminuted are often used to describe their injuries and may be novel to the patient. As providers, we often assume that patients understand

these terms. However this may not be the case and thus may not translate into a patients’ understanding of their injury. A patients’ understanding of their injury is important to optimize care and improve outcomes. Previous literature has demonstrated increased compliance, satisfaction and improved outcomes

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when patients have a thorough understanding of their medical condition and the treatments rendered. One study of 1,367 patients treated at an urgent care clinic over a 2 week period demonstrated compliance with prescription drug regimens to be positively correlated to the patients' understanding of drug instructions and negatively correlated to their satisfaction with physician communication during the visit (1).

Patients who sustain orthopaedic trauma in the form of fractures commonly ask treating providers whether the bone is "fractured" or "broken". While orthopaedic surgeons consider these terms synonymous, patients appear to comprehend the terms as having different meanings. The Merriam-Webster dictionary defines the word broken as it regards to material objects as "violently separated into parts, damaged or altered by breaking." Interestingly, included in their definition is the descriptor: "having undergone or been subjected to fracture <a broken leg>" which implies that, by definition, the two terms are one and the same (2).

Given the commonality of this frequently posed question, it may be important for providers to assess patients' understanding when using different terminology in order to improve communication, understanding of their orthopaedic injury, and ultimately care. Patients' understanding of the severity of their condition is important for outcomes and setting realistic expectations for the future. The purpose of this study is to evaluate patient's comprehension and understanding regarding the use of the terms fractured and broken when describing orthopaedic injuries.

Materials and Methods

A survey was administered as a patient-quality measure to patients, family members and/or other non-patients presenting to an orthopaedic outpatient clinic at an academic teaching hospital. Inclusion criteria consisted of age greater than 18 years and the ability to read/comprehend English. Exclusion criteria included responders less than 18 years of age, those unable to read/comprehend English or with significant cognitive impairment. Responder demographic information was collected including age, gender, ethnicity, educational level and occupation. Additionally, responders were asked about their orthopaedic history (if any) and whether they had ever sustained a fracture previously. Responders were then asked several multiple choice questions assessing their understanding of the different terminology, fracture vs. broken, by being asked to choose appropriate synonyms. Less severe synonym choices included colloquial terms such as: "hair-line", "non-displaced", "non-separated", "non-comminuted", "non-compound", "simple", "non-shattered", and "cannot see bone through skin wound" whereas more severe options included colloquial terms such as: "displaced", "separated", "comminuted", "compound", "complex", "shattered", and "can see the bone through skin wound."

Finally, patients were shown three AP radiographs of femur fractures [Figures 1-3] demonstrating different fracture patterns and asked to classify them as a fractured bone, broken bone, both a fractured and broken



Figure 1. X-ray 1 (non-comminuted, displaced fracture).

bone, or neither. They were also asked to describe the injury using the above various synonyms based on their understanding of the different terminology.

Results

200 responders met inclusion criteria. The average age was 49.08 years (Range: 18-89, SD=15.43). 109 (57.6%) were female and 71 (37.5%) were male. Figures 4-6 demonstrate the distribution of education level, ethnicity, and age in this inclusion group. Only 45% of responders understood the terms fracture and broken to be synonymous on multiple choice questions and this number decreased to 33% when assessing the 3 images of radiographs demonstrating various fracture types.

Responders described a fractured bone by choosing synonyms of less severe characteristics (i.e. "hair-line", "non-displaced", "non-separated", "non-comminuted", "non-compound", "simple", "non-shattered", and "cannot see bone through skin wound") in 55.7% of their answers and more severe characteristics in only 44.3% of their



Figure 2. X-ray 2 (comminuted, displaced fracture).

answers. On the contrary, for a broken bone responders chose synonyms with more severe characteristics (i.e. "displaced", "separated", "comminuted", "compound", "complex", "shattered", and "can see the bone through skin wound.") in 62.1% of cases and only chose less severe characteristics in 37.9% of these cases. The difference for each group was statistically significant ($P=0.0458$ and $P\leq 0.00001$, respectively).

There was no correlation between having a personal history of a previous fracture with an understanding of the terms being synonymous. Of patients with no prior history of fracture, 46% understood these terms to be synonymous whereas 47.11% of the responders who had a previous fracture understood the terms to be synonymous demonstrating no significant difference between these groups ($P=0.32$).

Having an occupation in the field of medicine showed a significant improvement in identifying fractured and broken bone as synonymous with 100% of physicians (6 of 6 respondents) and 75% of physical & occupational therapists (3 of 4 respondents) participating in the



Figure 3. X-ray 3 (non-displaced fracture).

study understanding the terms to be synonymous ($P<0.00001$). However, this rate of understanding was not seen in other medical professions such as medical administrators (1 of 10 respondents, 10%), medical assistants (1 of 3 respondents, 33.33%), nor nurses and physician extenders (3 of 7 respondents, 42.85%) [Table 1; Figure 7].

When comparing between levels of education, there was no significant difference between groups. Even in the group of doctorate-educated participants, in which 7 out of 11 (63.63%) answered "broken and fractured are the same", the difference was not statistically significant ($P=0.239$) [Table 2].

Participants were shown images of 3 AP x-rays demonstrating a left femur with various fracture patterns. For x-ray 1 (non-comminuted, displaced fracture) [Figure 1], "broken" was used to describe the injury in 64% of responders. 3% of responders chose "fractured", 31% of responders chose "both fractured and broken", and 2% chose "neither".

For x-ray 2 (comminuted, displaced fracture) [Figure 2], "broken" was used to describe the injury in 23% of responders. 18.6% of responders chose "fractured", 54% of responders chose "both fractured and broken", and 3.9% chose "neither".

For x-ray 3 (non-displaced fracture) [Figure 3], "broken" was used to describe the injury in 20% of responders. 42% of responders chose "fractured", 31% of responders chose "both fractured and broken", and

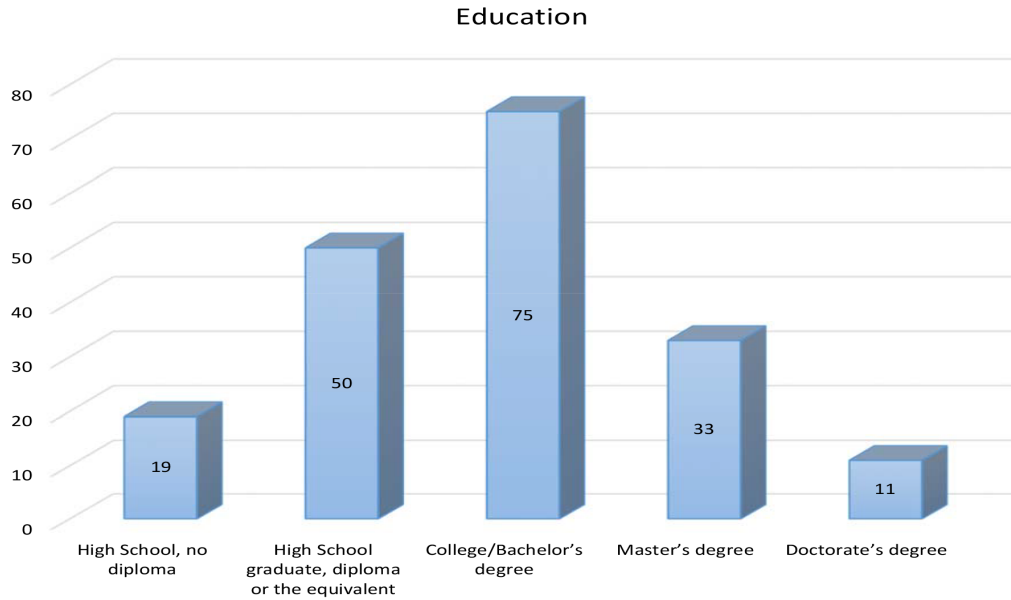


Figure 4. Educational Level distribution.

7% chose "neither" [Table 3].

Discussion

Orthopaedic trauma patients are faced with a large amount of information when diagnosed with their injury.

A common misconception is that patient understand that the terms fracture and broken bone, which orthopedic surgeons use synonymously, mean the same thing. The terminology of a fractured versus a broken bone can be confusing and have different meanings to patients including

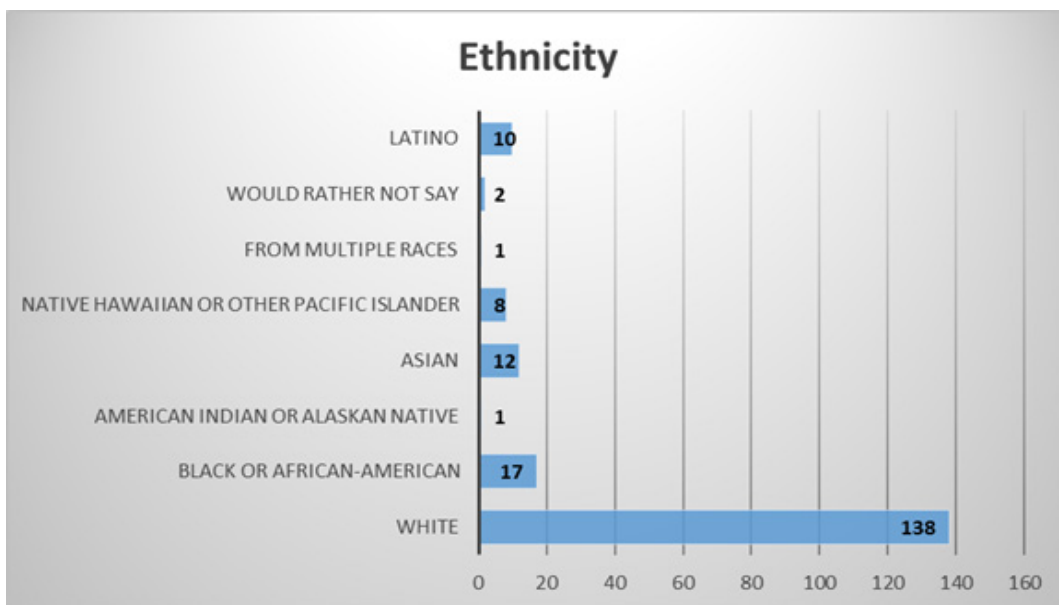


Figure 5. Ethnicity distribution.

Range: 18-89 years

Mean: 49.08 years

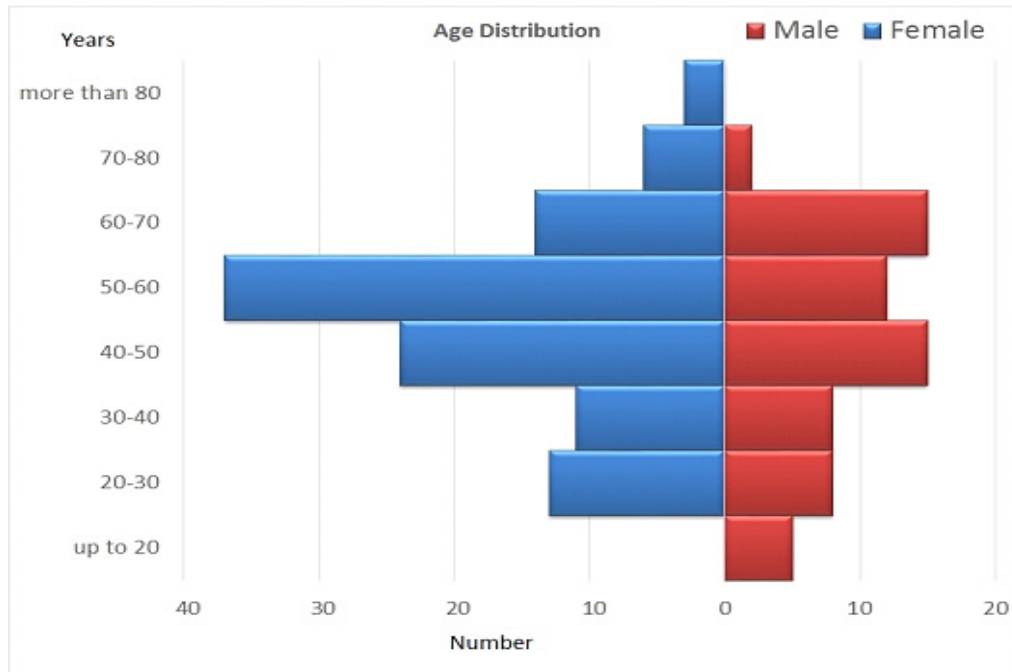


Figure 6. Age distribution.

Table 1. Participant choices for describing a "Broken" or "Fractured" bone

	Broken	Fractured
Hair-line	(34.4%) 65	(54.5%) 103
Displaced	(31.2%) 59	(27%) 51
Non-displaced	(16.9%) 32	(18.5%) 35
Separated	(40.2%) 76	(22.22%) 42
Non-separated	(11.6%) 22	(20.1%) 38
Comminuted	(13.2%) 25	(12.1%) 23
Non-comminuted	(9%) 17	(10.6%) 20
Compound	(35.4%) 67	(33.33%) 63
Non-compound	(18%) 34	(22.22%) 42
Simple	(29.1%) 55	(30.1%) 57
Complex	(28%) 53	(23.8%) 45
Shattered	(44%) 83	(26%) 49
Non-shattered	(16.4%) 31	(18.5%) 35
Can see bone through skin wound	(34.9%) 66	(15.3%) 29
Cannot see bone through skin wound	(22.22%) 42	(23.8%) 45
Fractured and Broken are the same	(45.5%) 86	(45.5%) 86

differing degrees of severity of injury. This may lead to a lack of understanding of one's injury severity and therefore treatment, which may result in decreased compliance and potentially worse outcomes. The results of the current investigation demonstrate that most responders don't think of a fracture and broken bone as the same thing and view a fracture as a less severe injury. This may hold significant implications for the treating physician and therefore one must be clear when describing the injury to their patient. This will afford both the physician and patient the understanding of the degree of injury and why they are undergoing a specific treatment protocol.

Age/Gender/Ethnicity

This study demonstrated no significant correlation with understanding broken or fractured terminology with regards to age, gender, or ethnicity. While no specific literature exists documenting differences in patient health literacy regarding these two terms, older age and ethnic background have been associated with lower health literacy in other medical fields. A study by Ashida et al. in 2010 looked at 971 patients surveyed through a community health center and found a highly significant correlation between increased age and decreased health literacy (3). Chaudhry et al looked at 1,464 patients with heart failure and demonstrated significant correlations between race and health literacy in which African

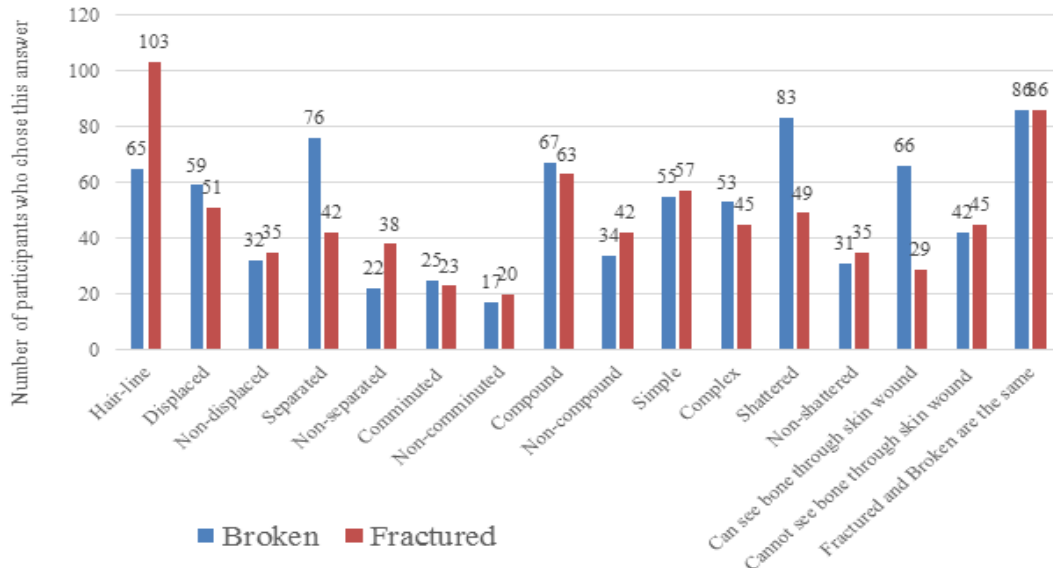


Figure 7. Participant choices for describing a "Broken" or "Fractured" bone.

Table 2. Response rate of "Broken and Fractured are the same" based upon level of education

Level of Education	"Answered "Broken and Fractured are the same"
High School, no diploma	(47.3%) 9/19
High School graduate, diploma or the equivalent	(34%) 17/50
College/Bachelor's degree	(48%) 36/75
Master's degree	(48.48%) 16/33
Doctorate's degree	(63.63%) 7/11

American patients demonstrated significantly lower levels of health literacy even after adjusting for issues such as demographics, non-cardiac comorbidities, social support, insurance status, and socio-economic status (4). Despite our results demonstrating no significant difference in understanding with regards to age, gender or race, the literature shows that these can certainly play a role in health literacy. Therefore, it is important

for the practicing physicians to keep in mind patient demographics when discussing one's injury and expected prognosis. This can affect the patients understanding of their injury and treatment plans; influencing patient compliance, outcomes, and, ultimately, satisfaction.

Educational Level

Previous literature has shown that level of education is

Table 3. Participant answer choices for each x-ray shown

	1'st X-Ray (Simple Displaced)	2'nd X-ray (Comminuted Displaced)	3'rd X-Ray (Simple Nondisplaced)
Broken	104 (64%)	36 (23%)	31 (20%)
Fractured	5 (3%)	29 (18.6%)	65 (42%)
Both	51 (31%)	85 (54.5%)	48 (31%)
None	3 (2%)	6 (3.9%)	11 (7%)

significantly related to health literacy (5,6). Van der Heide et al looked at 5,136 adults demonstrating significant correlations between low education level and a lack of health literacy (5). Yamashita et al. looked at patients in Canada, the United States, Italy, Norway, Switzerland, and Bermuda to compare associations among literacy, education and health involving an international population. They found that while overall literacy skills were linked to patient health in all locations, different types of literary skills (i.e., numeracy skill in U.S. and prose skills in Italy) proved more relevant to health and health literacy in patients from different backgrounds (6). Our data shows no significant difference in educational level in the ability to identify fractured or broken as synonymous. Despite this fact, there was a trend towards responders with higher educational levels better understanding fractured and broken to be synonymous [Table 2]. Our data is not necessarily contradictory to prior reported literature results, however it demonstrates that as providers we cannot assume based on education alone patients will understand the terminology we use. As terms such as broken or fractured are often used to describe a patient's condition in orthopedic care, it is the job of the treating provider, regardless of a patient's level of education, to present clear information and ensure that the patient fully understands what these terms mean.

Occupation

When looking at differences in patient occupation, the current investigation demonstrates a significant difference regarding specific occupations and ability to understand terminology. Physicians, regardless of subspecialty, had 100% (6 of 6 participants) accuracy in understanding the terms to be synonymous and 75% (3 of 4) of participants who were physical and/or occupational therapists did as well ($P < 0.00001$). Our data also demonstrates that responders not in the medical field often categorize a fracture as a less severe form of injury as compared to a broken bone. Providers need to understand their patients' occupation may be as or more important than educational level in their understanding of the terminology we use. It is up to the provider to identify each patient's level of understanding of their condition in order to provide clear information regarding their injury and treatment plans. This demonstrates that health literacy, even amongst medical professionals, needs to be further assessed and taken into account when counseling a patient regarding their injury.

Previous Fracture

Fifty five percent of responders surveyed had suffered a prior fracture, yet 53% of these responders reported a perceived difference between a fractured or broken bone. Of the respondents who had no personal history of fracture, 54% also reported the terms fractured and broken to be non-synonymous. It is important for providers to not make assumptions that a patient has an understanding of their current injury due to sustaining a similar one previously. As the current investigation demonstrates, patients confuse several terms describing a fracture and associate these terms and descriptors to the severity

of an injury/radiograph. As providers may not be privy to the terminology used during previous orthopaedic care, one should not assume patients' understanding of their current injury based on their history of past injury. Furthermore, patients may mistake their current injury as of similar severity to their previous injury if their understanding of various terminology is incorrect. It is necessary for the provider to clarify this and explain how their current injury is either similar or different from previous ones. This will ensure adequate patient understanding of their current injury and treatment course, which may differ from previous experiences.

Limitations of this study include the fact that responders were recruited from an orthopaedic clinic where understanding of various terminology may be higher than the general population due to the nature of their visit. By proxy, family members or other non-patient visitors may have demonstrated a higher level of knowledge simply by being associated with someone receiving orthopaedic care. However, our study shows that even patients with a previous history of fracture demonstrated poor understanding of various terminology. The fact that this was a patient survey study also limited the utility and reliability of the data as it was reliant on patient response and understanding of the questions being asked without the ability to clarify or further discuss the information. Furthermore this study was performed in a major metropolis in the northeastern United States. Although there was a relatively wide demographic range of responders regarding age, gender, ethnicity and socioeconomic status, the results of the current study may not be applicable to all populations.

The majority of people, regardless of the age, gender, race, education or occupation, may not understand that fractured and broken are synonymous terms. Providers need to be cognizant of the terminology they use when describing injury to optimize patient understanding and care.

The authors have no relevant disclosures to the content of this work.

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