

# Patient Comprehension of Common Orthopedic Terminology

Filip Cosic, MBBS(Hons), BMedSc(Hons); Lara Kimmel, PhD, B.Physio, Grad Dip Clin Epi; and Elton Edwards, MBBS, FRACS(Ortho)

## ABSTRACT

**Background:** Medical terminology is often complex and confusing to lay people. Even common terms used by health care professionals often have other meanings and can easily be misinterpreted. **Objective:** This study aimed to identify patient comprehension of common orthopedic terminology across multiple hospital settings. **Methods:** A cross-sectional study was conducted from September 2016 until November 2016 at an Academic Level 1 trauma center. One hundred and fifty emergency department patients and 150 orthopedic inpatients with isolated orthopedic injuries were included. Participants completed a questionnaire consisting of 12 multiple-choice questions determining patient comprehension of common orthopedic terminology. **Key Results:** Total comprehension scores on the questionnaire were scored as number correct out of 11. In the emergency department, the mean total score was 5.01 compared to 5.45 in orthopedic inpatients ( $p = .046$ ). Patients in both groups demonstrated poor understanding of medical terms (including fracture, ruptured tendon) and anatomical terms. In contrast, nonmedical terminology such as broken bone was better understood. Fifty-seven percent of participants stated that they understood their orthopedic condition completely. Notably, there was no correlation ( $r = .15$ ) between comprehension and participants describing that they completely understood their orthopedic condition. **Conclusions:** Emergency department patients and orthopedic inpatients demonstrate poor comprehension of orthopedic terminology. Health care professionals should assume a poor level of comprehension during their interactions with orthopedic patients and ensure that patient communication is clear, concise, and informative to facilitate better patient comprehension, informed consent, and an improved doctor-patient relationship. [*HLRP: Health Literacy Research and Practice. 2019;3(3):e187-e193.*]

**Plain Language Summary:** This study evaluated patient comprehension of common orthopedic terminology in orthopedic inpatients and patients presenting to the emergency department with orthopedic injuries. This study found that patients demonstrate poor understanding of terminology used commonly by health care professionals, and that patients demonstrated little insight into their lack of comprehension. These findings have implications for doctor-patient communication, informed consent, and patient satisfaction.

Medical terminology can be complex and confusing and terms commonly used by health care professionals can have multiple meanings and may be easily misinterpreted. Health care professionals often use terminology that is unfamiliar to patients and assume the patient has understood, and doctors frequently overestimate patient literacy, which may increase the likelihood that patients will misunderstand the terminology used (Kelly & Haidet, 2007). In the orthopedic setting there are many medical terms used commonly; however, these terms may not necessarily be familiar to nonmedical

lay people and thus can be confusing for patients (Azam & Harrison, 2011; Bagley, Hunter, & Bacarese-Hamilton, 2011; Kampa, Pang, & Gleeson, 2006; Lerner, Jehle, Janicke, & Moscati, 2000). Furthermore, there is a growing understanding that there are large groups of patients that have poor health literacy, particularly those from lower socioeconomic and educational backgrounds (Cosic, Kimmel, & Edwards, 2017; Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005). These patients may need information to be more carefully delivered to ensure patient

comprehension. However, even carefully delivered information can be misunderstood if common medical terminology is not familiar, particularly in orthopedics, where analogous terms used commonly by health care professionals have different meanings to patients (Bagley et al., 2011; Kampa et al., 2006).

This study aimed to identify patient comprehension of common orthopedic terminology across multiple hospital settings and determine whether inpatient stay as an orthopedic patient improved patient comprehension of terminology.

## METHOD

Ethics approval was obtained through the Alfred Health Office of Ethics and Research Governance. A cross-sectional study was designed to evaluate patient comprehension of orthopedic terminology commonly used in clinical practice using a simple multiple-choice questionnaire designed in conjunction with an orthopedic surgeon and a senior physiotherapist. Two groups of patients were recruited to compare patient comprehension between emergency department patients and orthopedic inpatients with similar injuries.

### Participant Recruitment

Patients presenting to the emergency department with isolated orthopedic injuries and orthopedic inpatients treated for isolated traumatic orthopedic injuries were approached to complete a simple questionnaire between September 2016 and November 2016. Consecutive patients were approached immediately prior to discharge from the emergency department or discharge from orthopedic inpatient stay. Sample size was determined by referencing previous literature (Bagley et al., 2011). Participants were asked to complete the questionnaire without

the assistance of health care staff or relatives. The questionnaire contained a series of multiple-choice questions (MCQs) relating to common orthopedic terminology and analogous orthopedic terms (**Table 1**).

Participants were excluded if they were non-English speaking, had sustained a head injury or had previous cognitive impairment (defined by any history of an active medical condition affecting cognition), presented with an altered conscious state as documented by nursing/medical staff, sustained multiple injuries, or required significant analgesia as defined by any intravenous or intramuscular pain relief.

### Questionnaire

The questionnaire consisted of 12 MCQs (**Table 1**) containing one correct option, two or three incorrect options, and the option to select *not sure*. The initial 11 questions asked the participant to select the correct option in defining an orthopedic term. The final question asked the participant to give an indication of their understanding of their injury, treatment, and ongoing restrictions.

### Statistical Analysis

Statistical analysis was performed using STATA Version 13.1. Results were displayed as percentages and means with 95% confidence intervals (CI).

The number of correct answers from patients within the emergency department were compared to the number of correct answers from inpatients for each question individually using chi-squared analysis. A two-student *t*-test was used to compare mean scores between the two groups. A multiple logistic regression was undertaken, accounting for age, gender, education, employment, English as a second language, and previous orthopedic encounters.

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*Filip Cosic, MBBS(Hons), BMedSc(Hons), is an Orthopaedic Registrar, Department of Orthopaedic Surgery. Lara Kimmel, PhD, B.Physio, Grad Dip Clin Epi, is a Senior Physiotherapist, Department of Physiotherapy and Department of Epidemiology and Preventive Medicine. Elton Edwards, MBBS, FRACS(Ortho), is a Consultant Orthopaedic Surgeon, Department of Orthopaedic Surgery and Department of Epidemiology and Preventive Medicine. All authors are affiliated with The Alfred Hospital.*

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Address correspondence to Filip Cosic, MBBS(Hons), BMedSc(Hons), Department of Orthopaedic Surgery, The Alfred, 55 Commercial Road, Melbourne VIC 3004, Australia; email: [filcosic@gmail.com](mailto:filcosic@gmail.com).

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**TABLE 1**  
**Participant Questionnaire**

- |  |
|--|
| 1. A fracture is:<br><b>A. A bone broken into more than one piece</b><br>B. A cracked or chipped bone<br>C. A bone that is not completely broken<br>D. Not sure        |
| 2. A fracture is:<br>A. Not as bad as a broken bone<br><b>B. The same as a broken bone</b><br>C. Worse than a broken bone<br>D. Not sure                               |
| 3. A broken bone is:<br><b>A. A bone broken into more than one piece</b><br>B. A cracked or chipped bone<br>C. A bone that is not completely broken<br>D. Not sure     |
| 4. A ruptured tendon is:<br><b>A. A complete tear of a tendon</b><br>B. A partial tear of a tendon<br>C. A tendon that has been separated from the bone<br>D. Not sure |
| 5. A ruptured tendon is:<br>A. Not as bad as a torn tendon<br><b>B. The same as a torn tendon</b><br>C. Worse than a torn tendon<br>D. Not sure                        |
| 6. A ligament is:<br><b>A. A structure connecting two bones</b><br>B. A structure connecting muscle and bone<br>C. A structure connecting two muscles<br>D. Not sure   |
| 7. A tendon is:<br>A. A structure connecting two bones<br><b>B. A structure connecting muscle and bone</b><br>C. A structure connecting two muscles<br>D. Not sure     |
| 8. A ligament and a tendon are:<br>A. The same<br><b>B. Different</b><br>C. Not sure   |

A Pearson's correlation was performed to determine if there was a correlation between patients who reported a good understanding of their orthopedic condition (Question 12)

**TABLE 1 (continued)**  
**Participant Questionnaire**

- |  |
|--|
| 9. Soft tissue refers to:<br>A. Ligaments<br>B. Tendons<br>C. Muscles<br><b>D. All of the above</b><br>E. Not sure   |
| 10. If you are instructed to avoid weight-bearing:<br>A. You may put as much weight on your leg as tolerated<br>B. You must use crutches or a frame when the leg is sore<br><b>C. You must use crutches or a frame all the time</b><br>D. Not sure |
| 11. Do all operations need an anesthetic:<br><b>A. Yes</b><br>B. No<br>C. Not sure   |
| 12. Do you understand your injury, its treatment, and any ongoing restrictions? <sup>a</sup><br>A. Not at all<br>B. Partially<br>C. Completely   |

Note. Correct answers are in bold.  
<sup>a</sup>The question is subjective. No one answer is correct.

and a higher score on the questionnaire. A *p* value of < .05 was considered to be statistically significant.

## RESULTS

### Participant Recruitment

One hundred and fifty emergency department patients and 150 orthopedic inpatients completed the participant questionnaire (Table 2).

### Questionnaire Results

Total comprehension scores on the questionnaire were scored out of 11. In the emergency department population, the mean total score was 5.01 (95% CI [4.69, 5.33]). In the orthopedic inpatient population, the mean total score was 5.45 (95% CI [5.14, 5.76]; *p* = .046).

The proportion of correctly answered questions is demonstrated in Table 3. The most common answer to Question 1, asking the definition of a fracture, was "a cracked or chipped bone"; this was the response in 38% of answers, followed closely by "a bone that is not completely broken" by 37% of participants. Only 20% of all participants an-

**TABLE 2**  
**Participant Demographic Information (N = 300)**

Characteristic	Emergency Department (%) <i>n</i> = 150	Orthopedic Inpatient (%) <i>n</i> = 150
Mean age (years)	40.5	50
Gender <sup>a</sup>		
Male	89 (59)	87 (59)
Female	61 (41)	63 (41)
Educational attainment <sup>a</sup>		
Less than high school	28 (19)	56 (37)
Completed high school	24 (17)	17 (11)
Diploma/TAFE	19 (13)	28 (19)
Tertiary education	74 (51)	49 (33)
Employment status <sup>a</sup>		
Employed	104 (69)	87 (58)
Unemployed	21 (14)	16 (11)
Student	10 (7)	5 (3)
Retired	15 (10)	42 (28)
English as first language <sup>a</sup>		
Yes	134 (89)	140 (93)
No	16 (11)	10 (7)
Previous orthopaedic encounters <sup>a</sup>		
0	43 (31)	54 (36)
1	36 (26)	46 (31)
2 or more	59 (43)	50 (33)

Note. TAFE = technical and further education.  
<sup>a</sup>No significant differences noted across groups at *p* < .05.

swered correctly that a fracture is “a bone broken into more than one piece.”

One-half of the participants answered that a fracture is not as bad as a broken bone and 37% answered that a fracture and a broken bone were the same. Seventy-seven percent of participants were able to correctly define a broken bone as “a bone broken into more than one piece.”

Only 27% of participants were able to define a ligament as “a structure connecting two bones” and 37% were able to define a tendon as “a structure connecting muscle and bone”. Seventy-six percent of participants correctly identified tendons and ligaments as being different structures.

Seventy-eight percent of participants were able to correctly define non-weight-bearing as being required to “use crutches or a frame all the time.” Fifty percent of participants either were unsure or answered incorrectly when asked to answer whether all operations require an anesthetic.

### Participant Perception of Understanding

Question 12 asked participants to describe their level of understanding about their current orthopedic condition. Fifty-seven percent of participants stated they understood their orthopedic condition completely, 39% said they understood their condition partially, and 4% said they did not understand any part of their injury, treatment, or ongoing restrictions.

There was a weak correlation (*r* = .15) between overall comprehension score and participants describing that they completely understood their orthopedic condition.

### Factors Associated with Comprehension

Age and a tertiary education were both significantly associated with participant comprehension. Participants ages between 42 and 58 years demonstrated better comprehension than participants in other age groups.

TABLE 3

**Proportion of Correct Answers by Group (N = 300)**

Question Number	Emergency Department (%) <i>n</i> = 150	Orthopaedic Inpatient (%) <i>n</i> = 150	<i>p</i> Value
1	22 (15)	38 (25)	.021
2	52 (35)	60 (40)	.341
3	121 (81)	110 (73)	.132
4	44 (29)	45 (30)	.900
5	37 (25)	40 (27)	.693
6	39 (26)	43 (29)	.606
7	57 (38)	55 (37)	.812
8	119 (79)	110 (73)	.222
9	90 (60)	104 (69)	.091
10	107 (71)	126 (84)	.008
11	63 (42)	87 (58)	.006

Participants with a university degree or higher level of education demonstrated more than twice the odds of displaying correct comprehension compared to participants who did not complete high school (odds ratio 2.26; 95% CI [1.29, 3.95];  $p = .004$ ). Participants who completed high school only did not demonstrate significantly better comprehension than those who did not complete high school.

Neither employment, gender, previous orthopedic encounters, nor speaking English as a first language was significantly associated with patient comprehension.

## DISCUSSION

Ensuring patient comprehension should be the cornerstone of doctor-patient communication. Effective doctor-patient communication is a core clinical skill and forms a large part of the “art” of medicine (Ha & Longnecker, 2010). Effective communication, attributed by patients to be a doctor’s “bedside manner,” is used as a major indicator of a doctor’s general competence by many patients (Hall, Roter, & Rand, 1981). Good communication also impacts patient satisfaction with their care, the extent to which they share pertinent information for accurate diagnosis, follow advice, and adhere to prescribed treatment (Hall et al., 1981; Herndon & Pollick, 2002; Tongue, Epps, & Forese, 2005). Additional benefits of satisfied patients are a reduction in formal complaints and malpractice complaints (Brown, Boles, Mullooly, & Levinson, 1999; Tongue et al., 2005), along with greater job

satisfaction, less work-related stress, and reduced burnout for doctors (Maguire & Pitceathly, 2002). Thus, ensuring patient comprehension is a key part of clinical practice. This study has demonstrated that orthopedic inpatients and emergency department patients are often confused by, and misinterpret, basic orthopedic terminology, with minor improvement in comprehension after orthopedic inpatient admission.

This study is the first to demonstrate limited patient comprehension of orthopedic terminology in an Australian cohort, and further reinforces findings of limited comprehension in other countries. Patients in both the emergency department cohort and the orthopedic inpatient cohort had a mean score of less than 50% on the questionnaire, with emergency department patients demonstrating worse comprehension than orthopedic inpatients. Previous literature has demonstrated similar shortcomings in patient comprehension in both emergency department and orthopedic settings (Azam & Harrison, 2011; Bagley et al., 2011; Hadlow & Pitts, 1991; Kampa et al., 2006; Lerner et al., 2000; Peckham, 1994). In the emergency department setting, patients have been shown to have poor understanding of medical terminology with better comprehension of lay terminology (Lerner et al., 2000). Similarly, in the orthopedic setting, patients frequently misunderstand common orthopedic terminology and are more familiar with lay terminology (Azam & Harrison, 2011; Bagley et al., 2011; Hadlow & Pitts, 1991; Kampa et al., 2006; Peckham, 1994). Of note, fracture and broken bone are

confusing terms for patients, with most patients not able to identify that they are synonymous terms. Previous strategies to improve patient understanding have included supplying information leaflets and visual aids, which in the time-poor hospital setting are feasible measures, although these have had limited efficacy and most patients in one study were found to not read the leaflets (Kampa et al., 2006). The provision of leaflets has an additional risk; doctors may abbreviate their explanations based on the assumption that the leaflet contains the necessary information. If the leaflet is then ignored by the patient the total information transfer is even less than when a leaflet is not provided. Although there is the potential to implement other strategies, direct patient education enacted by health care professionals may be more beneficial. The use of common terminology that patients are familiar with, such as “broken bone” as opposed to “fracture” and “torn” as opposed to “ruptured,” along with satisfactory explanations of these terms, may prove to be sufficient in improving patient comprehension.

Misunderstanding commonly used terms has the potential to affect many aspects of patient care. McCormack, Evoy, Mulcahy, and Walsh (1997) have previously shown that many patients willingly consent to acute orthopedic procedures that they do not fully understand, particularly with the use of orthopedic terminology such as “fracture reduction” and “internal fixation.” Although an element of consent and patient care can result from trust in the doctor-patient relationship, in current medical practice a lack of informed consent has medico-legal consequences, particularly if complications arise. Previous work has also found that orthopedic patients understand little of their injury, acute management, and ongoing treatment, which may have significant implications on patient compliance with management instructions and recovery (Cosic et al., 2017; Kadakia et al., 2013). Given that in the orthopedic setting, surgery forms only the initial management of an injury, it is essential to ensure patient compliance with ongoing management to achieve satisfactory outcomes for both patient and surgeon. The inpatient setting provides excellent accessibility for both doctor and patient, and there is the potential that a small amount of time spent ensuring patient understanding as an inpatient can make a significant difference to patient outcome and satisfaction in the long term.

This study has also shown, in both patient cohorts, that patients frequently have poor understanding of relevant orthopedic terminology despite reporting complete understanding of their diagnosis and treatment. Previous literature has also shown that patients are generally not aware

when they do not understand (Engel et al., 2009), which makes the task of ensuring patient comprehension increasingly difficult for health care professionals. Adding to the difficulty of ensuring that patients understand is the fact that doctors are often guilty of overestimating a patient’s level of comprehension (Kelly & Haidet, 2007), and an awareness of this is critical to ensure adequate time is spent informing and educating patients.

## STUDY LIMITATIONS

This study looked at the understanding of common orthopedic terminology in two Australian cohorts: one in the emergency department setting, and one in the orthopedic inpatient setting. The key limitation of the study was the cross-sectional nature of the questionnaire, with an inability to follow up with patients at a later stage of their management to determine whether comprehension improved. However, given that the number of previous orthopedic encounters was not associated with patient comprehension, and that previous work has found that orthopedic outpatient review alone does not improve health literacy (Cosic et al., 2017), it is unlikely that patient comprehension improved after the questionnaire. Additionally, in this study we did not examine whether poor patient comprehension was associated with understanding of postoperative instructions or compliance to these instructions, and ultimately to orthopedic outcomes. These remain areas for future research. Another study limitation was the MCQ format and the ability of participants to guess the correct answer. Although one option on each question was *not sure* and participants were instructed to answer *not sure* if they did not know the answer, participants commonly preferred to select an answer that was incorrect as opposed to answer *not sure*. Of note is that this limitation could have led to an overestimation of patient comprehension of orthopedic terminology. Given that our findings demonstrated relatively poor comprehension, it remains vital for doctors to communicate and explain terminology more clearly to patients. Lastly, given this cohort consisted of Australian patients, levels of comprehension may differ between patient populations with differing demographics, and the applicability of the questionnaire in other countries may differ.

## CONCLUSION

Patient comprehension and understanding is vital in ensuring adequate informed consent, compliance with treatment, and patient satisfaction. This study has found that patient comprehension of common orthopedic terminology is poor in both the emergency department and orthopedic

inpatient settings, and that patients frequently overestimate their level of understanding in regard to their injury. Health care professionals must be aware of patient misinterpretation of common orthopedic terminology and ensure that patient communication is clear, concise, and informative to facilitate better patient comprehension, informed consent, and an improved doctor-patient relationship.

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