An Easier Way to Classify Acetabulum Fractures: A Model for Improved Learning Efficiency in the Digital Age

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Introduction

Although good interobserver reliability is reported amongst Orthopaedic traumatologists in classifying acetabular fractures, the Judet-Letournel classification system can be daunting, particularly for the junior resident (1, 2) (Figure 1). “Inductive trees” or “road maps” as a reasoning strategy have been shown to be five-fold more likely to lead to correct diagnosis than traditional novice strategies, such as hypothetico-deductive reasoning. (3) Indeed, algorithmic approaches to acetabular fractures have also been shown to improve resident classification ability. (4,5)

In our Orthopaedic residency program, every resident owns a smartphone and mini-iPads are distributed to all PGY2-PGY5 residents. Ninety-one percent of our residents use an app to facilitate their Orthopaedic training at least once per week. This burgeoning prevalence of mobile devices amongst residents is reflected in app availability and usage. (6) Apps are most commonly used for quick reference and information recall. Few have functions that utilize decision analysis as above. This suggests that current tools for resident teaching do not reflect the optimal reasoning strategies for the novice.

Computer-based instruction has been shown to outperform lecture or textbook delivery in measures of skill acquisition in randomized controlled trials when integrated with guidance or expository functions within the simulation. By integrating content and providing a decision tree approach to acetabular fracture classification these premises can be readily satisfied in a mobile platform. Furthermore, this method of evidence-based learning allows collection of data to pinpoint misclassification with greater precision and create optimization strategies accordingly.

Hypothesis

Mobile-compatible technology, integrating content & simulation can be developed in cost-efficient manner, without specialized training to promote resident accuracy in classifying acetabular fractures according to the Judet-Letournel system.

Methods

Website development

A mobile responsive website, www.classetabulum.com, (Figure 1) was developed utilizing a drag and drop interface, (Divi, Elegant Themes, San Francisco, CA) powered by WordPress platform (San Francisco, CA). This site is hosted by Bluehost, Inc (Orem, UT).

Structure

“Classify”: Decision tree or algorithm portion of the app as outlined in Figure 2 and Table 1. “Practice”: Quiz portion of the app, which presently has 20 examples of acetabular fractures. “Learn”: Content delivery, e.g. surgical approaches, fracture descriptions, and demographics.

Assessments

Pre- and post-test administered before and after website usage. Available, respectively. 3 month washout period. For the pre-test, the mean correct response score for PGY2-5 was 38.4%. Average completion time was 16.67 minutes. (Figure 4). In the post-test phase, the mean correct response score for PGY2-5 in the post test phase was 53.6%. Average time to completion in the post test phase was 20.38 minutes.

Conclusions

• Algorithms are efficient and effective ways of introducing the novice learning to acetabulum fracture classification
• Novel teaching tools can be developed in a cost-effective manner with little or no background in coding or web design.
• Web analytics hold promise not only for assessment but providing insights into how we think.
• Opportunity for improved learning efficiency not only for acetabular fractures.

References