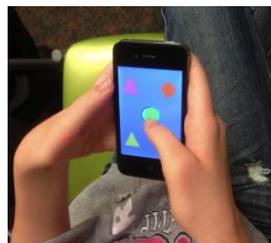


Introduction

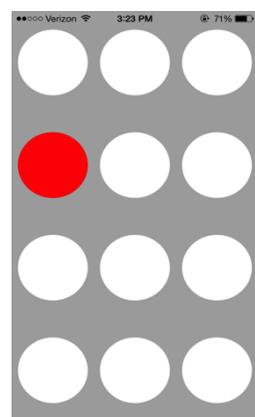
Quantification of hand function in patients who have musculoskeletal impairments has traditionally been achieved with the Jebsen-Taylor Hand Function Test. However, administration of this test is difficult and time-consuming, and with the recent advent of touchscreen technology, the test may no longer accurately reflect modern day environmental interaction. Therefore, the purpose of this project is to develop a novel hand function test, quickly and easily administered, using touchscreen technology to serve as a modernized evaluation of an individual's upper extremity function.

Methods & Materials

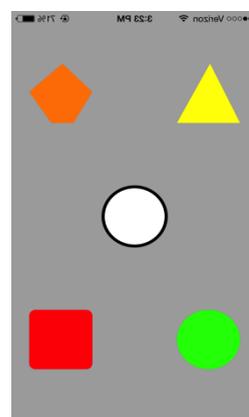
The Minnesota Hand Function Test was developed on the Apple iOS platform using an Apple iPhone 4. Four different tasks were designed, believed to be representative of touchscreen use. These included: touching dots on a 3x4 grid, dragging shapes, using the camera, and copying a line of text using the onscreen keyboard. The test was designed to take approximately 60-120 seconds, with each patient first performing a "pre-test" for familiarization. Demographic information included: age, gender, years of experience with touchscreens, handedness, and diagnosis. Each section was timed independently, and an overall time was recorded. The test was administered at Gillette Children's Specialty Healthcare in St. Paul, MN under the supervision of a pediatric orthopaedic specialist.



The Minnesota Hand Function Test



Dots



Shapes



Camera



Text

Discussion

The age groups were established based on the similarities in completion time between individual ages within the normal hand function category. In general, patients with diagnoses of neuromuscular (cerebral palsy, brachial plexopathy, etc.) and congenital (hypoplasia, syndactyly, etc.) conditions were more likely to have impaired hand function and show an increased completion time. The largest time differences were accounted for mainly by the camera and texting portions of the test, whereas the dots and shapes were generally consistent between the age-matched groups.

Conclusion

These data show that our test potentially discriminates between age-matched patients with normal versus impaired hand function. Initial analysis indicates that our test is best suited for quantifying hand function in patients with neuromuscular and congenital abnormalities. Expansion of sample size is likely necessary to achieve significance within the other age groups. Additionally, we also believe our test could serve as a reliable and standardized method to assess recovery after major upper extremity surgery.

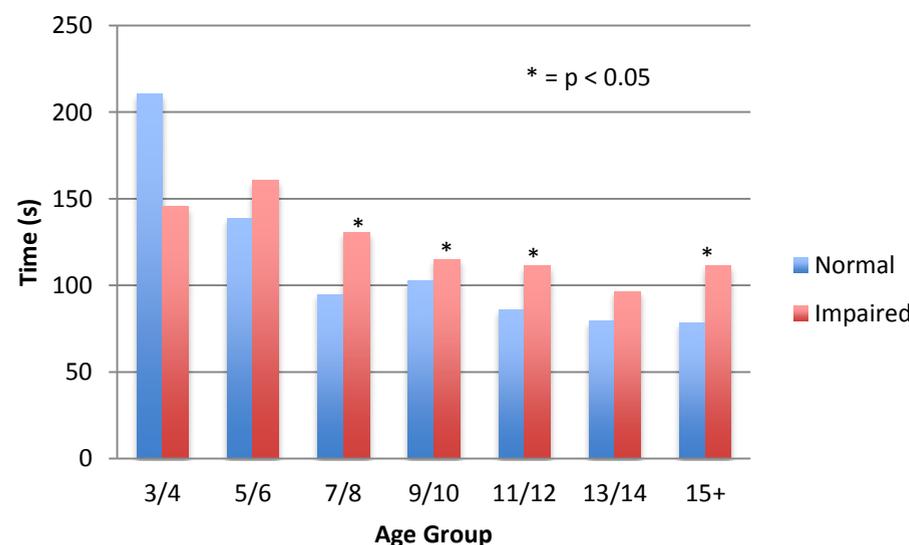
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Download the App at: <https://itunes.apple.com/us/app/mn-hand-function-test/id627546133?ls=1&mt=8>

Results

Total Completion Time



Patients were classified as having either normal (n = 87) or impaired (n = 74) hand function based on assessment by a pediatric orthopaedic specialist. Patients with less than 6 months of touchscreen experience were excluded due to inconsistent test times. There were no gender or handedness differences observed. T-test showed a statistically significant increase in completion time (p < 0.05) in 4 of the age groups as indicated by the column graph.