The Accuracy of Self-Reported Height in Orthopaedic Clinics

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INTRODUCTION: Body mass index (BMI) plays a vital role in a myriad of healthcare processes including surgical planning, health risk assessment, and pharmacologic dosing. BMI is calculated by weight (in kilograms) divided by the square of height (in meters). In orthopedics and namely arthroplasty, BMI has traditionally been implemented as a surgical guide, where patients with class III obesity (BMI >40kg/m^2) are refused surgery. Studies have questioned the validity and accuracy of patients' heights – specifically when self-reported height measurements are utilized. This study aimed to identify the accuracy of self-reported height measurements in multiple orthopaedic clinics.

METHODS: This study was approved by the institutional review board. This study recruited patients to self-report their height prior to height measurement at their regularly scheduled arthroplasty, spine, hand, and sports medicine clinic visits. Height measurements were completed using a calibrated, wall-mounted stadiometer. Differences among height measurements, BMI calculations, descriptive statistics, ANOVA were calculated.

RESULTS SECTION: Data included 600 total patients: 200 arthroplasty patients (mean age: 63.39 ± 11.63 yrs), 100 hand patients (mean age: 46.98 ± 14.68 yrs), 200 spine patients (mean age: 58.55 ± 16.98), and 100 sports patients (31.92 ± 13.06 yrs). Arthroplasty clinic patients (2.56 ± 2.64 cm) overestimated their heights more than spine (2.12 ± 2.67 cm), hand (2.18 ± 2.31 cm) and sports medicine (0.74 ± 1.96 cm) patients. Arthoplasty height overestimation was not significant versus spine ($p = 0.0965$) or hand ($p = 0.2038$) but was significant versus sports medicine ($p < 0.0001$). There was no significant difference between spine and hand clinics ($p = 0.8302$). Spine height overestimation was significant versus sports medicine ($p < 0.0001$) and so was the hand clinic ($p < 0.0001$). Across all clinics, patients overestimated their heights by 2.04 ± 2.57 cm, on average. Age correlated significantly with increasing height overestimation significantly ($r = 0.2812$, $p < 0.0001$). Across all clinics, males (2.54 ± 2.50 cm) significantly overestimated their heights more egregiously compared to females (1.56 ± 2.55 cm) ($p < 0.0001$). Arthroplasty had the largest average change in BMI (-1.08 ± 1.30 kg/m^2) due to height overestimation and was significantly greater than spine ($p = 0.006$), hand ($p = 0.0112$) and sports medicine ($p < 0.0001$) There was no difference between spine and hand patients ($p = 0.9279$). Spine patients had greater BMI change than sports medicine patients ($p < 0.0001$). Likewise, hand clinic patients had greater BMI change than sports medicine patients ($p < 0.0001$). In all clinics, using corrected BMI, 13 (2.17 %) patients crossed 40 kg/m^2, 10 (1.67 %) crossed 45 kg/m^2, and 8 (1.33 %) crossed 50 kg/m^2.

DISCUSSION: This study demonstrates that patients, on average, overestimated their height by 2.04 cm (0.803 in). Additionally, patients presenting to arthroplasty, spine, and hand clinic had the most egregious overestimations of their height This may be due to each clinics' patient demographics, namely age; with senior patients more commonly suffering from arthritic changes they likely experience gradual height loss. Therefore, this study confirms prior reports regarding height loss in the orthopaedic spine population and highlights that similar precautions regarding self-reported heights need to be taken in all orthopaedic clinics as well. In this study there were patients who crossed BMI thresholds when accurate heights were obtained. To make sure obesity is correctly captured as a comorbidity and post-operative complications are accurately assessed, uniform measured heights are important. Additionally, surgeons who operate on a patient with a BMI ≥ 40kg/m^2 are generally entitled to more compensation via current procedural terminology (CPT) modifier-22 for a complex procedure requiring significantly more effort. With an incorrect BMI calculation surgeons may be missing out on compensation for a procedure that takes more time and effort due to a patient's morbid obesity, but it is not being accounted for due to inaccurate patient reported heights. With height contributing to BMI calculations, and prior literature describing reliance on the likely widespread self-reporting of heights at large institutions, this current study highlights the need for uniform, accurate height measurements to avoid clinical, surgical, pharmacologic, and billing errors.

SIGNIFICANCE/CLINICAL RELEVANCE: Overall, this study demonstrated that patients frequently over-report their height in multiple orthopaedic practices, which, in turn, affects their BMI calculation and contributes to downstream medical and financial consequences.

IMAGES AND TABLES:

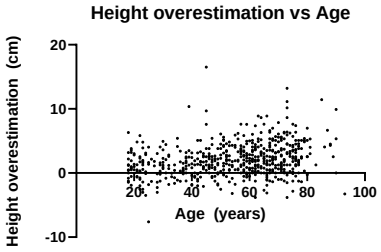

Figure I. All patient height overestimation data plotted vs the age of the patient. Height overestimation correlated significantly with increasing age ($r = 0.2812$, $p < 0.0001$).

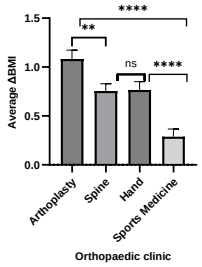

Figure II. Change in BMI from height overestimation in each clinic. Arthroplasty patient BMI change was significantly greater than spine ($p = 0.006$), hand ($p = 0.0112$) and sports medicine ($p < 0.0001$). There was no difference between spine and hand patients ($p = 0.9279$) but both spine and hand clinics had more BMI change than sports ($p < 0.0001$). Errors bars represent SEM.

Table I. Study population for arthroplasty, spine, hand, and sports medicine clinics. The discrepancy between self-reported height and measured height was greater in the arthroplasty, spine, and hand clinics than in the sports medicine clinic ($p > 0.0001$).

	N	Average age (yrs)	M:F	Average height Δ (cm)*	Average BMI Δ (kg/m^2)**
Arthroplasty	200	63.39 ± 11.63	95:105	2.56 ± 2.64	-1.08 ± 1.30
Spine	200	58.55 ± 16.98	97:103	2.12 ± 2.67	-0.76 ± 1.05
Hand	100	46.98 ± 14.68	54:46	2.18 ± 2.31	-0.77 ± 0.86
Sports Medicine	100	31.92 ± 13.06	53:47	0.74 ± 1.96	-0.29 ± 0.79
Total	600	53.80 ± 18.18	299:301	2.04 ± 2.57	-0.79 ± 1.11

*positive value denote self-reported heights were greater than measured heights
**negative values denote BMI calculated via self-reported heights was less than BMI calculated via measured heights