



Abstract Title: The development of a **KNee Osteoarthritis Walking Score (KNOWS)**.

Matthew Baker
Dalhousie University

Janice Moreside
Dalhousie University

Ivan Wong
Nova Scotia Health
Authority
Dalhousie University

Glen Richardson
Nova Scotia Health
Authority
Dalhousie University

Nathan Urquhart
Nova Scotia Health
Authority
Dalhousie University

William Stanish
Dalhousie University

Derek Rutherford
Nova Scotia Health
Authority
Dalhousie University

Introduction

Patient-reported outcomes are relied on heavily in knee osteoarthritis (OA) management. Although self-report measures have shown clinical utility (Maly, Costigan, & Olney, 2006), they are influenced by factors that may not reflect how knee joint function is altered by OA. Those with OA commonly report walking difficulties (King, Kendzerska, Waugh, & Hawker, 2018). Researchers have described alterations to knee biomechanics and muscle activation during walking with OA (Rutherford, Baker, Wong, & Stanish, 2017b) that are characteristically altered with increasing severity of disease progression (Asthen Wilson, Deluzio, Dunbar, Caldwell, & Hubley-Kozey, 2011). From these data, it is possible to develop a multivariate **KNee OA Walking Score (KNOWS)**.

Objective

To develop a multivariate KNOWS, with the ability to discriminate populations with symptomatic moderate knee OA from asymptomatic participants using objective measures of knee function collected during a treadmill walking assessment.

Methods

Bilateral walking assessments were completed on 201 participants with knee and hip pathologies and asymptomatic controls (n=402 knees) using standard procedures (Rutherford, Baker, Wong, & Stanish, 2017a). Joint moments were calculated on those

where knee joint centers and ground reaction forces were collected, while knee motion and medial and lateral hamstring activation was measured on all 201 participants. Visual assessment of knee motion, moments and muscle activation waveforms was completed across all groups. Four factors were identified (sagittal and frontal plane knee moments, hamstring activation and mass) and used in a multiple linear regression model to determine a KNOWS based on group assignment (asymptomatic knee or OA knee). Multiple t-tests were used to determine statistical differences (Bonferroni Corrected Alpha) between asymptomatic right and left legs and symptomatic OA knees. A Linear Discriminant Analysis was completed to determine correct group classification.

Results

Sagittal and frontal plane moment features, lateral and medial hamstring activation and participant mass were used as factors in the KNOWS. A significant difference was found between the symptomatic OA knee ($\bar{x}=5.5$ ($s_x=2.4$)) and the asymptomatic group ($p<0.001$) and effect size was large (Cohens $d=1.3$). No score differences were found between right ($\bar{x}=2.4$ ($s_x=2.1$)) and left ($\bar{x}=2.2$ ($s_x=2.1$)) legs of asymptomatic individuals ($p=0.669$). The Linear Discriminant Analysis showed an average 78% correct classification in asymptomatic and knee OA groups.

Conclusion

Using current literature and visual observations of treadmill-based gait waveforms, a multivariate KNOWS was developed. This score provides a value between 0 and 10 that has potential to deliver an objective measure of knee joint function that can be integrated into clinical practice and decision making.

References

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Cite this document in APA:

Baker, M., Moreside, J., Wong, I., Richardson, G. Urquhart, N., Stanish, W., & Rutherford, D. (2018, September). *The development of a KNee Osteoarthritis Walking Score (KNOWS)*. Paper presented at the Healthy Living, Healthy Life: Collaborative Health Conference on Research, Practice and Community Innovations Conference, Dalhousie University, Halifax, NS. Retrieved from <https://ojs.library.dal.ca/HLHL/>

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