



Universiteit
Leiden
The Netherlands

MR imaging of the knee in primary care

Oudenaarde, K. van

Citation

Oudenaarde, K. van. (2018, November 22). *MR imaging of the knee in primary care*. Retrieved from <https://hdl.handle.net/1887/67119>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/67119>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/67119> holds various files of this Leiden University dissertation.

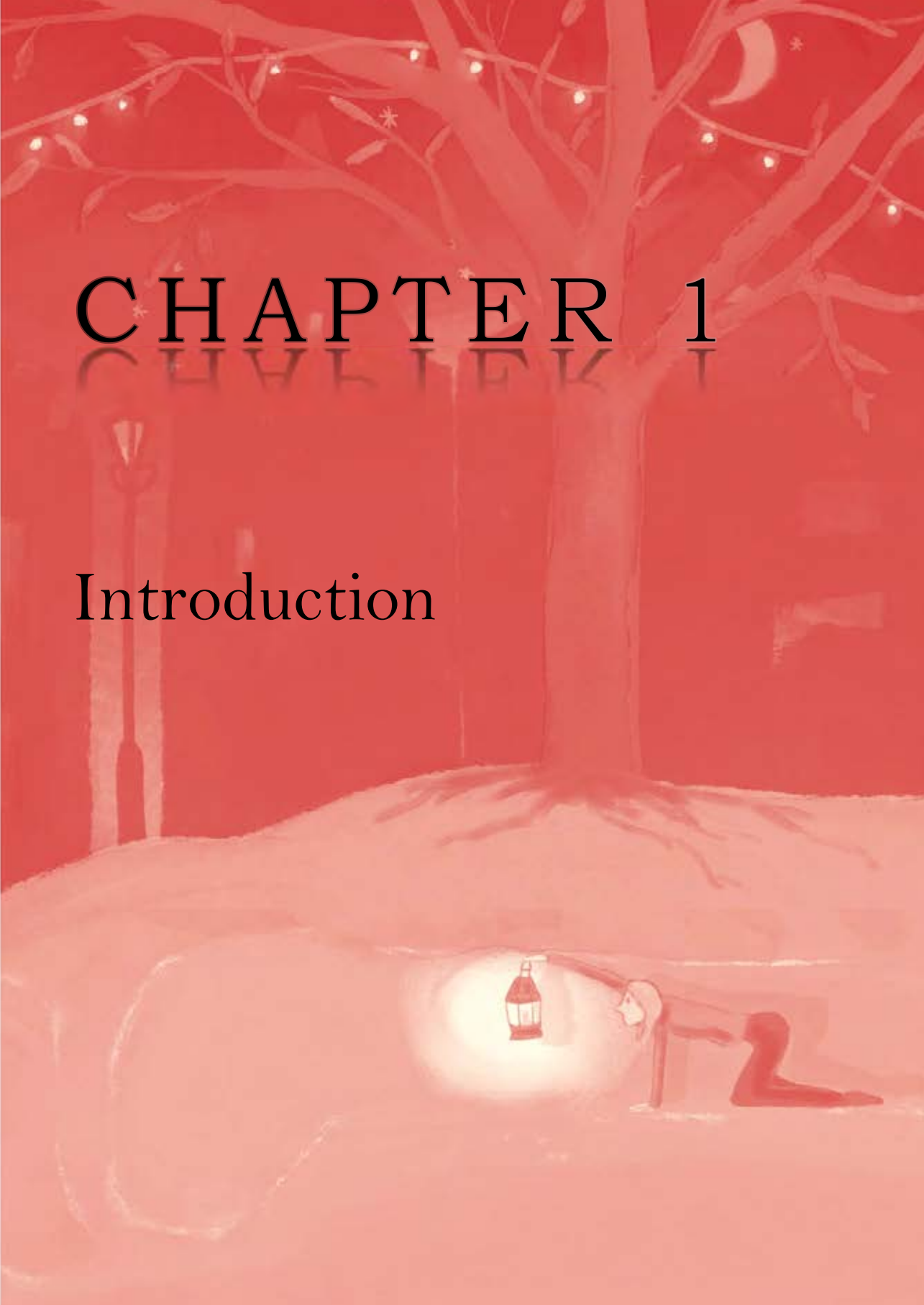
Author: Oudenaarde, K. van

Title: MR imaging of the knee in primary care

Issue Date: 2018-11-22

CHAPTER 1

Introduction



Introduction

General practitioners (GPs) in the Netherlands play an important role in the primary assessment of patients suffering from knee complaints due to a trauma. The GP is often the first to be consulted by a patient with a newly occurring knee complaint. The main task is then to determine the severity of a patient's knee complaint and to determine if a conservative treatment by the GP or a referral to secondary care is needed. GPs have a number of options available to accomplish this task, supported by the clinical guideline 'traumatic knee problems' provided by the Dutch College of General Practitioners.¹ The consultation will start with a medical history in which details of the trauma, current knee complaints and earlier knee complaints are discussed. Then a physical examination is performed, which is often difficult in freshly injured knees. Patients are in pain and may present with a swollen and stiff joint making it hard to assess true function and knee stability. In addition to this, diagnostic imaging can be performed using conventional knee imaging to rule out a fracture or magnetic resonance (MR) imaging to assess bone as well as soft tissue injuries of the knee.

MR imaging enables a detailed view on knee joint structures. Injuries affecting menisci, ligaments, cartilage and bones, can be assessed in a non-invasive manner without the use of ionizing radiation. The wider availability of MR scanners, the improved MR techniques with the increased diagnostic accuracy made the diagnostic arthroscopy of the knee obsolete.² Several studies hypothesised the added value of MR imaging used in primary care.³⁻⁷ Negative MR findings could reassure patients and prevent unnecessary referrals to secondary care. Positive MR findings could enable a more dedicated treatment at an earlier stage, in which patients could return earlier to sports or to work. However, high quality studies supporting these hypotheses lack, and therefore the Dutch GPs' clinical guideline on traumatic knee complaints advised not to request an MR scan in these patients.¹

On the other hand, literature shows that MR imaging might also be of added value in patients suspected for early knee osteoarthritis, since MR imaging is able to detect subtle changes to bone and cartilage where radiographs fail to detect these early changes.⁸ Radiographs have a poor correlation with knee function and pain.⁹ However, in patients suspected for osteoarthritis, the Kellgren and Lawrence score¹⁰ assessed on the radiograph

is still used to diagnose osteoarthritis and is often the main outcome measure in disease modifying osteoarthritis drug trials.^{11,12}

The purpose of this thesis is to determine the added value of MR imaging in primary care for patients presenting with knee complaints. To this end, we conducted a randomised controlled trial including patients with knee complaints after a recent trauma, aged 18-45 year. Several substudies were performed to determine the associations of MR findings with clinical outcome measures, and their predictive values. Furthermore, a study was performed to assess the added value of MR imaging in early knee osteoarthritis.

Outline of this thesis

The majority of the studies in this thesis are derived from the TraumaAtic Complaints of the Knee – LUMC and Erasmus MC (TACKLE) trial, a randomised controlled trial including patients aged 18-45 years with a recent knee trauma. The aim of this trial was to assess the non-inferiority and the cost-effectiveness of MR imaging in primary care, compared to usual care. This thesis also covers a study with the added value of MR imaging in early knee osteoarthritis. In this study, patients from the Cohort Hip and Cohort Knee (CHECK) study were included, with knee complaints suspected to develop knee osteoarthritis. Furthermore, baseline data of the TACKLE trial was used to correlate MR findings with self-reported knee specific scores, to create a prediction model for a negative MR scan in primary care and to determine the added value of MRI imaging in the prediction of return to sports.

In chapter 2 the research protocol of the TACKLE trial is presented. Chapter 3 covers the baseline MR findings in the TACKLE trial cohort, and the associations with patients/trauma characteristics and clinical scores. In chapter 4 a clinical prediction rule is composed for the selection of patients with neative MR findings to support a conservative treatment in primary care. In chapter 5 the predictors for return to sports are presented, and the added value of MR imaging for the prediction of (the number of weeks to) return to sports was determined. Chapter 6 covers the main article of this thesis with the cost-effectiveness analysis of MR imaging in primary care for patients with traumatic knee complaints. In chapter 7 the non-inferiority analyses of MR imaging over usual care are presented. In

chapter 8 the MR findings in a group of patients aged 45-65 years suspected for early knee osteoarthritis are correlated with the development of radiographic knee osteoarthritis after 5 year, for which a prediction model was constructed. Finally, in chapter 9 the main results and implications of this thesis are discussed.

References

1. Belo JN, Berg HF, Klein Ikink AJ, Wildervanck-Dekker CMJ, Smorenburg HAAJ, Draijer LW. Clinical guideline 'traumatic knee complaints' from the Dutch College of General Practitioners (in Dutch). *Huisarts en Wetenschap*. 2010;54:147-158.
2. Tuite MJ, Daffner RH, Weissman BN, et al. ACR Appropriateness Criteria® Acute Trauma to the Knee. *J Am Coll Radiol*. 2012;9(2):96-103.
3. DAMASK (Direct Access to Magnetic Resonance Imaging: Assessment for Suspect Knees) Trial Team. Cost-effectiveness of magnetic resonance imaging of the knee for patients presenting in primary care. *Br J Gen Pract*. 2008;58(556):e10-e16.
4. Berg HF, Vermeulen M, Algra PR, Boonman-de Winter LJM. Direct access to magnetic resonance imaging improved orthopaedic knee referrals in the Netherlands. *Fam Pract*. 2016;33(5):482-487.
5. Aphthorp LA, Daly CA, Morrison ID, Field S. Direct access MRI for general practitioners — Influence on patient management. *Clin Radiol*. 1998;53(1):58-60.
6. Hughes CM, Kramer E, Colamonic J, Duszak R. Perspectives on the Value of Advanced Medical Imaging: A National Survey of Primary Care Physicians. *J Am Coll Radiol*. 2015;12(5):458-462.
7. Watura R, Lloyd DC, Chawda S. Magnetic resonance imaging of the knee: direct access for general practitioners. *BMJ*. 1995;311(7020):575-576.
8. Sharma L, Chmiel JS, Almagor O, et al. Significance of Pre-Radiographic MRI Lesions in Persons at Higher Risk for Knee Osteoarthritis. *Arthritis Rheum*. 2014;66(7):1-23.
9. Kraus VB, Burnett B, Coindreau J, et al. Application of biomarkers in the development of drugs intended for the treatment of osteoarthritis. *Osteoarthr Cartil*. 2011;19(5):515-542.
10. Kellgren J, Lawrence J. Radiological assessment of osteo-arthritis. *Ann Rheum Dis*. 1957;16(4):494-502.
11. Kraus VB, Nevitt M, Sandell LJ. Summary of the OA biomarkers workshop 2009 – biochemical biomarkers: biology, validation, and clinical studies. *Osteoarthr Cartil*. 2010;18(6):742-745.
12. Roemer FW, Eckstein F, Hayashi D, Guermazi A. The role of imaging in osteoarthritis. *Best Pract Res Clin Rheumatol*. 2014;28(1):31-60.

