

# Diagnostics at the point-of-care in general practice

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## **Valorisation**



## VALORISATION

Valorisation is the process of creating value out of knowledge. In the General Discussion we paid attention to various possible societal and economic implications of the research we performed. For specific implications of the different studies in this thesis we refer to the individual chapters. In this chapter we will shortly summarize the implications of the main findings.

### Relevance, target groups and implementation

In the past few decades, more point-of-care tests (POCTs) have become available that might aid physicians in clinical decision-making. We assessed the access of GPs to diagnostics at GP out-of-hours services. It is advised by the profession that GPs should have sufficient access to diagnostics not only during routine day care, but also during out-of-hours care.<sup>1</sup> In chapter 2 we showed that, in 2014, GPs in the Netherlands had limited and varying access to diagnostics during GP out-of-hours care. Therefore, GPs were unable to adhere to all Dutch GP guidelines during out-of-hours care. These findings may guide changes in policy-making with regard to the availability of diagnostics at GP out-of-hours services.

In chapter 3 we illustrate that GPs currently use a limited number of POCTs, but wish to have more POCTs available for acute cardiopulmonary conditions. This is understandable as patients with these symptoms are fairly common in general practice, nonetheless accurately diagnosing these patients is often considered challenging (chapter 5).<sup>2-4</sup> Chest pain alone accounts for about 0.7% to 2.7% of all general practice consultations, with annually over one million doctor-patient contacts in primary care in the Netherlands.<sup>5-9</sup> Acute cardiopulmonary symptoms can be caused by either serious or minor conditions, with the latter constituting the majority of patients.<sup>5, 7, 8</sup> However, missing a possibly life-threatening condition, such as a pulmonary embolism (PE) or acute coronary syndrome (ACS), could have serious consequences. Distinguishing the potentially serious and life-threatening causes from minor conditions is a challenge, due to

overlapping signs and symptoms and often non-specific, atypical or even vague symptoms.<sup>4, 10, 11</sup>

In chapter 5 we explored GPs' experiences with and views on the diagnosis and management of patients with acute cardiopulmonary symptoms at GP out-of-hours services. The results of this study provide insights into the cardiopulmonary decision-making process, which may aid the development of strategies to reduce the number of referrals and could aid in improving mutual understanding between primary and secondary care physicians. Besides the value of these results to guide policy-making and maintaining professional relations, these acquired insights may refine GP vocational training, as these results may be used to illustrate the experiences of experienced GPs.

Currently, GPs have a low threshold for referring patients suspected of ACS or PE to secondary care, which seems to be an effective strategy for GPs to avoid missed cases. However, the downside of this approach is that a significant number of patients are referred to secondary care, which leads to e.g. strain on resources in secondary care, anxiety in patients and high health care costs.<sup>5, 12-16</sup> The annual societal cost of non-cardiac chest pain patients is about €10 000 and the cost of the index admission to the hospital is estimated around €2 000.<sup>15</sup> Thus, reducing the number of referrals is of interest to the patient, health care providers, society and economy.

In order to safely reduce referrals, we focussed on test strategies to safely rule out a serious cardiopulmonary condition, such as the use of POCTs and a clinical decision rule in the decision-making process. However, in chapter 6, we show that there currently is limited and inconclusive evidence that GPs' use of POCTs in primary care patients with acute cardiopulmonary symptoms leads to more accurate diagnoses and affects clinical management. In chapter 9 we also investigated a potentially promising clinical decision rule, the Marburg Heart Score (MHS), and a few other potential predictors of ACS. Nevertheless, we could not validate the MHS in a referred primary care population, nor were we able to construct a more accurate clinical decision rule from the investigated possible predictors of ACS.

In the systematic review of chapter 6, one large prospective study on GPs' use of a D-dimer POCT included in the review showed promising results, especially when the POCT was combined with a clinical decision rule. However, before considering wide scale implementation of a D-dimer POCT, it is useful to investigate the current (urgent) referral pathways of venous thromboembolism (VTE) and analyse the role of laboratory D-dimer testing in patients referred with suspected VTE. We showed that GPs currently have a high detection rate for VTE in patients who they urgently refer based on clinical assessment only. We argue that a closer proximity to a D-dimer POCT may lead to testing without explicitly using the D-dimer test in combination with a clinical decision rule, possibly leading to an increased use of the test, resulting in an increase in referrals. Moreover, GPs would only infrequently use a D-dimer POCT in daily practice, which raises questions with regard to training and costs.

In summary, the results of this thesis show that we currently cannot advise a specific adapted strategy in primary care patients with acute cardiopulmonary symptoms that would safely reduce the number of referrals to secondary care. We advise future research to focus on a strategy combining a clinical decision rule and a POCT or a clinical decision rule incorporating a POCT in diagnosing patients with acute cardiopulmonary symptoms. Nevertheless, the use of POCTs in patients with these symptoms may reassure patients and physicians (see General Discussion).

### **Products and innovativeness**

Although this thesis did not lead to any physical products, we did produce an intellectual product. Close collaboration with secondary care providers, medical laboratories and diagnostic test manufacturers is necessary for professional POCT use. As differences in the definition of a POCT in general practice may lead to misconceptions and confusion, we decided to perform a modified e-Delphi procedure among expert panel members from different professional backgrounds. The aim was to reach consensus on an internationally and multidisciplinary supported definition of a POCT in general practice. The results

of this study are shown in chapter 4. The described definition of a POCT can inform GPs, laboratory specialists, policymakers, researchers and manufactures on the most widely supported international definition. It could act as a clear starting point for the organisation and execution of professional point-of-care testing worldwide.

Finally, diagnostic research in primary care has proven to be challenging, since it requires large scale prospective studies, which makes this kind of research time consuming and costly. Researchers often experience difficulties to include a sufficient number of patients, leading to extension of the study period, need to include more practices, or studies being terminated early while remaining underpowered.<sup>17-19</sup> Specifically the latter is a waste of research resources. Chapter 9 illustrates the use of a novel and innovative study design, the flash mob method, a method we used trying to overcome some of the barriers of patient recruitment. To the best of our knowledge, we performed the first nationwide flash mob study in general practice and we showed that this method is feasible in general practice. This design may be considered as a new research method, to investigate relatively simple clinically relevant research questions in general practice on a large scale in a relatively short time frame. Ideas about a yearly flash mob study in the week following the Dutch College of General Practitioners Annual Conference are already being discussed.

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