Cognitive impairment in older emergency department patients

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Chapter 1

Introduction

INTRODUCTION

General introduction

Older patients in the Emergency Department

With the ageing population increasing numbers of people aged 70-years and older are admitted at the Emergency Department (ED)[1]. The number of patients who visit the ED because of a fall has risen with approximately 2% per year[2] and the number of older patients who die because of a fall has increased with 60% in the last five years, with the majority of the victims being 80-years or older[3]. While the percentage of people aged 70-years and older in the Dutch population is 13%[4], they account for 24% of ED visits[5]. Because of the complexity of their medical and social problems, older patients remain longer admitted at the ED[6], attributing to the problem of ED crowding[7], which is in itself a risk factor for negative health outcomes[6, 8]. One of the main issues contributing to this problem is cognitive impairment of the older patient.

Cognitive impairment

Cognitive impairment is one of the most important issues in older ED patients, with a prevalence of approximately 20-40% in different health care systems[9, 10]. In the Emergency Department cognitive impairment *per se* is frequently missed[11]. Also, delirium is frequently missed, which may be caused by the existence of comorbid neuropsychiatric disorders, prominent pain, illness or hypoactive presentation[12, 13]. The clinical heterogeneity of the delirium syndrome and varying skills of assessors also contributes to the lack of identification of delirium in the ED. Cognitive impairment is known to be associated with adverse outcomes such as ED revisits, decline in quality of life and functional decline[14-16] from several studies in subsets of patients. Several screening instruments for use in the ED have been proposed, such as the 4AT and 6-Item Cognitive Impairment Test (6-CIT)[17], but none have been implemented on a wide scale. There are various systemic, neurological and psychiatric causes of cognitive impairment, such as dementia, delirium, brain hypoperfusion, stroke, and brain tumours. But irrespective of the cause, cognitive disorders have several important practical consequences, amongst others for history taking, treatment decisions and the explanation of treatment plans. It seems therefore important to determine the cognitive status of an ED patient as soon as possible to optimize the diagnostic and treatment processes, and the care during the ED stay. However so far, the association between cognitive impairment and adverse outcomes has not been extensively studied in large cohorts of unselected older ED patients.

Prediction of adverse outcome

Designing care models to provide optimal care for older patients has been an important research topic in the last decade, however, the perfect model has not been found yet due to the complexity of the issue. Comprehensive geriatric assessment and a multidisciplinary specialist care team approach is sometimes seen as the gold standard of care[18], but is not always feasible due to limited time, financial means and resources[19]. Several screening tools exist to assess the risk of adverse outcomes in older ED patients. The purpose of such tools is to identify older patients with the highest risk in order to implement protective measures for these patients specifically. However, available tools that use solely 'geriatric factors' like the Identification of Seniors at Risk (ISAR)[20], and Triage Risk Screening Tool (TRST)[21] are not accurate enough to discriminate high from low risk groups[22]. Also tests that exclusively look at cognitive impairment (i.e. the Mini Mental State Examination (MMSE[23])) cannot discriminate properly, complicating the development of cost-effective and well targeted interventions. Prediction models can behave differently in different patient populations, which requires attention during the derivation, validation and implementation of new screening instruments[24]. The range of the predictor values in a different population, the incidence of the predictors in the population, the face validity and the availability of better alternative models determines whether a model can be used in clinical practice. The purpose of the Acutely Presenting Older Patient (APOP) study was therefore to first identify easily collected parameters, with high prevalence and discriminatory properties, associated with adverse outcomes. After which we aimed to design a prediction model with a high positive predictive value as a first step towards improving care for older patients in the ED, taking into account cognitive impairment as a major determinant.

Aim of thesis

The primary aim of this thesis was to investigate whether cognitive impairment is associated with adverse outcomes in older patients acutely presenting to the ED. The second aim was to assess whether routinely collected parameters in addition to cognitive impairment can be used to screen for high risk of adverse outcome in older ED patients. The third aim was to investigate whether a proportion of older ED patients might have cognitive impairment due to impaired brain perfusion and oxygenation. These aims are a first step towards the design of screening instruments and implementation of interventions to improve the care for older patients in the ED.

Outline of thesis

This thesis is divided into two parts.

In the first part, the association between cognitive impairment and adverse outcomes in acutely presenting older patients is investigated in two different settings. In **chapter**

2 we studied whether acutely hospitalised older patients with impaired cognition, as measured using the 6-CIT, have a higher chance of 90-day functional decline and mortality, as well as prolonged hospital length of stay, admission to a nursing home and in-hospital mortality. **Chapter 3** studies whether impaired cognition is independently associated with 90-day and one year functional decline and mortality in older ED patients.

The second part of this thesis consists of five studies about the development of prediction models and screening instruments to identify patients with a high risk of adverse events.

In **chapter 4** we investigate whether routinely collected parameters at arrival of older patients in the ED can predict 90-day mortality. **Chapter 5** studies the prediction of hospital admission using routinely collected parameters at arrival to the ED and compares the predictive capabilities of these models between younger and older patients. In **chapter 6** we combine the knowledge drawn from previous chapters and study the refinement of the APOP-screener to identify patients with high risk of functional decline and mortality. In **chapter 7** delirium incidence in the ED is measured using two different delirium screeners. Finally, we explore future perspectives for research in cognitively impaired older patients. We hypothesize that a proportion of patients might have cognitive impairment due to impaired brain perfusion and oxygenation. Therefore, in **chapter 8** we investigate if vital signs, as a measure of acute hemodynamic changes, associate with cognitive impairment in older ED patients.

In **chapter 9** a general summary and discussion, with points for future research are provided.

Overview of used patient cohorts

Herstelzorg cohort

The Herstelzorg cohort is the result of a prospective multi-centre study 'Recovery Care Programme' (*Herstelzorgprogramma*)[25]. This was an observational study in which data were prospectively collected during three consecutive years in three secondary care facilities and one tertiary care hospital in the Netherlands which included acutely hospitalised patients aged 70-years and older. Cognition was assessed using the 6-CIT. Available endpoints were 90-day mortality, in-hospital mortality, admission to a nursing home and hospital length of stay.

APOP retrospective cohort

The Acutely Presenting Older Patient (APOP) retrospective cohort is a retrospective cohort, including all patients aged 18 years and older who visited the ED of the Leiden University Medical Center (LUMC) during the year 2012. Available parameters in this

cohort consisted of demographic data (age and sex), triage category, mode or arrival to the ED, type of medical specialist, whether laboratory tests were performed and vital signs. The endpoint of hospital admission was available in all patients. Mortality data was only available in patients aged 70-years and older.

APOP prospective cohort

The Acutely Presenting Older Patient (APOP) prospective cohort is an observational, multicentre study which took place in two secondary care and two tertiary care hospitals in the Netherlands. Patients were included between September 2014 and January 2017. Patients aged 70-years and older were included in this study. Within 1 hour of arrival to the ED a battery of tests was performed by trained medical students, among which were the 6-CIT score, CAM-ICU and Katz-ADL. Other available parameters were demographic characteristics, mode of arrival to the ED, triage category, vital signs, laboratory test results and geriatric characteristics. Endpoints were three months and one year functional decline and mortality.

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