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Age modifies the association between apathy and recurrent falling in Dutch ambulant older persons with a high fall risk
Recurrent falling in Dutch outpatients, does apathy play a role?

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ABSTRACT

Apathy, a common and disabling behavioural syndrome in older persons, has been associated with impaired physical performance and executive dysfunction. Both are fall risk factors and they share pathophysiological pathway. We cross-sectionally examined the association between apathy and recurrent falling (≥2 falls in the past 12 months) and number of falls in the past 12 months in 243 outpatients aged ≥65 years with ≥3 fall risk-factors visiting a fall-clinic after a fall. We calculated Odds Ratio's (ORs), Incidence Rate Ratio's (IRRs) and their 95% Confidential Intervals (CI95) using multivariable regression and negative binomial regression analyses. We adjusted for cognitive functioning, depression, the use of fall risk increasing drugs, visual impairment, urine incontinence, comorbidity, smoking, use of alcohol, body mass index (BMI), and the number of months between assessment of fall risk and of apathy. We assessed effect modification by age and gender.

In our study, apathy was independently associated with recurrent falling in patients aged 65–75 years: OR 2.8 (CI95 1.0–7.7). Overall, patients with apathy experienced 1.46 times as many falls in the past 12 months compared to patients without apathy (IRR 1.46 (CI95 1.0–2.1).

To conclude, in high fall-risk older outpatients, apathy was cross-sectionally associated with recurrent falling in patients aged 65–75 years and the number of falls. Apathy appeared to be especially relevant in relation to falling in this age group. Whether apathy predicts recurrent falling is yet to be determined.

1. Introduction

Accidental falls are a major health care concern in older individuals. Approximately one third of community-living persons aged 65 or above experience a fall each year (Gillespie et al., 2012), with approximately 50% falling at least two times annually (Tromp et al., 1998). Both fall rate and fall-related injury rates have been growing at a worrying rate in the last few decades. Fall-related hospital admissions in the Netherlands have increased by 63% from 2006 through 2015 (Draisma, 2016), resulting in straining hospital capacity and increasing health care expenditure. For older persons, falling often results in a cascade of negative outcomes, such as functional decline, institutionalization or even mortality (Tinetti & Speechley, 1989; Tinetti et al., 1988). Among fallers, recurrent fallers have been suggested to form a distinct group as compared to single fallers, with recurrent falling mostly defined as experiencing at least two falls per given time unit (Luukinen et al., 1995; Askari et al., 2013; Raffard et al., 2016). Since one fall may occur by chance, the repetition of the event suggests an increased vulnerability for falling. Several risk factors for (recurrent) falling have been identified over the years, including cognitive disorders (Askari et al.,

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2013), experiencing functional difficulties and impaired balance (Burton et al., 2018). In order to make fall preventive strategies as effective as possible, it is important to scrutinize new possible fall risk factors and its accompanying pathways leading to fall incidents. Apathy, which has been associated with several negative outcomes in various older populations, may be such a new and unexplored fall risk factor.

Apathy has widely been recognized as a disabling neuropsychiatric syndrome after its first description by Marin et al. in 1991 (Marin, 1991). Although there is no clear consensus, apathy is usually defined as a motivational disorder, affecting motor (initiative), cognitive (interest) and emotional aspects of behavior (Raffard et al., 2016; Marin, 1991; Onyike et al., 2007). Apathy precedes cognitive decline in persons with neurocognitive disorders (Lanctot et al., 2017; Pagonabarraga et al., 2015), but also in community-dwelling older persons without dementia (Clarke et al., 2010; van Dalen et al., 2018). In divergent study samples, apathy has mainly been associated with executive dysfunctioning (Lohner et al., 2017; Kawagoe et al., 2017; Douven et al., 2018). However, in persons with mild cognitive impairment (MCI), apathy also has been associated with worse performance on overall cognitive functioning, attention and imprinting (Vloeberghs et al., 2018). Despite the fact that there is increasing evidence that apathy and depression should be considered as separate entities, apathy is frequently misdiagnosed as depression due to an overlap of symptoms such as psychomotor retardation, anhedonia and diminished enthusiasm about usual interests (Onyike et al., 2007; Pagonabarraga et al., 2015). Apathy and depression are thought to have a (partly) different pathophysiology and thus perhaps require different treatment strategies (Yuen et al., 2015; Yuen et al., 2014; Groeneweg-Koolhoven et al., 2016; Mortby et al., 2012). With regard to physical functioning and joint occurrence of apathy and depression in older persons, it was suggested that supplementary treatment of apathy may have a positive impact on disability (Yuen et al., 2015). Furthermore, recently it was demonstrated that apathy predicted decline in physical functioning in older persons without dementia, independent of depression severity (Henstra et al., 2018).

Besides in depressed patients, the negative impact of apathy on physical functioning has also been demonstrated in persons with Parkinson's Disease (Pedersen et al., 2009) and cognitive impairment or dementia (van Reekum et al., 2005; Starkstein et al., 2001; van der Linde et al., 2016), but also in older persons without dementia or other psychiatric diseases (Ayers et al., 2017a).Next, an association between apathy, frontal white matter lesions and executive dysfunction has been determined in several previous studies (Hollocks et al., 2015), due to a disruption of fronto-striatal circuits (Taylor et al., 2013; Brodaty et al., 2005; Wen et al., 2016; Sigmundsson et al., 2001; Sener et al., 2015). Separately, both frontal white matter lesions and executive dysfunction have been associated with gait and balance impairment (Rapport et al., 1998; Zheng et al., 2011), as well as an increased risk of falling (Zheng et al., 2011; Muir et al., 2012; Blahak et al., 2009). Therefore, an association between apathy and falling appears likely. However, to our knowledge, this association has not yet been addressed in the literature before. If we are able to identify apathy as a risk-factor for falling, this may be a first step towards an identification of a new, potentially modifiable fall-risk factor.

This study aims to determine a potential association between apathy and recurrent falling. We hypothesize that apathy is associated with recurrent falling in a Dutch cohort of older individuals visiting a fall clinic, irrespective of cognitive functioning and depressive symptoms.

2. Methods

2.1. Study population and source of the data

For this cross-sectional study, from 01-01-2006 to 31-12-2015 data were extracted from an ongoing observational prospective cohort study involving Dutch patients aged 65 years and older visiting the outpatient fall-clinic at the Academic Medical Centre (AMC) in Amsterdam (Scheffer et al., 2013). The medical ethics committee of the Academic Medical Center (Amsterdam) approved this study and waived the necessity for informed consent because of the observational design. All patients gave informed consent for use of the data for research purposes.

Data were gathered using the Combined Amsterdam and Rotterdam Evaluation of Falls (CAREFALL) Triage Instrument (CTI). This is a validated self-reported questionnaire which assesses modifiable risk-factors for recurrent falls in elderly Accident & Emergency room (A&E) patients (Scheffer et al., 2013; Boele van Hensbroek et al., 2009). Data on the number of falls in the past 12 months are collected via the CTI. All patients aged 65 years and older presenting with a fall at the A&E at the AMC received a CTI questionnaire within one week after the visit. After 2 weeks, non-responders received a reminder call. Patients with an increased risk of falling, defined by the presence of 3 or more risk factors identified by the CTI, were contacted and invited to attend the fall prevention clinic (FPC). Patients with 1–2 fall risk-factors were invited to the CAREFALL-A clinic, which covers a more basic outpatient service than the fall prevention clinic. Additional information on patient characteristics and possible contributing factors to falling was gathered and specified during the visit to the fall clinic. Patients who visited the fall-clinic > 6 months after filling in the CTI-questionnaire were excluded from the study, as were patients with missing data on symptoms of depression and apathy (patients without information on 15-item Geriatric Depression Scale (GDS-15) and patients with > 1 item missing on the GDS-apathy-3 (GDS3-A), a subscale of the GDS-15).

2.2. Apathy

For the assessment of apathy, the GDS3-A was used, comprising three questions of the GDS-15 (answer yes/no) ((1) Have you dropped many of your activities and interests?; (2) Do you prefer to stay at home, rather than going out and doing new things?; and (3) Do you feel full of energy?). The GDS3-A indicates that apathy is present with ≥2 positive answers and apathy is absent with ≤1 positive answer. The scale has been validated in previous studies in community dwelling older persons (van der Mast et al., 2008; Ligthart et al., 2012).

2.3. Primary and secondary outcome measures

Recurrent falling registered through use of the CTI was the primary outcome, defined as ≥2 fall incidents the past 12 months. This is in alignment with previous literature where recurrent falling is frequently defined as ≥2 falls per 6–12 months (Luukinen et al., 1995; Askari et al., 2013; Masud & Morris, 2001). ≥3 falls in 12 months has been mentioned in previous studies as alternative definition of recurrent falling (Rapport et al., 1998). Therefore, as secondary outcomes ≥3 fall incidents and number of falls during the past 12 months were assessed.

2.4. Co-variables

Various variables were examined as co-variables: age, gender, cognitive functioning, depression, the use of Fall Risk Increasing Drugs, visual impairment, urine incontinence, comorbidity, smoking, use of alcohol, body mass index (BMI), balance, physical activity and the number of months between completing the CTI and GDS. Cognitive functioning was assessed with the Mini Mental State Examination. Depression was assessed with the Geriatric Depression Scale-12 (GDS-12D), a subscale of the GDS-15, excluding the three items of apathy (van der Mast et al., 2008). A predefined list of known Fall Risk Increasing Drugs (FRIDs) as described in previous studies was used (van der Velde et al., 2007). Urine incontinence and visual impairment were based on self-report (yes/no). Comorbidity was measured with the Charlson Comorbidity Index, a validated method of classifying