Proactive care programs in the emergency department: effectiveness and feasibility

Loon, M. van

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Effectiveness and feasibility

Merel van Loon

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The studies described in this thesis were performed at the Emergency Departments of Haaglanden Medical Center, The Hague, The Netherlands.

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CHAPTER 1

| General introduction

The Emergency Department (ED) is a unique place, visited by a broad variety of people of all ages when they experience an acute health problem. In the ED, acute health problems may be due to an acute illness or accident in otherwise healthy individuals, but can also be caused by a known condition or an accumulation of multiple health problems. Patients visiting the ED may be referred by their general practitioner or a medical specialist, brought in by an ambulance, or patients visit the ED on their own initiative. However, most visits are typically unscheduled. In the ED, treatments are often initiated to first stabilize the patient's health situation, and diagnostic procedures are primarily aimed at finding the cause of the disease. Treatment in the ED is usually reactive care, as it is provided in response to an acute health problem, and usually not aimed at treating a disease over the longer term.

An ED visit may have a large impact on patients as their situation is often acute and severe. Under these circumstances, patients are generally receptive to help and education. Moreover, if the ED visit is a result of the consequences of their behavior, patients may be more open to seeing the connection with the medical consequences.[1-3] Therefore, the ED is potentially an excellent setting for the detection of hazardous behavior, such as excessive alcohol consumption, or other health problems, e.g., repeated falls in older adults. In addition, the ED can also be a suitable setting for patient education and starting support.[4]

Proactive care programs for specific patient groups in the ED

In several countries, many EDs offer proactive care programs. In contrast to reactive care, where action is taken if the patient presents with a health problem, the aim of proactive care programs is to actively identify patients at risk and to subsequently offer these patients additional care to improve their situation.

Within existing care, proactive care programs generally target specific patient groups, with each program serving a specific goal, such as reducing unplanned ED return visits or referral to specialist treatment after ED discharge. Proactive care programs usually include a screening tool to detect target patient groups. Subsequently, these patients are offered one or more interventions, which can be performed by trained ED staff, by specialized professionals in the ED, or by other professionals at a later stage in the outpatient setting. International examples of proactive care programs in the ED are pharmacist-led discharge medication counselling to improve patient satisfaction and length of ED stay, and to reduce ED-representations;[5] suicide risk screening and brief interventions to reduce suicidal behavior;[6] and a fall prevention program for older ED patients presenting with a fall.[7]

Until recently, proactive care programs were uncommon in Dutch EDs. One important reason for this is the good accessibility of primary care in The Netherlands. Patients usually have a long-term relationship with their general practitioner, who takes

preventive measures when indicated and ensures regular follow-up. However, people who suffer from an underlying psychiatric or cognitive problem often avoid the health care system and do not present to their general practitioner.[8-10] For these patients, an ED visit provides a "window of opportunity" to signal these problems, provide education, and start support. Therefore, an increasing number of Dutch EDs have started proactive care programs in the last decade. Other reasons for starting proactive care programs are the changes in the Dutch healthcare system and in the characteristics of patients visiting the ED.

Changes in the Dutch healthcare system and in the organization of Dutch EDs

Less and larger EDs

In the last decade, the Dutch ED-landscape has changed. The number of EDs was reduced gradually from 105 in 2010 to 83 in 2020 because of hospital mergers or closures.[11-13] The aim of concentrating emergency care in a smaller number of EDs was to reduce costs and increase the quality of ED care.[11] The remaining EDs increased in scale, receiving more patients and operating with more ED staff. Unfortunately, the reduction in the number of EDs did not reduce the total number of ED visits, nor did it reduce the pressure on the acute care system.[11] A particularly growing problem concerns crowding in the ED, meaning that the remaining EDs have become excessively busy.[14,15] Crowding is associated with negative consequences, including delayed patient care and poorer outcomes for patients.[16-18]

Increased professionalization of ED staff

Until a few decades ago, EDs were staffed by one or more non-specialized nurses and house staff resident physicians.[19] From 1992 onwards, EDs gradually became increasingly staffed by trained ED nurses. However, the treating physicians in the ED remained junior doctors on rotation with little clinical experience and without formal training in emergency medicine. In 2000, four teaching hospitals started the first emergency medicine training program in The Netherlands.[20-23] Since 2008 a uniform, nationwide, emergency medicine medical training program has been in place. In 2017, 85% of the Dutch EDs were staffed with trained and registered emergency physicians (EPs).[20,23] This permanent, well-educated staff ensures continuity of the work processes in the ED.

Increase of quality standards in the ED

An increasing number of guidelines and quality standards set by health care authorities and professional medical associations, such as the Health and Youth Care Inspectorate and the Royal Dutch Medical Association, emphasize early awareness of specific diseases and health problems in the acute care setting. Examples of mandatory checklists in the ED are screening instruments to detect child

maltreatment,[24,25] and delirium in older adults needing hospitalization.[26] In addition to checklists, guidelines from professional medical associations have been published on how to detect or rule out specific diseases in the acute setting. Many of these guidelines advise complex but often time-consuming diagnostic investigations, like CT-and MRI-scans.[27]

Changes in characteristics of patients visiting Dutch EDs

More seriously ill patients

Until the 1990s, between 40% and 80% of all patients presented to the ED on their own initiative (self-referrals).[22] They were mostly young men with minor traumas, of whom only 4% needed hospital admission. From 2000 onwards, acute care provided by general practitioners has become organized nationally in joint ventures, the so-called General Practitioners Cooperatives (GPCs). Cooperation between GPCs and EDs has increased over the last ten years. Self-referrals were more often redirected to the GPCs instead of directly treated in the EDs.[22,28] At the same time, patients in the ED were more often referred by the general practitioner or the associated GPC, or came by ambulance. The number of hospital admissions from the ED increased and was 32% in 2019.[13] These findings suggest that patients currently visit the ED with more serious medical problems.[11,29,30]

More older patients

In the Netherlands, the proportion of patients aged 65 years and older in the ED increased from 29% in 2013 to 33% in 2016 and is still rising.[12,13,30] This increase is due to demographic changes and the increasing number of older adults with one or more chronic diseases.[31-33] In addition, the in 2015 implemented stay-at-home policy of the Dutch government has led to increased utilization of the ED by older adults.[12,34-37] This policy supports older patients living at home longer[38] and has resulted in an increase in the number of frail older persons living in the community. At home, the health of older patients is less likely to be adequately monitored than in an assisted living environment, and therefore health deterioration may not be noticed and picked up until a later stage. As a result, a relatively minor medical problem can trigger a disbalance in the at home situation, making an ED visit necessary.

More patients with mental health problems and intoxications

Due to budget cuts, staff shortages, increased social and economic stressors and reduction of psychiatric beds, waiting lists for patients with mental health problems have grown.[39] This is reflected in the increasing number of patients with acute psychiatric problems presenting to the ED.[39]

There has also been a steady increase in patients presenting to the ED with alcohol or drugs intoxications in the last decade.[40,41] Although these patients represent a small proportion of the ED population in The Netherlands, they put a high burden of care on ED staff, and their often maladaptive behavior may result in countertransference phenomena and stigmatization.[42,43] In addition, these patients often present outside office hours when the ED has fewer staff.

In conclusion, Dutch EDs have increased in capacity, and receive more patients with complex and serious medical problems, older adults and patients with mental health problems and intoxications. These patients require more diagnostic investigations and more care and competence from ED staff. All of these changes contribute to ED crowding. The implementation of proactive care programs may improve the quality of care for target patient groups, facilitate patient flow, reduce hospital returns by initiation of follow-up care and may therefore contribute to a reduction of ED crowding. The development of proactive care programs is stimulated by the government by introducing mandatory checklists for specific patient groups and by establishing quality indicators. The permanent staff in the ED can facilitate the implementation of proactive care programs.

AIM OF THESIS

The overall aim of this thesis is to contribute to optimization of ED care by evaluating the effectiveness and the feasibility of two pro-active care programs in the ED.

Proactive care programs in the EDs of Haaglanden Medical Center

In this thesis two proactive care programs that were implemented in the ED of the Haaglanden Medical Center (HMC) are evaluated.

HMC is located in The Hague, a seaside city in The Netherlands, with more than 500,000 inhabitants. HMC delivers care at three locations: Antoniushove, Bronovo and Westeinde. Acute care was gradually centralized from three EDs in 2017 into one in 2019. The remaining 34-bed ED is located at the Westeinde hospital in the city center. It serves as a regional level I trauma and acute neurovascular center, has an annual census of approximately 54,000 patients, and a 29% admission rate. The usual staffing includes emergency physicians (EPs), EP residents and residents of Cardiology, Neurology, Surgery and Internal Medicine 24 hours per day, seven days per week. The total nursing staff consists of approximately 80 nurses, being certified emergency nurses (CEN) (75%), nurse practitioners (5%) and registered nurses in training for CEN (20%).

The ED of HMC is located in an area where many individuals of lower socio-economic status live, and a substantial number of people have no permanent address. In addition, there is a considerable number of immigrants. In particular undocumented immigrants often have neither insurance nor a general practitioner. Therefore, they often remain undetected by health care providers.

Because of its unique position in a large inner-city hospital, the ED of HMC has frequently been a pilot department for proactive care programs during the last decade. Most programs were designed by members of the ED staff themselves, often adopted from programs in foreign EDs, and started from a need to provide better quality of care for a specific patient group. Examples are a program for detection of child maltreatment, based on parental characteristics,[44,45] and a follow-up program for patients visiting the ED after a suicide attempt.[46] The programs were initially not set up as scientific programs (e.g., clinical trials or case-control studies). For some of these programs, (temporary) external financial funding for implementation was obtained. The procedures of the programs were all conducted by the ED staff and incorporated into daily practice, making them low-threshold, easy to apply and 24/7 available.

Outline of this thesis

Part one focuses on the effectiveness and feasibility of a screening and intervention program for hazardous alcohol use in a Dutch inner-city ED. In **chapter 2**, we examine whether screening and intervention for hazardous alcohol use in ED patients results in a reduction of alcohol consumption in the three months after the ED visit. Moreover, we explore which factors are associated with hazardous alcohol use in ED patients. In **chapter 3**, we investigate whether patient-and staff-related factors are associated with screening failures and explore whether patients with risk factors for hazardous alcohol use are reached with screening. This study provides insight into the feasibility of the screening program in the ED.

Part two focuses on the effectiveness and feasibility of telephone follow-up for community-dwelling older adults after ED discharge on health-related outcomes. In **chapter 4**, we present a systematic review on studies examining the effect of telephone follow-up for older patients, discharged home from the ED on health-related outcomes. In **chapter 5** we present a pragmatic randomized controlled trial, examining the effect of telephone follow-up after ED discharge for older adults on unplanned hospital returns. In this study, we also explore the effect of the intervention in several subgroups of patients. The pragmatic study design enables us to evaluate the feasibility of this intervention in the ED. In **chapter 6,** we analyze patient- and ED visit characteristics and reasons for unplanned ED return visits of older adults, in order to investigate whether proactive care programs for older adults are sufficiently attuned to the reasons why they return to the ED. In **chapter 7**, the main

findings of the studies are summarized, and elaboration of their impact is provided. Following the general aim of this thesis, future perspectives are discussed, including recommendations for clinical practice and future programs, not only focused on the ED setting, but also on healthcare in general.

The final two chapters include a summary of the findings of this thesis, in English in **chapter 8** and in Dutch in **chapter 9**.

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CHAPTER 2

Evaluation of screening and brief intervention for hazardous alcohol use integrated into clinical practice in an inner-city emergency department

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Eur J Emerg Med. 2017;24(3):224-229 ■

ABSTRACT

Introduction

In small studies, Screening, Brief Intervention and Referral to Treatment (SBIRT) in Emergency Departments (EDs) is effective in reducing hazardous alcohol use.

Objective

To examine the effectiveness of SBIRT in an inner-city ED in routine clinical practice.

Methods

Of the 41,900 consecutive ED patients aged 18 years and older, 22,537 (53.8%) were screened using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). Patients with positive AUDIT-C scores (men ≥5 and women ≥4) received educational leaflets. Brief interventions were performed by ED personnel trained in motivational interviewing. At three months, patients were contacted by telephone and recent drinking pattern was assessed.

Results

Out of 22,537 patients, 2209 (9.8%) had an elevated AUDIT-C score. Male sex, alcohol-related reason for ED visit, alcohol or other intoxication at ED visit, head injury, stomach or intestinal bleeding and wounds were significant predictors of hazardous alcohol use in both univariate (all $p<0.001$) and multivariate analysis. Out of 2209 AUDIT-C positive patients, 894 (40.5%) received an intervention: of these 894 patients, 70% received educational material only and 30% received both motivational intervention and educational material. In the subset of patients available for follow up, 34.9% either reduced or stopped alcohol use.

Conclusion

Our study shows that in a large inner-city ED, SBIRT can be implemented in daily care. Screening uncovered large numbers of patients with hazardous alcohol use and identified several risk factors. Moreover, screening and intervention appeared to be effective in reducing alcohol intake.

INTRODUCTION

Hazardous alcohol use is becoming a growing target of attention as many diseases and injuries are either caused or worsened by alcohol. In the Emergency Department (ED) population alcohol-related problems are prevalent and cover a wide spectrum of misuse, ranging from at-risk drinking patterns to dependence. Alcohol use not only affects the individual drinker, but also has far-reaching implications for families, communities, workplaces and the health care system [1]. Literature suggests that, during an ED visit, patients may be more receptive to education and help, and more open to seeing the connection between their drinking patterns and their consequences [2,3]. Therefore, EDs are excellent settings for detection of alcohol abuse and implementation of brief interventions by ED staff [4]. Several studies have reported that a standardized Screening (using a questionnaire), Brief Intervention and Referral to Treatment (SBIRT) intervention, performed at an ED, can effectively minimize future alcohol consumption, reduce injury recurrence, and decrease the number of repeat ED visits [5-8].

Despite the magnitude of the problem and the evidence that brief interventions are effective, few EDs actually screen for alcohol-related problems, much less intervene once misuse is identified [9]. In the Dutch EDs, screening for alcohol-related problems has only been done incidentally in case of evident alcohol-related injuries.

Clinical trials on the efficacy of SBIRT in EDs usually carry some factors that might hinder implementation in daily practice: some studies only screen 'at-risk' patients, which requires a continuous alertness of ED personnel on the risk factors for hazardous alcohol use [5,10]. Moreover, alcohol-related complaints and symptoms can be nonspecific and difficult to recognize [11]. Therefore, this approach carries the risk of missing at-risk subjects.

In several studies external personnel, for example, 'health advocates' or addiction experts, were introduced to perform the screening or the intervention [5,7,10,12]. Other trials only screened during a certain time of the day (afternoon or evening) [7,12,13]. These approaches evidently carry the risk of bias and missing subjects at risk that might present at night. Furthermore, introducing procedures only during certain shifts undermines the approach of making it part of the daily routine.

Some trials performed extensive screening or very time-consuming interventions [7,10,12]. Although 15-20 minutes might not seem to be long in addiction and mental health settings, it is considered to be a long period of time in a busy ED.

The objective of this project was to investigate whether SBIRT could be implemented in the daily clinical practice of the ED, performed by the ED staff themselves, 24 hours a day, seven days a week and all year round. All adult ED patients were eligible for inclusion.

In this article we present the initial results of this project.

We present the demographic characteristics of the patients who were screened and the reasons why patients were not screened. We describe which patient characteristics were found to be associated with a risky drinking pattern. We show in how many cases an intervention was done. Finally, we evaluate the effect of screening and of brief intervention on hazardous alcohol use at three months follow up.

METHODS

This study is an evaluation of the SBIRT protocol in the period from November 2012 to November 2013.

Setting

In September 2010, the SBIRT approach was introduced at the ED of Medical Centre Haaglanden Westeinde (MCH Westeinde). The MCH Westeinde is an inner-city hospital in The Netherlands, with 50,000 ED visits annually. During implementation, all ED healthcare professionals (nurses, medical doctors, nurse practitioners) received a standardized training and were educated in techniques of motivational interviewing. SBIRT was adopted as a standard approach in the ED. A computerized instrument for screening was incorporated in the hospital electronic system. Referral options were coordinated within the project.

Study patients and procedures

According to the protocol, all patients aged 18 years and older who presented to the MCH Westeinde ED were screened for hazardous alcohol use. Screening took place during triage (a brief, focused assessment after entering the ED, in which the urgency of the complaints is established) and was performed 24 hours a day, seven days a week.

Screening was performed using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). The AUDIT-C is a shortened variant of the AUDIT and is validated for ED settings [12,14]. An AUDIT-C score of five and higher is a positive result in men and an AUDIT-C score of four or more indicates a positive result in women [14].

For patients who were not screened, the reasons for not screening were noted: (a) patient is not capable to answer, (b) healthcare professional forgot to ask, (c) patient refuses cooperation and (d) screening has been performed recently (during a former visit to the MCH Westeinde ED, less than 6 months ago).

Patients with a positive AUDIT-C score received a leaflet. These leaflets provided information on the consequences of hazardous alcohol use, as well as relevant

Internet addresses, and addresses and telephone numbers of the addiction prevention centre and the addiction treatment centre in the city.

In addition, patients with a positive AUDIT-C score received a motivational intervention (MI). A MI was performed by an ED health care professional and consisted of feedback on the screening result and information on alcohol-related harm, related to the patient's complaints if applicable. The patient also received information on what is considered low-risk alcohol consumption. The advantages and disadvantages of alcohol use that the patient experienced were discussed in an open, respectful conversation. Coping strategies and high-risk situations for drinking were analysed. Feedback, support and motivation were provided when the patient became aware of thoughts and feelings about the alcohol use. The aim was to help the patient develop a personal plan to reduce alcohol consumption. This interview took about 5-10 minutes.

To evaluate the effect of the SBIRT approach, all AUDIT-C positive patients were contacted by telephone three months after their ED visit. The AUDIT-C score was repeated and answers were based on their alcohol use during the last three months. There were no financial consequences for participation in follow up.

The ethical review committee of the MCH (METC Zuidwest Holland, nr. 11-079) granted institutional review board exemption.

Data collection

To identify patient and ED visit characteristics associated with hazardous drinking, the following data were extracted from the hospital's database for each adult registered patient: age, sex, chief complaint, triage level, alcohol-related or non-alcohol-related visit according to the triage nurse, living district, day and time of ED visit. Chief complaints were identified from the triage notes for each ED visit. Triage levels were assigned according to the five-level Manchester Triage System. Living districts were divided into disadvantaged and not-disadvantaged areas. Disadvantaged areas were defined as districts that have received additional government funding since 2007 to improve living conditions ("Actieplan Krachtwijken", Dutch Ministry of Housing, Spatial Planning and Environment, July 2007).

Statistical analyses

In describing the general characteristics of our study population, to prevent skewing of the mean because of outliers, we present the age as the median plus the range in ages. The difference in median age between patients with a positive AUDIT-C score and patients with a negative AUDIT-C score was analysed using the Mann-Whitney-U test.

Differences between patients with a positive AUDIT-C score and patients with a negative AUDIT-C score in age categories, sex, chief complaint, alcohol–related and not-alcohol-related visits, living district, weekend and week visits, and the time of the day were analysed using χ^2 tests and were presented as odds ratios (ORs). As multiple testing was performed in the univariate analysis, Bonferroni correction was performed on the significant predictors. After this correction, characteristics with *P*-values of $0.05/33 \leq 0.0015$ were considered to be significant predictors of hazardous alcohol use. In addition, all variables that were univariately associated with a positive AUDIT-C score were entered into a multivariate logistic regression model. The variables included in the model were sex, whether the ED visit was alcohol-related or not, visit at night, and the following chief complaints: alcohol or other intoxication, head injury, physical abuse, stomach or intestinal bleeding, trauma and wounds. Adjusted ORs [exp (B)] are provided with their 95% confidence intervals (CI). The calibration and overall discriminative capacity of the model was assessed with the Hosmer-Lemeshow test and the area under the receiver operating curve analysis.

Data were analysed using the statistical package for the social sciences (IBM SPSS Statistics for Windows, version 20.0, IBM Corp, Armonk, New York, USA).

RESULTS

Of the 41,900 consecutive ED patients aged 18 years and older who presented at the ED in the period from November 2012 to November 2013, 22,537 (53.8%) were screened for hazardous alcohol use. The median age of the adult ED patients was 42 years and 50.9% were men. The proportion of patients who refused to cooperate in answering the questions on their alcohol use was negligible (0.7%). In 21.8% of cases, ED staff forgot to ask about the alcohol use. In other instances, patients were either not capable of answering (6.9%) or they had been screened recently (16.7%) (Table 1).

Table 1. Alcohol screening performed in consecutive patients attending the Emergency Department between November 2012 and November 2013

Number of patients	41900
Age [median (range)] (years)	42 (18-104)
Male sex [n (%)]	21339 (50.9)
Alcohol screening performed [n (%)]	22537 (53.8)
Alcohol screening not performed [n (%)]	
Patient not able to answer	2911 (6.9)
Forgotten by healthcare professional	9152 (21.8)
Recent alcohol screening done	7012 (16.7)
Patient refuses to cooperate	288 (0.7)

Patients who were screened differed from patients who were not screened in terms of the percentage of men (48.6% in screened patients versus 53.6% in unscreened patients, *P*<0.0001), median age (41 years (range 18-99 years) in screened patients versus 43 years (range 18-104 years) in unscreened patients, *P*<0.001) and time of ED visit (9.6% at night in the screened group versus 10.9% at night in the unscreened group, *P*<0.001) (data not shown).

Elevated AUDIT-C scores were found in 2209 out of 22,537 ED patients screened (9.8%) (Table 2). In univariate analysis, several patient and ED visit characteristics were significantly associated with an elevated AUDIT-C score and some were associated with a low AUDIT-C score. As multiple testing was performed, Bonferroni correction was performed on the results of the univariate analysis (Table 2).

Table 2. Analysis of factors associated with hazardous alcohol use

	AUDIT-C positive (N=2209) [n (%)]	AUDIT-C negative (N=20328) [n (%)]	OR (95% CI)	*P*-value
Male sex	1436 (65.0)	9518 (46.8)	2.11 (1.9-2.3)	<0.001#
Age [median (range)] (years)^	41 (18-99)	41 (18-93)		0.091
Between 18-25	377 (17.1)	3556 (17.5)	0.97 (0.86-1.10)	0.62
Between 25-55	1260 (57.0)	10917 (53.7)	1.15 (1.05-1.25)	0.002
Older than 55	572 (25.9)	5855 (28.8)	0.86 (0.78-0.95)	0.004
Alcohol-related visit according to triage nurse				
Yes	357 (16.2)	208 (1.0)	18.7 (15.6-22.3)	<0.001#
No	1720 (77.9)	20012 (98.4)		
Possibly	132 (6.0)	108 (0.5)		
Living in a disadvantaged area*	740 (33.5)	10716 (52.7)	0.45 (0.41-0.50)	<0.001#
Chief complaint				
Abdominal pain, diarrhoea, vomiting	238 (10.8)	2990 (14.7)	0.70 (0.61-0.81)	<0.001#
Abnormal behaviour, psychiatric illness	11 (0.5)	62 (0.3)	1.63 (0.86-3.11)	0.2
Alcohol or other intoxication	74 (3.3)	93 (0.5)	7.54 (5.5-10.3)	<0.001#
Automutilation	1 (0.0)	12 (0.1)	0.77 (0.10-5.91)	0.8
Back pain	52 (2.4)	693 (3.4)	0.68 (0.51-0.91)	0.008
Burns, chemical injury	7 (0.3)	117 (0.6)	0.55 (0.26-1.8)	0.11
Collapse or near collapse	126 (5.7)	1360 (6.7)	0.84 (0.70-1.02)	0.08
Diabetes, haematological disease	6 (0.3)	80 (0.4)	0.69 (0.30-1.59)	0.38
Dyspnoea	94 (4.3)	1049 (5.2)	0.82 (0.66 - 1.01)	0.06
Ear, eye, nose, throat complaint	103 (4.7)	1150 (5.7)	0.82 (0.66 -1.00)	0.06
Head injury	77 (3.5)	275 (1.4)	2.6 (2.04-3.40)	<0.001#

Table 2. Continued.

	AUDIT-C positive (N=2209) [n (%)]	AUDIT-C negative (N=20328) [n (%)]	OR (95% CI)	*P*-value
Headache	75 (3.4)	896 (4.4)	0.70 (0.60-0.97)	0.03
Limb complaints	489 (22.1)	4118 (20.3)	1.20 (1.01-1.24)	0.04
Physical abuse	41 (1.9)	164 (0.8)	2.32 (1.65-3.3)	<0.001#
Pregnancy	2 (0.1)	267 (1.3)	0.07 (0.02-0.27)	<0.001#
Seizure	11 (0.5)	107 (0.5)	0.95 (0.51-1.76)	0.86
Skin rash or infection	109 (4.9)	943 (4.6)	1.07 (0.87-1.31)	0.53
Stomach or intestinal bleeding	32 (1.4)	141 (0.7)	2.10 (1.43-3.10)	<0.001#
Thoracic pain	238 (10.8)	2182 (10.7)	1.00 (0.87- 1.16)	0.95
Trauma	54 (2.4)	294 (1.4)	1.71 (1.27-2.29)	<0.001#
Urinary tract or testis complaint	34 (1.5)	435 (2.1)	0.71 (0.50-1.02)	0.06
Vaginal bleeding	3 (0.1)	273 (1.3)	0.01 (0.03-0.31)	<0.001#
Venereal disease	3 (0.1)	27 (0.1)	1.02 (0.31-3.37)	0.97
Wound	196 (8.9)	1160 (5.7)	1.61 (1.37-1.89)	<0.001#
Other	133 (6.0)	1440 (7.1)	0.84 (0.70-1.01)	0.06
Visit in weekend	1022 (46.3)	8824 (43.4)	1.10 (1.03- 1.23)	0.01
Time of visit				
Day	1403 (63.5)	12423 (61.1)	1.2 (1.0- 1.2)	0.03
Evening	527 (23.9)	6032 (29.7)	0.74 (0.67-0.82)	<0.001#
Night	279 (12.6)	1873 (9.2)	1.42 (1.25-1.63)	<0.001#

^ Mann-Whitney U-test

* Disadvantaged areas are defined as districts that have received additional government funding since 2007 to improve living conditions. In popular press they are called “Vogelaarwijken”: Laakkwartier, Binckhorst en Spoorwijk, Bouwlust/Vrederust, Moerwijk, Morgenstond, Stationsbuurt, Schilderswijk, Transvaal, Groente en Fruitmarkt.

Statistically significant after Bonferroni correction.

AUDIT-C, Alcohol Use Disorders Identification Test-Consumption; *n*, number; *OR*, odds ratios.

After multivariate analysis, male sex (*P*<0.001), alcohol-related ED visit according to the triage nurse (*P*<0.001), alcohol or other intoxication (*P*<0.001), head injury (*P*<0.001), stomach or intestinal bleeding (*P* 0.008) and wounds (*P*<0.001) were significant predictors of hazardous alcohol use (Table 3). The goodness of fit of the logistic model was strong (*P*<0.001), whereas the area under the curve of the receiver operating characteristic curve showed a moderate discriminative ability [0.67 (95% confidence interval 0.64-0.69)].

Of the 2209 AUDIT-C positive patients, 894 (40.5%) received an intervention: 70% was given a leaflet and 30% received both a motivational interview and a leaflet. The remaining 1315 (59.5%) patients with an elevated AUDIT-C score did not receive any intervention beyond screening (Figure 1).

Table 3. Multivariate model analysis of factors associated with a positive AUDIT-C score

	Exp(B)	95% CI	*P*
Male sex	1.80	1.64-1.99	<0.001
Alcohol-related visit according to triage nurse	6.41	5.62-7.32	<0.001
Chief complaint			
Alcohol or other intoxication	8.17	3.52-17.31	<0.001
Head injury	1.91	1.44-2.54	<0.001
Physical abuse	1.39	0.86-1.93	0.23
Stomach or intestinal bleeding	1.80	1.17-2.77	0.008
Trauma	1.25	0.90-1.74	0.18
Wound	1.31	1.13-1.50	<0.001
Visit at night	0.71	0.60-0.83	<0.001

Model characteristics: -2 log likelihood 13088; AUC of the ROC 0.67 (95% CI 0.64-0.69; *P*<0.001)
AUC, area under the curve; *AUDIT-C*, Alcohol Use Disorders Identification Test-Consumption; *CI*, confidence interval; *ROC*, receiver operating characteristic curve.

The proportion of patients with a positive AUDIT-C score reached for follow-up was 55.3%. Of these patients, 74% were able and willing to cooperate. These patients were more often women and were older (*P*<0.005) than patients who were not reached (data not shown).

Of patients available for follow-up, 34.9% had either reduced or stopped alcohol consumption three months after the ED visit (*P*< 0.005) and 34.3% no longer had a positive AUDIT-C score (*P*<0.005). Of the patients who did not receive any intervention beyond screening, 31.4% reduced or stopped alcohol intake. In all, 64.2% of patients who received a leaflet either reduced or stopped alcohol intake at the three-month follow-up (*P*<0.005) and 41.7% no longer had a positive AUDIT-C score (*P*<0.005). These proportions were even higher among patients who also received a MI (87.2%, respectively, 62.5%, *P*<0.005) (data not shown).

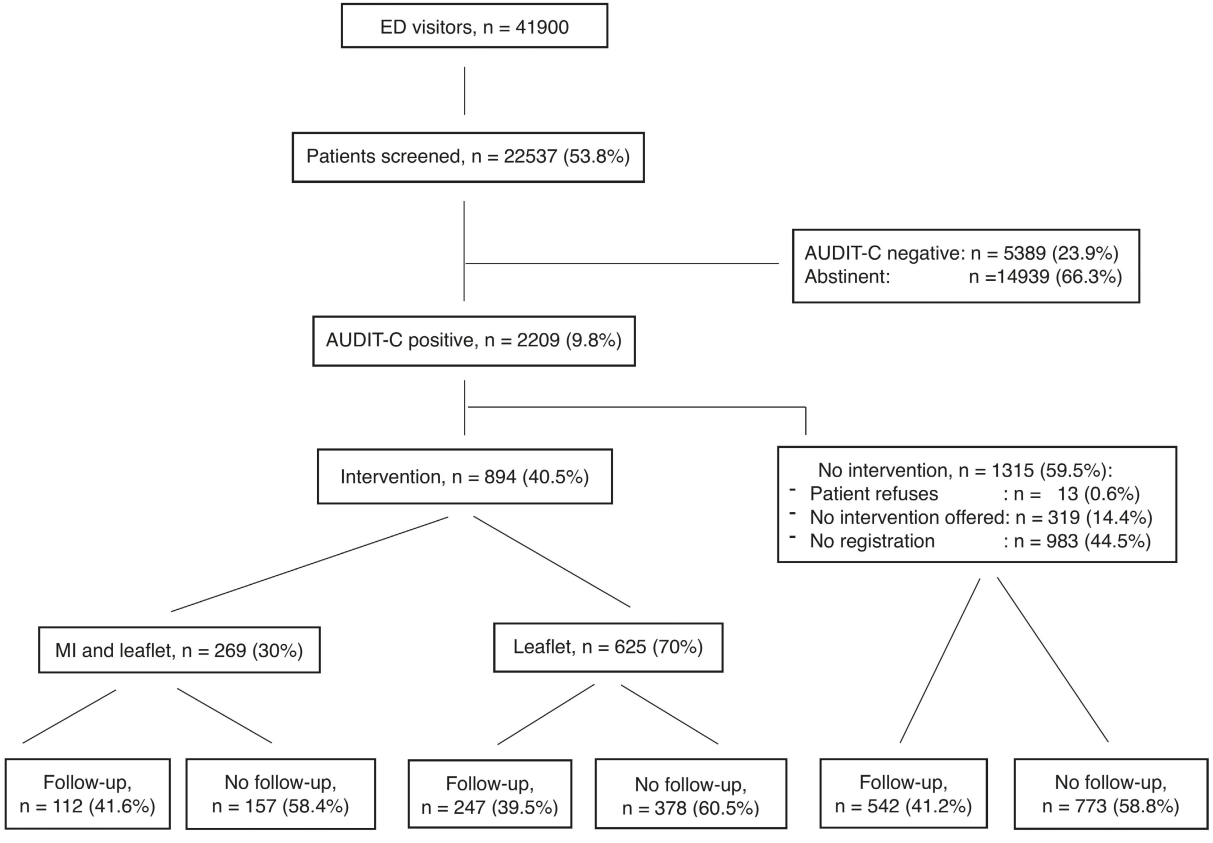

Figure 1. Flow chart showing screening, recruitment and follow-up rates of ED patients during the 1-year study period. *AUDIT-C*, Alcohol Use Disorders Identification Test-Consumption; *ED*, Emergency Department; *MI*, motivational intervention.

DISCUSSION

SBIRT in ED settings has been shown to be effective in several clinical trials. This study was designed to investigate the feasibility of incorporating SBIRT into the daily routine of the ED, to identify the proportion and characteristics of ED patients with hazardous alcohol use and to assess the effectiveness of SBIRT in this clinical setting.

The proportion of patients being screened was 53.8%, which is comparable to most clinical trials (especially those including all ED visitors) [6,10]. Refusal rate was strikingly low. This might be explained by the fact that the screening process was part of the triage procedure. In all, 9.8% of patients being screened were AUDIT-C positive, which is rather low compared to some clinical trials [5,7,10,12,13], but is in accordance with data from a study on alcohol use performed in three EDs in the Netherlands [15]. Screening of all patients visiting the ED, and not just patients at risk, might be an explanation for this.

We identified several risk factors for hazardous alcohol use (male sex, alcohol-related ED visit, alcohol or other intoxication, head injury, stomach or intestinal bleeding and wounds). These findings are in accordance with previous studies [1,3,5,15].

According to the literature, most intervention studies have been restricted to risk groups. However, it is apparent from our data that a substantial number of patients with hazardous alcohol use did not belong to any of these risk groups. Therefore, we are currently analysing our data, focusing on patients with a positive AUDIT-C score, to study whether the height of their score is related to specific risk factors, the intervention that was carried out and their response to intervention and follow-up. This is relevant to fully evaluate the need for screening all patients as we did in our practice.

The number of interventions that was performed was limited compared to previous studies [5,7,10,12,13], although it was higher than that in one of the few other studies in which the ED staff performed the entire process of SBIRT, as in our study [16].

The follow-up rate was rather low compared with other studies [5,6,10,13]. The absence of a financial reward for patients who participated at follow-up might be an explanation for this. Another explanation might be that the hospital is situated in a disadvantaged area, where the rate of migration may be high and individuals might not be reachable by telephone.

The overall proportion of patients either reducing or quitting alcohol use at follow-up was 34.9%. This number is considerable compared with most clinical trials [6,7,10,12,13]. However, in the light of the number of patients unavailable for follow-up, it is difficult to draw definite conclusions from this number, particularly because, as

we have described, there are demographic differences (age and sex) between patients reached for follow-up and patients not reached. Nevertheless, among patients who were reached for follow-up, just screening already resulted in reduced alcohol use in a notable number of patients. However, intervention, and particularly MI, resulted in a greater reduction in alcohol use. This may have occurred because of the fact that ED personnel performed the screening and intervention. The advantage of ED personnel performing the MI is that they can incorporate it into the process of the ED visit as well as relate the patient's complaints to their alcohol use. Consequently, the moment of awareness that is created by visiting the ED is well used.

Limitations

This study was a single-centre study and the follow-up duration was rather short. More research is needed involving multiple centres and longer follow-up times. Currently, SBIRT is performed at both locations of our hospital, situated in different parts of the city. We are planning to carry out future analysis on the results of these two locations.

We restricted our project to patients 18 years of age and older. As hazardous alcohol use is also prevalent in younger populations, we have started to include 16 and 17-year-old individuals in our current SBIRT protocol. This change was made after the completion of this study.

Although comparable to other studies, the proportion of patients screened, the number of patients who received an intervention and the number of patients reached by follow-up were rather low. We are currently analysing the entire process of the study, focusing on these three crucial stages of the SBIRT process. In our database, we are looking for patient factors that are positively or negatively associated with being screened, receiving an intervention and being reached for and cooperating with follow-up.

This study was not designed as a clinical trial. Therefore, the design was not randomised.

It is conceivable that MI was offered more often to patients with a good understanding of the Dutch or English language, who were not terminally ill and who were more open about their alcohol use and receptive to changing their habit.

Multiple testing was performed. We corrected for this by using rigid Bonferroni correction.

Strengths

In this study, we show that SBIRT can be adopted in daily clinical practice. All ED visitors ≥ 18 years were included, 24 hours a day, seven days a week, all year round. The screening and interventions were performed by ED personnel and were incorporated in the ED care process.

CONCLUSION

In this large study in the Netherlands, we show that SBIRT can be implemented as part of the daily routine in a large inner-city ED. We found that 9.8% of ED visitors had a positive AUDIT-C score. Screening and performing interventions, by offering educational material and by motivational interviewing, appeared to be effective in reducing alcohol intake and therefore in reducing an important health risk factor.

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CHAPTER 3

Routine alcohol screening in the emergency department: unscreened patients have an increased risk for hazardous alcohol use

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ABSTRACT

Background

Routine screening programs for hazardous alcohol use in the emergency department (ED) miss large numbers of patients. We investigated whether patient-related or staff-related factors cause screening failures and whether unscreened patients are at increased risk of hazardous alcohol use.

Methods

This is a secondary analysis of a prospective study. From November 2012 until November 2013, all adult patients visiting a Dutch inner-city ED were screened for hazardous alcohol consumption using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). Reasons for failure of screening were recorded and were categorised as: (a) patient is unable to cooperate (due to illness or pain, decreased consciousness or incomprehension due to intoxication, psychiatric, cognitive or neurological disorder or language barrier), (b) healthcare professional forgot to ask, (c) patient refuses cooperation and (d) screening was recently performed (<6 months ago). Presence of risk factors for hazardous alcohol use was compared between screened and unscreened patients.

Results

Of the 28,019 ED patients, 18,310 (65%) were screened and 9709 (35%) were not. In 7150 patients staff forgot to screen, whereas 2559 patients were not screened due to patient factors (2340 being unable and 219 unwilling). Patients with any of these risk factors were less likely to be screened: male sex, alcohol-related visit, any intoxication, head injury, any kind of wound and major trauma. In multivariate analysis, all these risk factors were independently associated with not being screened. Patients with at least one risk factor for hazardous alcohol use were less likely to be screened. Highest prevalence of risk factors was found in patients unable or unwilling to cooperate.

Conclusion

Patients who do not undergo routine screening for alcohol use at triage in the ED have an increased risk for hazardous alcohol use. These data highlight the importance of screening patients, especially those initially unwilling or unable to cooperate, at a later stage.

INTRODUCTION

Hazardous alcohol use is one of the most important risk factors for increased morbidity and premature mortality worldwide. Beyond health consequences, alcohol abuse causes significant social and economic losses for individuals and society.[1–3] Given the rate of injuries and health problems that are due to hazardous alcohol use, the emergency department (ED) is a common portal of entry into the healthcare system for many of these patients.

To reduce alcohol-attributable harm, a growing number of emergency health services have developed and implemented prevention and treatment programs for patients with hazardous alcohol use.[3] These Screening and Brief Intervention (SBI) programs consist of alcohol screening with a validated instrument, followed by advice or brief intervention for patients who exceed recommended drinking limits. A Cochrane review of studies in general practice, emergency care and other primary care settings found moderate-quality evidence that brief interventions reduce alcohol consumption in hazardous drinkers.[4] Results of a large meta-analysis of randomized controlled trials in emergency care settings generally favoured brief interventions above no intervention or standard care, although the observed effects were small.[5]

In 2017 we published a study, called the Screening and brief InteRvention for hazardous alcohol use in an inner-city Emergency department in the Netherlands (SIREN) study, in which routine screening for hazardous alcohol use was performed in all adult patients who visited the ED, using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). Male sex, an alcohol-related reason for the ED visit, any intoxication (including but not limited to alcohol intoxication), head injury, gastrointestinal bleeding and any kind of wound were significant predictors for a positive AUDIT-C score.[6]

A considerable number of ED patients in the SIREN study were not screened, a limitation found in other studies and reflecting how challenging the implementation of routine screening for hazardous alcohol use is in a busy ED.[7–9] It is unknown which patients fail to undergo screening and in particular whether these patients are at increased risk of hazardous alcohol use. Screening failure may leave possible hazardous drinkers undetected, which undermines the impact and success of routine screening for hazardous alcohol use.

We aimed to investigate which patient-related or staff-related factors were associated with screening failures using data from the SIREN study. Moreover, we aimed to determine the presence of risk factors for hazardous alcohol use in both screened and unscreened ED patients.

METHODS

Study design and setting

The SIREN study was performed from November 2012 to November 2013 in the ED of Haaglanden Medical Centre Westeinde (HMC Westeinde).[6] The HMC Westeinde is an inner-city general hospital and level I trauma centre in the Netherlands, with 50,000 ED visits annually. During implementation, all ED healthcare professionals (nurses, medical doctors and nurse practitioners) received a standardized training that included education in techniques of motivational interviewing. Screening, Brief Intervention and Referral to Treatment (SBIRT)[10] was adopted as a standard approach in the ED.

Study population

All consecutive patients, both arriving by ambulance and ambulatory, aged 18 years and older visiting the ED were eligible for screening for hazardous alcohol use.

Study procedures

Screening took place during triage (a brief, focused assessment after entering the ED, in which the urgency of the complaints is established)[11] and was performed 24 hours a day, 7 days a week. Prior to screening, the triage nurse indicated whether the patient's ED visit was certainly or possibly alcohol-related and recorded this in the patient's file. An ED visit was designated as alcohol-related if the patient's presenting problem was either a direct result of alcohol use shortly before presentation or due to effects of longer term excessive alcohol use. Thereafter, screening was performed using the AUDIT-C. The AUDIT-C is a short form of the AUDIT, limited to consumption questions, and is validated for ED settings.[12] The aim of the screening was to detect patients with hazardous alcohol use in order to offer them a brief intervention and/or further treatment, independently of the relationship between their alcohol use and the reason for the ED visit. We therefore decided to use the AUDIT-C, because it performs well in screening for high-volume drinking, alcohol-related social problems and dependence.[12] An AUDIT-C score of 5 and higher was considered to be a positive result in men and an AUDIT-C score of 4 or more indicated a positive result in women.[12] The screening questions were incorporated in the hospital electronic system. Nurses were not able to complete and close the patient's file if the AUDIT-C score or reason for not screening was not filled in. Reasons for not screening were noted as follows: (a) patient is not capable of answering (e.g., due to severe illness or pain, decrease in consciousness or incomprehension of the screening questions due to a neurological, cognitive or psychiatric disorder, intoxication or language barrier), (b) healthcare professional forgot to ask, (c) patient refuses cooperation (in case the patient indicated he or she was not willing to answer the screening questions) and (d) screening has been performed recently (during a former visit to the HMC Westeinde ED but less than 6 months ago). Being not capable of answering and

refusal of cooperation were defined as patient-related factors for not screening, whereas forgotten by healthcare professional was defined as staff-related factor for not screening. Patients who were recently screened, according to the protocol, were excluded from this study.

Brief interventions were not performed during triage, but at a later stage during the patient's stay in the ED by one of the healthcare professionals, trained in techniques of motivational interviewing.

Measurements

To identify patient and ED visit characteristics of both screened and unscreened patients, the following data were extracted from the hospital's database for each registered patient: age, sex, presenting problem, triage level, whether or not the ED visit was alcohol-related according to the triage nurse, living district, day and time of ED visit. Presenting problems as defined by the Manchester Triage System were identified from the triage notes for each ED visit.[11] Comparable presenting problems were merged into one main category. Like in other studies,[10,13] we merged the presenting problems "head injury" and "major trauma", "fall from height" and "trunk injury" into a single category, as these were all due to trauma; we also analysed the prevalence of head injury separately. The category "any kind of wound" was analysed separately from the "trauma" category, as wounds could also have a non-traumatic cause. Triage levels were assigned according to the five-level Manchester Triage System.[11]

Outcomes of interest

Outcome measures describe the differences in patient characteristics between patients who were screened for hazardous alcohol use and patients who were not screened, due to patient-related and staff-related factors, using numbers, percentages and odds ratios. Risk factors for hazardous alcohol use that were independently associated with not being screened in multivariate analysis were presented in adjusted odds ratios and their 95% confidence intervals and p-values.

Data analysis

For patients with multiple ED visits during the 1-year study period, only data from the first ED visit were included for analyses (Figure 1). Data from the SIREN study were entered in SPSS, version 20. To assess associations between patient characteristics, presenting problems, specific ED-related circumstances and whether or not patients were screened by ED staff, cases were split into patients who received screening and those who did not. Unscreened patients were divided into two groups: patients who were not screened due to patient-related factors and patients who were not screened as a result of staff-related factors. Patient-related factors were (a) being unable or (b)

being unwilling to cooperate with screening. Staff-related factors were situations in which the nurse indicated that screening was forgotten.

Data were tabulated and differences between groups were analysed using $\chi 2$ tests. Numerical data were compared using Mann-Whitney U tests. Statistical significance was set at a p-value ≤ 0.05, and odds ratios (ORs) were calculated.

In a subsequent analysis, we compared the number of patients with one or more risk factors between screened patients and patients not screened due to patient-related factors (unable and unwilling to cooperate), between screened patients and patients not screened due to staff-related factors and between screened patients and the total group of unscreened patients. The factors that were found to be predictors for a positive AUDIT-C score in the SIREN study (male sex, an alcohol-related reason for the ED visit, any intoxication (including but not limited to alcohol intoxication), head injury, gastrointestinal bleeding and any kind of wound) were defined as risk factors for hazardous alcohol use in this study.[6] Although the category "major trauma, fall from height and trunk injury" was not independently associated with hazardous alcohol use in the SIREN study, major trauma was found to be associated with hazardous alcohol use in several other studies.[10,13] Therefore, we considered major trauma as a risk factor as well. Results are presented in numbers, percentages and ORs with their 95% confidence intervals (CI).

All factors associated with hazardous alcohol use that were significantly more common in unscreened than in screened patients in univariate analysis, were entered into a multivariate logistic regression model, using binary logistic regression. Being screened was chosen as dependent variable whereas risk factors were entered as covariates. Adjusted ORs and their 95% CIs were calculated.

Patient and public involvement

Patients were not involved in setting up or conduct of the study. After 3 months, all patients with a positive AUDIT-C score received a telephone interview, including an assessment of the burden of the study.

RESULTS

During the 1-year study period, 28,019 consecutive adult patients made a total of 41,900 ED visits. A total of 6869 patients (20%) had one or more ED return visits during the study period. Of the 28,019 patients, ED staff screened 18,310 (65%) patients for hazardous alcohol use and 9709 (35%) patients were not screened (Figure 1). Compared with screened patients, unscreened patients were more often men (OR 0.8 (95% CI: 0.8-0.8) and they were slightly older (42 vs. 41 years of age) (both p<0.001). Unscreened patients were more likely to be high urgency patients (translated into a red or orange triage colour) or non-urgent patients (blue triage colour) than screened patients (Table 1).

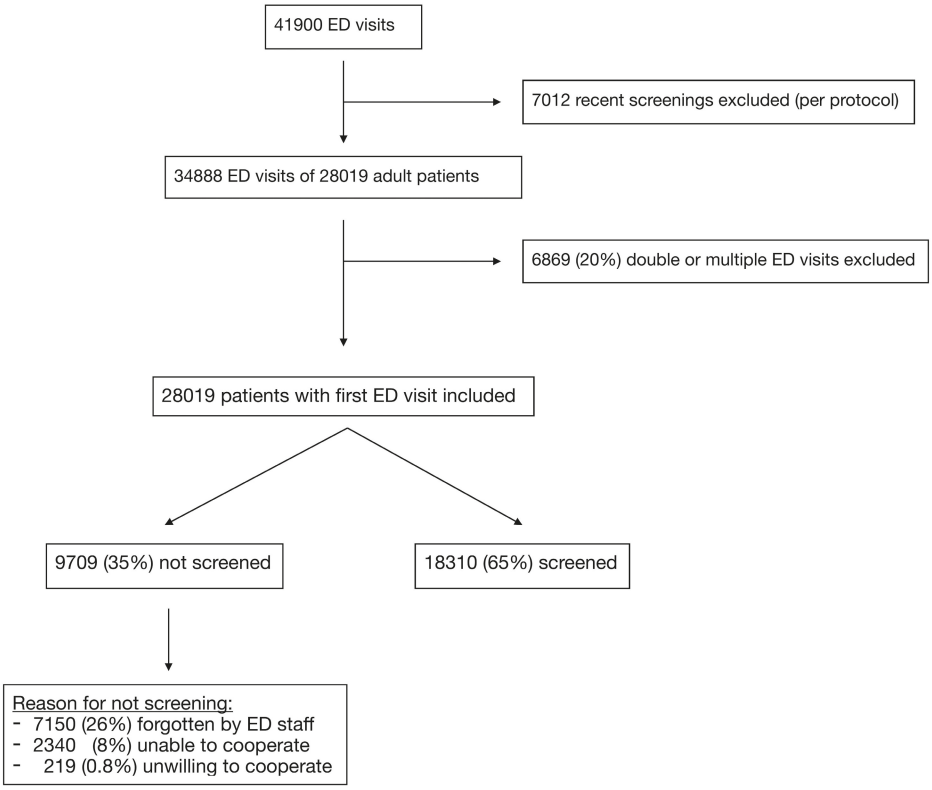

Figure 1. Flow chart showing the number of ED visits by actual number of adult patients visiting the ED during the 1-year study period. Only the first visit of each patient during the study period was included for analysis. Recently screened patient were excluded. Reasons for not screening are indicated.
ED, emergency department

Table 1. Comparison of sex, age, triage category (colour) and prevalence of factors associated with hazardous alcohol use (expressed in numbers and percentages) in patients visiting the ED, stratified for patients screened and patients not screened. Unscreened patients are divided into not being screened for patient-related or for staff-related factors.

	Screened (N=18310)	**Unscreened** (N=9709)				**Odds Ratio (95%CI)**^
		Patient-related (N=2559)		Staff-related (N=7150)	Total (N=9709)	
		Unable N=2340	Unwilling N=219			
Male sex, n (%)	8918 (49)	1281 (55)	149 (68)	3859 (54)	5289 (54)	0.8 (0.8-0.8)
Median age in years (range)	41 (18-99)				42 (18-104)	
Triage category (colour)						
Immediate (red) (%)	24 (0.1)	171 (7.3)	2 (0.9)	42 (0.6)	215 (2.2)	0.06 (0.04-0.09)
Very urgent (orange) (%)	2444 (13)	795 (34)	38 (17)	997 (14)	1830 (19)	0.7 (0.6-0.7)
Urgent (yellow) (%)	6737 (37)	810 (35)	101 (46)	2229 (31)	3140 (32)	1.2 (1.2-1.3)
Standard (green) (%)	8637 (47)	466 (20)	70 (32)	3245 (45)	3781 (39)	1.4 (1.3-1.5)
Non-urgent (blue) (%)	128 (0.7)	11 (0.5)	4 (1.8)	101 (1.4)	116 (1.2)	0.6 (0.5-0.7)
Triage colour unknown (%)	340 (1.9)	87 (3.7)	4 (1.8)	536 (7.5)	627 (6.5)	0.2 (0.2-0.3)
Risk factors for hazardous alcohol use:						
Alcohol related visit:						
Yes/possibly (%)	637 (3.5)	489 (21)	104 (47)	352 (4.9)	945 (9.7)	0.3 (0.3-0.4)
No (%)	17637 (96)	1851 (79)	115 (53)	6798 (95)	8764 (90)	2.8 (2.6-3.1)
Presenting problem:						
Any intoxication (%)*	131 (0.7)	205 (8.8)	28 (13)	66 (0.9)	299 (3.1)	0.2 (0.2-0.3)
Gastrointestinal bleeding (%)	150 (0.8)	21 (9.0)	0 (0)	48 (0.7)	69 (0.7)	1.2 (0.9-1.5)
Any kind of wound (%)	1269 (6.9)	126 (5.4)	28 (13)	826 (12)	980 (10)	0.7 (0.6-0.7)
Trauma:	681 (3.7)	242 (10)	36 (16)	391 (5.5)	669 (6.9)	0.5 (0.5-0.6)
Head injury (%)	*332 (1.8)*	*74 (3.2)*	*20 (9.1)*	*143 (2.0)*	*237 (2.4)*	0.7 (0.6-0.9)
Major trauma, fall from height, trunk injury (%)	*349 (1.9)*	*168 (7.2)*	*16 (7.3)*	*248 (3.5)*	*432 (4.5)*	0.4 (0.4-0.5)
Other presenting problems (%)**	16079 (88)	1746 (75)	127 (58)	5819 (82)	7692 (79)	1.9 (1.8-2.0)

^ Comparing all screened with all unscreened patients

* including “overdose and poisoning” and “alcohol intoxication”

**Other presenting problems (not associated with hazardous alcohol use) are: abdominal pain, diarrhoea, vomiting, abnormal behaviour, psychiatric illness, auto mutilation, back pain, neck pain, burns, chemical injury, (near) collapse, diabetes, haematological disease, dyspnoea, asthma, ear, eye, nose, teeth and throat complaints, headache, limb complaints, physical abuse, pregnancy related problems, seizure, skin rash, bite wounds, insect bites, infection, abscess, rectal problems, thoracic pain, urinary tract complaints, vaginal bleeding, venereal disease, questions about medication, other complaints.

ED, emergency department; *N*, number; *CI*, confidence interval.

Patients with an ED visit that was designated as alcohol-related by the triage nurse were less likely to be screened (OR 0.3; 95% CI 0.3-0.4). Apart from gastrointestinal bleeding (OR 1.2; 95% CI 0.9-1.5), all factors associated with hazardous alcohol use were significantly more common in unscreened than in screened patients (Table 1).

Table 2 shows that screened patients were less likely to have at least one risk factor for hazardous alcohol use compared with unscreened patients (OR 0.7 (95% CI 0.7-0.7) and p<0.001).

Table 2. Screened patients with at least one risk factor for hazardous alcohol use, compared to unscreened patients with at least one risk factor, stratified by patient-related and staff-related factors for not screening

	Screened (N=18310)	**Unscreened** (N=9709)			
		Patient-related (N=2559)		Staff-related (N=7150)	Total (N=9709)
		Unable N=2340	Unwilling N=219		
Patients with ≥1 risk factor (N=16084), N (%)	9947 (62)	1545 (10)	182 (1)	4410 (27)	6137 (38)
OR (95% CI)*		0.6 (0.6-0.7)	0.2 (0.2-0.3)	0.7 (0.7-0.8)	0.7 (0.7-0.7)

All comparisons *p*<0.001.
* ORs per column represent the comparison between screened patients and the group of unscreened patients in that column
N, number; *OR*, Odds Ratio; *CI*, confidence interval.

Compared with each subgroup of unscreened patients (not screened due to patient-related and staff-related factors), screened patients were more likely to have no risk factors for hazardous alcohol use than patients in each of these subgroups. Especially patients who were unwilling to be screened were likely to have one or more risk factors.

In multivariate analysis, all factors associated with hazardous alcohol use, except gastrointestinal bleeding, were significant predictors for failure to undergo routine alcohol screening (Table 3).

Table 3. Risk factors for hazardous alcohol use that are independently associated with being screened for hazardous alcohol use in routine ED care

	Exp (*B*)	95% CI	P-value
Male sex	0.8	0.8-0.9	<0.001
Alcohol-related visit according to triage nurse	0.5	0.4-0.5	<0.001
Any intoxication	0.3	0.3-0.4	<0.001
Any kind of wound	0.7	0.6-0.7	<0.001
Head injury	0.8	0.7-1.0	0.015
Major trauma, fall from height, trunk injury	0.4	0.4-0.5	<0.001

ED, emergency department; *CI*, confidence interval.

DISCUSSION

Using data from the SIREN study, we determined which patient-related or staff-related factors were associated with missed opportunities for alcohol screening and examined the presence of risk factors for hazardous alcohol use in both screened and unscreened ED patients. We found that in the 9709 (35%) patients who were not screened, staff forgot to screen in 7150 patients, whereas 2559 patients were not screened due to patient-related factors (2340 being unable and 219 unwilling to cooperate). ED patients who failed to undergo routine alcohol screening had an unfavourable risk profile for hazardous alcohol use compared with patients who were screened, especially those patients who were not screened due to inability or unwillingness to cooperate. This suggests that patients who are most likely to benefit from screening are not reached. This is an important finding as resources spent on SBIRT programs may be misdirected to patients who are not (most) in need.

It is not clear from our data why patients were unable or unwilling to cooperate with screening during triage. It is unknown whether these patients would be receptive to brief intervention and whether putting extra effort in reaching these patients for screening and intervention would improve the effectiveness of routine screening for hazardous alcohol use. Hence, more research focused on this specific group of unscreened patients is needed, especially given the high incidence of risk factors for hazardous alcohol use in this group. If these (unscreened) patients would indeed benefit from SBIRT programs, it could explain the observed low levels of improvement of SBIRT programs in prior studies [14], as these patients were not included.

We found triage a suitable moment for alcohol screening as hazardous alcohol use can play an important role in multiple presentations and diseases and can interact with medications that may be necessary to administer.[14] It is therefore desirable to be aware of the patient's alcohol consumption shortly after the patient has entered the ED. However, to reach patients for screening who are unable or unwilling to cooperate

when entering the ED, an approach could be to perform screening at a later stage than triage, for example, later during their stay in the ED or during hospitalisation. This offers the opportunity to plan a suitable moment for screening. It is likely that patients who did not present to the ED to seek help or advice for their drinking problems are more willing to cooperate with screening after being treated for their presenting problem than during the triage process.[14] Implementing a standing order in the hospital's electronic system that requires screening to be completed at a certain end point (e.g., discharge from the hospital) would be necessary in order not to forget the screening.[15] In our study, 24% of the patients who were not screened were admitted to the hospital (compared to 17% of screened patients), which means that there is an opportunity to screen a significant number of unscreened patients at a later moment while they are still under the care of hospital staff. Although it is preferable to perform the screening and brief intervention during the patient's ED visit, when the patient may be most receptive to intervention,[16],[17] other healthcare providers, most suitably the general practitioner, could also perform screening and intervention after discharge from the ED. A report of the ED visit could be sent to the general practitioner to facilitate this.

In our study, staff-related factors that resulted in forgetting or leaving out screening were the most common reasons why screening was not performed. Studies describing the implementation process of SBIRT in the ED indicate that ED staff experience several barriers in performing SBIRT. The most common barriers they mention are time pressure, competing priorities and the need to focus on more medically urgent issues. Besides that, the uncomfortable nature of the topic, not feeling competent enough to discuss the topic with the patient, lack of privacy and fear for a negative response of the patient are also mentioned as barriers. Doubt regarding treatment efficacy and patient adherence and the feeling that discussing alcohol use with the patient is not their responsibility were further reasons for low staff motivation and for leaving out screening.[18],[8],[19] During focus group discussions with our ED staff, we identified similar barriers for screening (unpublished data). Although implementation studies suggest multiple interventions to optimise screening, the barriers they report reflect how challenging successful implementation of routine screening for hazardous alcohol use is in a busy ED.

Given the reported overall small effect of brief interventions [4],[5] and the generally reported high number of missed patients when screening the entire ED population,[7],[8],[9] it would be worth considering targeting the screening on patients presenting with factors associated with hazardous alcohol use. Studies performing SBIRT according to this approach reported a lower number of unscreened patients. [20],[21] Adopting narrower screening criteria may decrease costs and increase specificity, especially when the occurrence of hazardous alcohol use in the total ED patient population is low.[6–8],[22]

Limitations

There are several limitations to this study. The AUDIT-C was used as screening tool. The AUDIT-C is a shortened variant of the AUDIT. By using the shortened variant, useful information about alcohol-related health problems may have been omitted. However, the AUDIT-C performs well in screening for high-volume drinking, alcohol-related social problems and dependence and is validated for ED settings. It is limited to consumption questions, which contribute most to the full AUDIT.[12],[23],[24]

Moreover, factors that were previously shown to be associated with hazardous alcohol use in the screened population of the SIREN study were used to assess whether the unscreened population of the study could be at increased risk for hazardous alcohol use. As of yet, these risk factors for an increased AUDIT-C score in ED patients require confirmation in a separate study. Nevertheless, several of these factors, including alcohol-related ED visit, male sex, trauma and gastrointestinal bleeding are widely considered to be risk factors for hazardous alcohol use.[10],[13],[25],[26]

In addition, the study was performed in an inner-city, non-academic general hospital, situated in an urban, low-socioeconomic environment with many immigrants, that serves as a regional trauma and neurology centre. Therefore, extrapolating these results to other populations should be done with caution.

In conclusion, ED patients who did not to undergo routine alcohol screening had higher risk for hazardous alcohol use than screened patients. Risk factors for hazardous alcohol use were most common in patients unwilling or unable to cooperate with screening. Using narrower screening criteria and screening patients later during their stay in the ED or during hospital admission may lead to better screening and brief intervention results directed at those patients most in need.

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CHAPTER 4

The effect of a telephone follow-up call for older patients, discharged home from the emergency department on health-related outcomes: a systematic review of controlled studies

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ABSTRACT

Background

Older patients discharged from the emergency department (ED) are at increased risk for adverse outcomes. Transitional care programs offer close surveillance after discharge, but are costly. Telephone follow-up (TFU) may be a low-cost and feasible alternative for transitional care programs, but its effects on health-related outcomes are not clear.

Aim

We systematically reviewed the literature to evaluate the effects of TFU by healthcare professionals after ED discharge to an unassisted living environment on health-related outcomes in older patients compared to controls.

Methods

We conducted a multiple electronic database search up until December 1, 2019 for controlled studies examining the effects of TFU by healthcare professionals for patients aged ≥65 years, discharged to an unassisted living environment from a hospital ED. Two reviewers independently assessed eligibility and risk of bias.

Results

Of the 748 citations, two randomized controlled trials (including a total of 2120 patients) met review selection criteria. In both studies, intervention group patients received a scripted telephone intervention from a trained nurse and control patients received a patient satisfaction survey telephone call or usual care. No demonstrable benefits of TFU were found on ED return visits, hospitalization, acquisition of prescribed medication, and compliance with follow-up appointments. However, many eligible patients were not included, because they were not reached or refused to participate.

Conclusions

No benefits of a scripted TFU call from a nurse were found on health services utilization and discharge plan adherence by older patients after ED discharge. As the number of high-quality studies was limited, more research is needed to determine the effect and feasibility of TFU in different older populations.

PROSPERO registration number CRD42019141403.

INTRODUCTION

Background

Older patients discharged from the emergency department (ED) are at increased risk of functional decline, ED return visits, hospitalization and death.(1–5) Risk factors associated with these outcomes are pre-existing functional and cognitive impairment, but also lack of social support, living alone and feeling depressed.(1,6) Therefore, older patients, discharged home from the ED may need close medical surveillance and adequate care transition from the ED to home.

In the last decades, many transitional care programs were started with the aim of preventing and reducing problems after discharge from the ED, and limiting ED return visits and hospitalization. Most transitional care programs focus on older high-risk patients, detected by geriatric assessment. These programs consist of discharge arrangements for community services and patient-education, which usually start during the patients' ED stay and are continued afterwards, either by home visits, telephone calls, or both.(1,7,8)

Several studies examining the effect of these transitional care programs found some positive effects, e.g., reduction in ED return visits,(9) hospital admissions,(10) and nursing home admissions.(11) However, many of these programs proved to be time-consuming and therefore involved deployment of additional staff, leading to considerable personnel costs.(9,12) This may be beyond the ability of many EDs to implement.

As an alternative intervention, telephone follow-up (TFU) is described as an inexpensive and easy to organise method of post-discharge care in various medical populations and settings.(13–16) Feasibility has been demonstrated in multiple medical settings, including the ED.(17–19) However, previous systematic reviews examining the effect of TFU by hospital-based and primary care professionals after hospital admission in (adult) patients of all ages found inconclusive evidence about the effects of TFU. The authors of the reviews reported a large variety in study methods and outcome measures and low methodological quality of the included studies.(13,20,21) The effect of TFU in older patients discharged home from the ED has not yet been examined in a systematic review, apart from one "short-cut review", solely focusing on compliance with follow-up visits and discharge instructions.(22) The effects of TFU in older adults, discharged from the ED, on other outcomes, like ED return visits and hospitalization, are still unknown.

Aim

The aim of this systematic review of controlled studies was to determine the effects of a telephone follow-up (TFU) call from a healthcare professional for older patients after discharge from the ED to an unassisted living environment on health-related and patient-oriented outcomes. These outcomes include ED return visits and hospitalization, but also compliance with discharge instructions, general functioning, patient satisfaction and emotional well-being.

METHODS

This systematic review was conducted in adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.(23,24)

Protocol and registration

A protocol describing the research question, search strategy, in-and exclusion criteria, and methods of the analysis was made in advance and registered in PROSPERO (registration number: CRD42019141403).

Search strategy and selection criteria

We performed an electronic search of MEDLINE, Ovid EMBASE and the Wiley Cochrane Library in the Cochrane Database of Systematic Reviews and Central Register of Controlled Trials from the beginning of indexing until December 1, 2019. Search terms used were a combination of Medical Subject Heading terms and relevant keywords; no restriction with respect to language was used. Full details of the search strategy are available in Additional file 1. Detailed selection criteria are described in Table 1.

Besides searching in electronic databases, we hand-searched several clinical trial websites (presented in Additional file 2) to identify relevant unpublished and ongoing research and publications in journals that are not peer-reviewed. Reference lists of selected full-text articles were hand-searched for other potentially relevant articles. Original, full-text articles with case-control or (randomized) controlled clinical trial design were eligible for inclusion.

Study selection

Two investigators (MvL and BvW) independently screened the electronic search results on title and abstract to identify potentially relevant articles, according to the predefined selection criteria (see Table 1). Disagreements concerning which citations were suitable for full-text review were resolved by discussion in the presence of a third author (MCvdL) until consensus was achieved. In case of disagreement, the full text of the article was retrieved and reviewed. Full-text articles of relevant citations were reviewed independently by two investigators (MvL and BvW). Agreement about which

articles were suitable for inclusion was again achieved by discussion in the presence of the third author (MCvdL). Records were managed using ® 2020 Mendeley Ltd.

Risk of bias assessment

Using the Cochrane risk of bias tool, two reviewers (MvL and MCvdL) independently assessed the risk of bias for each individual study on seven domains (Additional file 3).(25)

Table 1. Selection criteria

Category	Inclusion criteria	Exclusion criteria
Population	Patients aged 65 years and older, discharged from the ED to an unassisted living environment	Patients aged under 65 years; Patients discharged from the ED to an assisted living environment
Intervention	Telephone follow-up call by healthcare professional after ED discharge	Any other kind of transitional care; Telephone follow-up not conducted as independent intervention; Telephone follow-up calls by others than healthcare professionals
Control condition	Usual care or patient satisfaction survey telephone call	
Outcome measures	Any health-related, patient-oriented outcome, including: Health services utilization, including ED return visits, hospitalization, follow-up visits Physical health outcomes, including level of activities of daily living, independence Psychosocial health outcomes, including quality of life, mood, satisfaction Other patient-oriented outcomes, including treatment adherence, knowledge of disease and symptom management	Outcomes not health-related or patient-oriented
Setting	Discharged from hospital-based ED	Discharged from hospital ward or primary care setting
Study type	Case-control or (randomized) controlled clinical trials	Uncontrolled studies

ED, emergency department

Data extraction and synthesis

We developed a data extraction sheet, based on the Cochrane Consumers and Communication Review Group's data extraction template (see Additional file 3).

One reviewer (MvL) independently extracted data on patient and study characteristics and another reviewer (MCvdL) checked the extracted data on the sheets. Disagreements were resolved by discussion until consensus was reached. We contacted the author of the two included studies for further information concerning the methods, blinding of research staff and numerical outcome data. The author did not respond and hence the questions we had could not be clarified.

RESULTS

Study selection

Of the 748 citations until December 1, 2019, only two studies met the selection criteria for our systematic analysis (Figure 1). Searching clinical trial websites did not yield any relevant ongoing unpublished research.

Overview of included studies

Table 2 summarizes the study characteristics and outcome measures of the two included studies. Both studies were single-centred randomized controlled trials (RCTs) from the same author, performed in the same academic ED, but with a different study population in a different study period.(26,27)

The studies involved a total of 2120 patients aged ≥ 65 years who were discharged home from the ED. Study sample sizes were 120 and 2000 patients, respectively. The duration of follow-up ranged from 30 to 35 days. In both studies, trained nurses recruited patients by telephone. Older patients or, if they were not available, their caregivers or spouses, had to pass a mental cognition screening examination before participation. Patients in the intervention group received a post-discharge telephone intervention in which they were surveyed about their wellbeing, understanding of their ED diagnoses, discharge instructions, follow-up appointments and management of medications. The nurse provided review and re-emphasis of discharge instructions, reinforcement of follow-up appointments, assistance in making appointments and advice if not feeling well. Control group patients received either a telephone call during which satisfaction with their care during the ED visit was assessed, or no telephone call after discharge. One study (Biese et al. 2014) compared the outcomes of three patient groups: an intervention group, a placebo group in which patients received a patient satisfaction survey telephone call, and a control group in which patients received no telephone call after discharge. The primary objective of this

study was to investigate whether TFU improved discharge plan adherence.(26) The second study (Biese et al. 2018) consisted of two patients groups: an intervention group in which patients received an intervention telephone call and a control group in which patients received a patient satisfaction survey telephone call. The primary outcome measures of the study were the rates of ED return visits, hospital admissions or death within 30 days after ED discharge. Only this study was of sufficient sample size to detect a significant difference on these outcome measures between the study groups.(27)

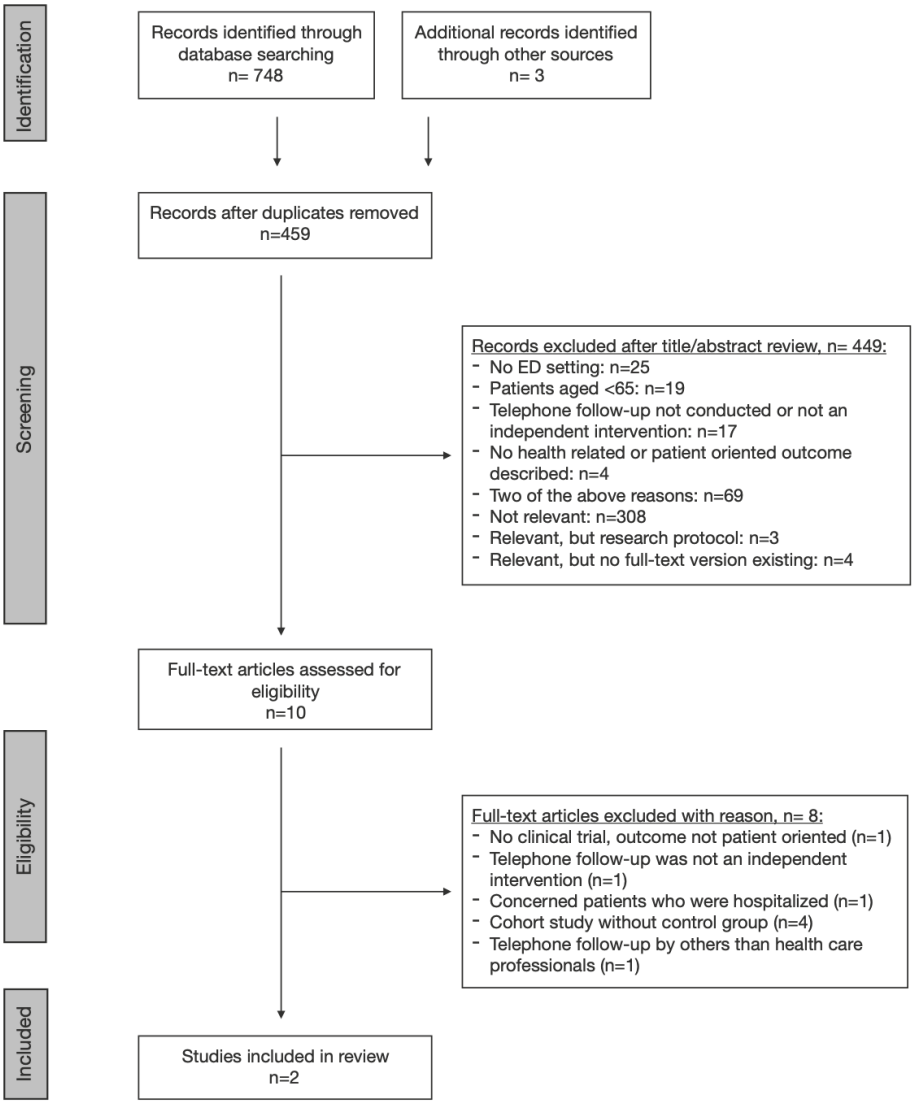

Figure 1. Flow diagram of study selection. *n*, number; *ED*, Emergency Department

Table 2. Characteristics, outcome measures and feasibility of included studies.

Characteristics	Biese et.al. 2014	Biese et.al. 2018
Setting, country	Academic center ED, USA	Academic center ED, USA
Study design	RCT	RCT
Aim(s)	To investigate whether an ED postdischarge telephone intervention by nurse improves discharge plan adherence.	To investigate whether an ED postdischarge telephone intervention by call-center nurse decreases ED return visit rates, hospitalization or death within 30 days after ED visit.
Study period	From September 5 until November 9, 2010	From August 2013 to March 2016
Study patients	Patients ≥65 years, discharged home from ED	Patients ≥65 years, discharged home from ED
Recruitment of study patients	Randomization before first call Recruitment by telephone after mental cognition screening examination was passed and informed consent was obtained.	Recruitment by telephone after mental cognition screening examination was passed and informed consent was obtained. Subsequent randomization.
Description of intervention: intervention group	Telephone call following pre-written script from trained study nurse within 1-3 days after ED discharge to review discharge instructions and offer assistance with discharge plan compliance.	Telephone call following pre-written script from call-center nurse within 1-3 days after ED discharge to identify problems, review discharge instructions and offer assistance with discharge plan compliance, advice if not feeling well.
Description of intervention: control group(s)	*Placebo group:* scripted patient satisfaction survey telephone call from research assistant 1-3 days after ED discharge. *Control group:* no telephone intervention	Scripted patient satisfaction survey telephone call from call-center nurse 1-3 days after ED discharge.
Sample size	Intervention group: n=39; placebo group: n=35; control group: n=46	Intervention group: n=999; control group: n=1001

Table 2. Continued.

Characteristics	Biese et.al. 2014	Biese et.al. 2018
Outcome measures	Primary outcome measures: Scheduled physician appointment within 5 days. Filled medication prescription. Knowledge of name, dosage, indication of prescribed medication.	Primary outcome measures: Days from ED discharge to ED return visit, 30-day hospitalization or death.
	Secondary outcome measures: 35-day hospitalization 35-day ED return visits	Secondary outcome measures: Scheduled physician appointment within 30 days. Difficulty acquiring prescribed medication.
Results of outcome measures	Primary outcome measures: Physician appointment ≤ 5 days: 54% (I), 20% (P), 37%(C); p=0.04 Filled prescription: 96% (I), 94%(P), 94% (C); NS. Knowledge name/dosage of medication: 92%(I), 94%(P), 89%(C); NS. Knowledge of reason for medication: 96%(I), 100% (P), 100%(C); NS.	Primary outcome measures: ED return visits ≤30 days: 12.2% (I) vs. 12.5% (C); NS. Hospitalization ≤30 days: 9.0% (I) vs. 7.4%(C); NS. Death ≤30 days: 0%(I) vs. 0.51% (C); NS.
	Secondary outcome measures: ED return visits/hospitalization ≤35 days: 22%(I), 33%(P), 27%(C); NS.	Secondary outcome measures: Physician appointment ≤ 30 days: 80.8% (I) vs. 80.8%(C); NS. Difficulty acquiring medication: 15.5% (I) vs. 15.6%(C); NS.
Feasibility	178 eligible patients: 120 (67%) included, 18 (10%) declined and 19 (11%) not reached during follow-up. 12 (7%) Were disqualified from primary outcome analysis, because of return to ED or other hospital setting within 5 days. Three were excluded for other reasons. Six had incomplete surveys. No patients failed mental screening examination. Inclusions only on Sunday, Monday, Tuesday and not more than 9 inclusions per day.	Of the 6463 eligible patients, 2000 (31%) consented to participate. 2712 (42%) Patients were not reached, 1683 (45%) patients who were reached declined participation, 37 were lost on call back and 31 failed mental screening examination. Inclusions 24/7.

C, control group; *ED*, emergency department; *I*, intervention group; *NS*, not significant (p<0.05); *P*, placebo group; *RCT*, randomized controlled trial; *USA*, United States of America

Risk of bias assessment of included studies

In both studies, the randomization process was well performed and described, ensuring a low risk of selection bias. Patients were not aware of the interventions, but blinding of personnel was not possible. However, the telephone calls were scripted in order to prevent performance bias. It was unclear whether the nurses who performed the data collection calls were (completely) blinded, but these telephone calls were also scripted to prevent detection bias. Loss to follow-up and incomplete data of included patients was limited. Methods were followed and expected outcomes were reported as planned in previously published study protocols. In the first study of Biese et al., it was not clear whether patients were analyzed according to intention to treat.(26) In both studies, patients who did not pass the mental cognition screening examination were not included.(26,27) However, this group involved a small number of patients (n=31) in the second study only (Biese 2018).(26,27) More details concerning the risks of bias are presented in Additional Table 1.

Main results: effect of TFU on health-related and patient-oriented outcomes

Both studies didn't find a statistically significant effect of TFU in reduction of ED return visits, hospitalization or death 30 or 35 days after ED discharge (Table 2).(26,27)

In one study (Biese et al. 2014), patients in the TFU group had significantly more often a physician appointment scheduled within 5 days than patients in the placebo and the control groups. However, the authors reported that for a minority of TFU group patients, the calling nurse helped to schedule appointments, which may have contributed to a shorter follow-up time.(26) In the other study (Biese et al. 2018), the authors found no benefit of the intervention on the number of scheduled physician follow-up appointments within 30 days after discharge from the ED.(27) Both studies did not report whether patients actually showed up on the planned appointments.

No significant differences between the groups were found in obtaining prescribed medication and in knowledge of name, dosage or indication of the prescribed medication.(26,27)

Feasibility in daily ED practice

In the included studies, eligible patients were approached for participation by telephone. In the Biese et al. 2014 study, all 178 eligible patients were reached, but in the Biese et al. 2018 study, 2712 (42%) of the 6463 eligible patients could not be reached and hence could not be approached for participation. During follow-up, the included patients were well accessible by telephone in both studies: ≥89% of the included patients was reached. Of the eligible patients who were reached and approached for participation, 10% declined to participate in the Biese et al. 2014 study, whereas in the Biese et al. 2018 study 45% declined.(26,27) In Biese's 2014

study, patients were only enrolled after visits to the ED on Sunday, Monday and Tuesday and not more than nine patients per day, to facilitate follow-up calls during the week, because they did not have enough staff to make calls during the weekend.(26) In Biese's 2018 study, there were no restrictions for inclusion concerning the day and time of the ED visit and the number of inclusions per day.(27)

DISCUSSION

Only two controlled studies, both RCTs, met the inclusion criteria for this review. Both studies reported no effect of a TFU call from a nurse for older patients, discharged home from the ED on hospital admission or ED return visit rates within 30 or 35 days after the index ED visit. However, only the Biese et al. 2018 study was powered to find a significant difference on this outcome.(27) The Biese et al. 2014 study reported that patients in the TFU group had significantly more often a physician appointment scheduled within 5 days than patients in the placebo and the control group. This effect was not found in the other included study, examining differences in scheduled physician appointments within 30 days. TFU was not shown to be helpful in obtaining prescribed medications or knowledge of name, dosage and indication of prescribed medications.

Although patients who were included in the studies were well accessible by telephone for follow-up calls, many eligible patients were not reached and hence, could not be approached for participation. Moreover, a substantial number of eligible patients refused to participate. This questions the feasibility of the intervention in daily practice.

The findings of the studies included in this systematic review, are in accordance with other systematic reviews that examined the effects of TFU after hospital admission in (adult) patients of all ages. Crocker et al. evaluated the impact of TFU, performed by primary care personnel, after hospital admission on ED visit and hospital readmission rates in adults of all ages and did not found TFU to be beneficial.(20) Authors of a 2006 Cochrane review and a review of Bahr et al. found inconclusive evidence about the effects of TFU after hospital discharge. In the included studies, TFU was performed in a large variety of ways and by different kinds of healthcare professionals in different patient populations. Most studies were of low methodological quality and many different outcomes were measured, ranging from outcomes related to health services utilization to physical and psychosocial health outcomes. Effects were not constant across the included studies and overall, the evidence was inconclusive.(13,21) In 2019 Nasser et al. published a review evaluating the effect of TFU on compliance with follow-up and discharge instructions in older patients, discharged home from the ED. It was concluded that TFU can identify non-compliance with discharge instructions, but evidence to improve compliance was not found.(22)

Some previously published uncontrolled studies reported that TFU after ED discharge was feasible as only few patients declined participation or were not reached.(17,28) The patients in the included studies in our review were also well accessible by phone for follow-up. However, this may reflect participation bias, as in one of the studies many eligible patients were not reached by phone and therefore could not be approached for inclusion. These may well have been patients with physical or other impairments who were unable to answer the telephone, but could have benefited from TFU.(17) Problems concerning telephone accessibility of patients are also mentioned in other studies.(14,21,29) Many studies report the lack of a correct phone number, which could be addressed by verifying the patient's telephone number at discharge. The telephone number of a caregiver or family member can also be asked in case the patient cannot be reached for TFU. It is probable that for many older patients, involvement of family members or other caregivers in TFU increases accessibility and improves discharge plan adherence and other postdischarge outcomes.(29,30) A substantial number of eligible patients refused to participate. This was also reported in a study, investigating the effect of telephone support calls by volunteers on feelings of loneliness and depression by older patients, discharged home from the ED.(31) Patients may have refused participation, because they did not want to be involved in a study, but they may also judge TFU as unnecessary interference. Although less time-consuming than other transitional care programs, TFU still requires sufficient staff to approach all eligible patients.(21) This is illustrated in the Biese et al. 2014 study, enrolling patients only on specific weekdays and up to a maximum of nine per day, because they did not have enough staff to perform more telephone calls.(26) Not including patients on other weekdays may undoubtedly have led to missing eligible patients who presented outside this inclusion window. The substantial number of eligible patients that was not reached or refused participation underlines the efforts that are needed to make FTU feasible in daily practice.(26,27,31)

The studies included in this review investigated the effect of TFU on health services utilization and understanding of and compliance with discharge instructions. The effects of TFU on other, more difficult to measure outcomes, such as psychosocial health outcomes, were not measured. A systematic review investigating older patients' expectations of emergency care, reported that insufficient or poorly-understood explanations about diagnosis or discharge instructions were associated with less satisfaction with care.(32) It may be that with TFU ED staff could meet these expectations by providing additional explanations and care. Besides that, TFU can be regarded as a socially complex intervention, characterized by difficult to define and to standardize interactions and by various contextual factors, which may mask potential effects. To support this idea, the Dutch Patients and Costumers Federation stated that TFU deserved a place in aftercare, despite the negative findings of the 2006 Cochrane review, because patients had indicated that they highly appreciated the call.(13) In accordance with this, some studies suggest that several older patients

are in need of social and emotional support following an ED visit and that (repetitive) TFU could provide for this.(28,31) It would be worth exploring in future research how care transition interventions after an ED visit affect perceived emotional and social support and specific needs and barriers that older ED users experience.(30)

The limited number of controlled studies concerning this subject is remarkable, given the increasing number of proactive care programs for older patients in many EDs.(27) Apart from the two studies that met the inclusion criteria for this review, we found one more suitable study. This cohort study with pre-post design, published in Dutch in a non-peer reviewed journal, also reported no effect of TFU on hospital admission or ED return visit rate within 30 days after discharge from a general hospital ED.(33) The small number of available studies, all showing no benefit of the intervention may underline the absence of effect of TFU on health-related outcomes. More controlled intervention studies are needed to investigate the effect of TFU in older ED patients. Future studies should best focus the intervention on individuals at highest risk of hospital use, such as those with functional or cognitive impairments, mental health conditions, limited social support, or with complex medical regimens, to determine whether there are different effects of TFU in these populations.(1,30,34) Interesting outcome measures, in addition to health service utilization, would be functional decline, perceived social and emotional support and feelings of anxiety or depression. Failure to reach eligible patients could be addressed by appointing sufficient staff members to perform the intervention, by verifying the patient's telephone number at discharge, and by involving the patients' caregivers. It would also be interesting to investigate the effects and feasibility of TFU performed by other personnel than ED staff, e.g., primary care personnel or nurses from a commercial call center.

STRENGTHS AND LIMITATIONS

Strengths

In this systematic review, only quantitative, controlled studies were included. Both included studies were RCTs and serious efforts had been made to limit the risks of bias. The risk of missing relevant publications was minimized by searching multiple databases and trial websites and by assessing citations and full-text articles for eligibility by two reviewers.

Limitations

The two RCTs included in this review were conducted in the same tertiary ED in the United States. This may limit generalizability of the study results to other countries. However, a Dutch study did not show a beneficial effect of TFU either.(33) Only one of the studies was of sufficient sample size to detect a significant effect of TFU on hospitalization and ED return visits. This study compared TFU with a telephone

satisfaction survey call, but not with no telephone call. In future research it would be worth comparing the outcomes of patients receiving TFU with those of patients who do not receive any telephone intervention. Patients or their caregivers or spouses who did not pass the mental cognition screening examination were excluded from both studies. Although cognitively impaired, these individuals might have benefited from a telephone intervention. However, the number of patients excluded for this reason was limited. Due to the small number of included studies, the heterogeneity of the study methods and the negative results, a quantitative analysis of the studies, including assessment of heterogeneity and publication bias by creating a funnel plot, was considered not to be of added value. Therefore, we used a qualitative approach to synthesize the literature.

CONCLUSIONS

Telephone follow-up is considered to be a low-cost intervention, that probably allows the opportunity to detect problems and complications, clarify discharge instructions and initiate other forms of aftercare for older adults discharged home from the ED. However, our systematic review of two published randomized controlled studies found no demonstrable effect of TFU for older adults, discharged from the ED on health services utilization and understanding of and compliance with discharge instructions. Furthermore, feasibility of the intervention appeared to be low. Considering the limited number of high-quality studies on this topic, more research is needed to explore whether TFU is an effective and feasible intervention to reduce hospitalization and ED return visit rates or to improve older patients' discharge plan adherence after an ED visit. In future studies, it is important to also investigate whether TFU promotes psychosocial wellbeing in older patients after ED discharge.

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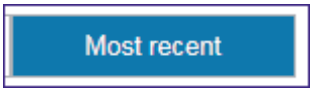
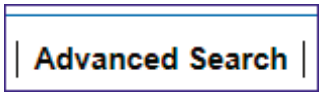
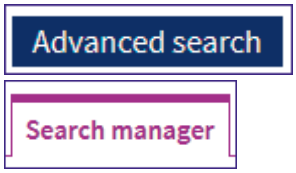
SUPPLEMENTARY INFORMATION

Additional file 1. Search strategy

Date	Database	Strategy	Number of references
09-12-2019	PubMed (www.pubmed.gov)	 ("Aged"[Mesh] OR aged*[tiab] OR aging*[tiab] OR ageing*[tiab] OR elder*[tiab] OR geriatr*[tiab] OR geront*[tiab] OR frail*[tiab] OR octogenarian*[tiab] OR octo-genarian*[tiab] OR nonagenarian*[tiab] OR nona-genarian*[tiab] OR non-agenarian*[tiab] OR centenarian*[tiab]) AND ("Emergency Medical Services"[Mesh] OR "Emergency Services, Psychiatric"[Mesh] OR "Emergency Treatment"[Mesh] OR "Emergency Nursing"[Mesh] OR "Emergency Medicine"[Mesh] OR emergenc*[tiab] OR emer-genc*[tiab] OR "ed"[tiab] OR "eds"[tiab] OR ed's*[tiab] OR "er"[tiab] OR "ers"[tiab] OR er's*[tiab] OR accident department*[tiab] OR "accident dept"[tiab] OR (trauma*[ti] AND (center*[ti] OR centre*[ti])) OR trauma center*[tiab] OR trauma centre*[tiab] OR (trauma*[ti] AND hospital*[ti]) OR trauma hospital*[tiab] OR (acute*[ti] AND (service*[ti] OR care*[ti] OR centre*[ti] OR center*[ti])) OR acute service*[tiab] OR acute care*[tiab] OR acute center*[tiab] OR acute centre*[tiab] OR (urgen*[ti] AND (service*[ti] OR care*[ti] OR centre*[ti] OR center*[ti])) OR urgency service*[tiab] OR urgent service*[tiab] OR urgent care*[tiab] OR urgent center*[tiab] OR acute centre*[tiab] OR urgent-centre*[tiab]) AND (("Aftercare"[Mesh] AND "Telephone"[Mesh]) OR post-discharge follow-up*[tiab] OR postdischarge follow-up*[tiab] OR post-discharge-followup*[tiab] OR postdischarge followup*[tiab] OR (interven*[ti] AND (phone*[ti] OR telephon*[ti])) OR ((phone*[ti] OR telephon*[ti]) AND (postdischarge*[ti] OR discharge*[ti] OR follow-up*[ti] OR followup*[ti])) OR postdischarge phon*[tiab] OR post-discharge-phon*[tiab] OR postdischarge telephon*[tiab] OR post-discharge telephon*[tiab] OR discharge-phon*[tiab] OR discharge telephon*[tiab] OR phone follow-up*[tiab] OR phone-followup*[tiab] OR telephone follow-up*[tiab] OR telephone followup*[tiab] OR follow-up phon*[tiab] OR followup-phon*[tiab] OR follow-up telephon*[tiab] OR followup telephon*[tiab]) AND ("Clinical Trial" [Publication Type] OR "Comparative Study" [Publication Type] OR "Evaluation Studies" [Publication Type] OR "Cross-Over Studies"[Mesh] OR "Multicenter Study" [Publication Type] OR "Random Allocation"[Mesh] OR "Double-Blind Method"[Mesh] OR "Single-Blind Method"[Mesh] OR "Placebos"[Mesh] OR "Research Design"[Mesh:NoExp] OR "trial"[tiab] OR trial'*[tiab] OR random*[tiab] OR placebo*[tiab] OR sham*[tiab] OR comparison*[tiab] OR controlled-clinical-trial*[tiab] OR controlled-clinical-stud*[tiab] OR crossover*[tiab] OR cross-over*[tiab] OR double-blind*[tiab] OR doubleblind*[tiab] OR "group"[tiab] OR group'*[tiab] OR groups*[tiab] OR "control"[tiab] OR control'*[tiab] OR "controls"[tiab] OR controls'*[tiab] OR controll*[tiab] OR controlgroup*[tiab] OR volunteer*[tiab] OR ((singl*[tiab] OR doubl*[tiab] OR trebl*[tiab] OR tripl*[tiab]) AND (mask*[tiab] OR blind*[tiab])) OR latin-square*[tiab] OR multicenter*[tiab] OR multi-center*[tiab] OR multicentre*[tiab] OR multi-centre*[tiab] OR 4-arm*[tiab] OR four-arm*[tiab])	252

Date	Database	Strategy	Number of references
09-12-2019	Embase - OVID-version - 1974 to 2019 december 06.	 (exp aged/ OR aged*.ti,ab,kw. OR aging*.ti,ab,kw. OR ageing*.ti,ab,kw. OR elder*.ti,ab,kw. OR geriatr*.ti,ab,kw. OR geront*.ti,ab,kw. OR frail*.ti,ab,kw. OR octogenarian*.ti,ab,kw. OR octo-genarian*.ti,ab,kw. OR nonagenarian*.ti,ab,kw. OR nona-genarian*.ti,ab,kw. OR non-agenarian*.ti,ab,kw. OR centenarian*.ti,ab,kw.) AND (exp emergency health service/ OR exp emergency medical dispatch/ OR exp hospital emergency service/ OR exp psychiatric emergency service/ OR exp emergency treatment/ OR exp emergency nursing/ OR exp emergency medicine/ OR emergenc*.ti,ab,kw. OR emer-genc*.ti,ab,kw. OR “ed”.ti,ab,kw. OR “eds”.ti,ab,kw. OR ed’s*.ti,ab,kw. OR “er”.ti,ab,kw. OR “ers”.ti,ab,kw. OR er’s*.ti,ab,kw. OR accident department*.ti,ab,kw. OR “accident dept”.ti,ab,kw. OR (trauma*.ti. AND (center*.ti. OR centre*.ti.)) OR trauma center*.ti,ab,kw. OR trauma centre*.ti,ab,kw. OR (trauma*.ti. AND hospital*.ti.) OR trauma hospital*.ti,ab,kw. OR (acute*.ti. AND (service*.ti. OR care*.ti. OR centre*.ti. OR center*.ti.)) OR acute service*.ti,ab,kw. OR acute care*.ti,ab,kw. OR acute center*.ti,ab,kw. OR acute centre*.ti,ab,kw. OR (urgen*.ti. AND (service*.ti. OR care*.ti. OR centre*.ti. OR center*.ti.)) OR urgency service*.ti,ab,kw. OR urgent service*.ti,ab,kw. OR urgent care*.ti,ab,kw. OR urgent center*.ti,ab,kw. OR acute centre*.ti,ab,kw. OR urgent-centre*.ti,ab,kw.) AND (((exp rehabilitation/ OR aftercare/) AND exp telephone/) OR post-discharge follow-up*.ti,ab,kw. OR postdischarge follow-up*.ti,ab,kw. OR post-discharge-followup*.ti,ab,kw. OR postdischarge followup*.ti,ab,kw. OR (interven*.ti. AND (phone*.ti. OR telephon*.ti.)) OR ((phone*.ti. OR telephon*.ti.) AND (postdischarge*.ti. OR discharge*.ti. OR follow-up*.ti. OR followup*.ti.)) OR postdischarge phon*.ti,ab,kw. OR post-discharge-phon*.ti,ab,kw. OR postdischarge telephon*.ti,ab,kw. OR post-discharge telephon*.ti,ab,kw. OR discharge-phon*.ti,ab,kw. OR discharge telephon*.ti,ab,kw. OR phone follow-up*.ti,ab,kw. OR phone-followup*.ti,ab,kw. OR telephone follow-up*.ti,ab,kw. OR telephone followup*.ti,ab,kw. OR follow-up phon*.ti,ab,kw. OR followup-phon*.ti,ab,kw. OR follow-up telephon*.ti,ab,kw. OR followup telephon*.ti,ab,kw.) AND (exp clinical trial/ OR exp comparative study/ OR exp evaluation study/ OR exp crossover procedure/ OR exp multicenter study/ OR exp randomization/ OR exp double blind procedure/ OR exp single blind procedure/ OR exp placebo/ OR “trial”.ti,ab,kw. OR trial’*.ti,ab,kw. OR random*.ti,ab,kw. OR placebo*.ti,ab,kw. OR sham*.ti,ab,kw. OR comparison*.ti,ab,kw. OR controlled-clinical-trial*.ti,ab,kw. OR controlled-clinical-stud*.ti,ab,kw. OR crossover*.ti,ab,kw. OR cross-over*.ti,ab,kw. OR double-blind*.ti,ab,kw. OR doubleblind*.ti,ab,kw. OR “group”.ti,ab,kw. OR group’*.ti,ab,kw. OR groups*.ti,ab,kw. OR “control”.ti,ab,kw. OR control’*.ti,ab,kw. OR “controls”.ti,ab,kw. OR controls’*.ti,ab,kw. OR controll*.ti,ab,kw. OR controlgroup*.ti,ab,kw. OR volunteer*.ti,ab,kw. OR ((singl*.ti,ab,kw. OR doubl*.ti,ab,kw. OR trebl*.ti,ab,kw. OR tripl*.ti,ab,kw.) AND (mask*.ti,ab,kw. OR blind*.ti,ab,kw.)) OR latin-square*.ti,ab,kw. OR multicenter*.ti,ab,kw. OR multi-center*.ti,ab,kw. OR multicentre*.ti,ab,kw. OR multi-centre*.ti,ab,kw. OR 4-arm*.ti,ab,kw. OR four-arm*.ti,ab,kw.)	297

Date	Database	Strategy	Number of references
09-12-2019	Cochrane Library	 Four *separated* searches, combined *afterwards*: (aged* OR aging* OR ageing* OR elder* OR geriatr* OR geront* OR frail* OR octogenarian* OR (octo NEXT genarian*) OR nonagenarian* OR (nona NEXT genarian*) OR (non NEXT agenarian*) OR centenarian*):ti,ab,kw AND (emergenc* OR (emer NEXT genc*) OR “ed” OR “eds” OR “er” OR “ers” OR (accident NEXT department*) OR (accident NEXT dept) OR (trauma NEXT center*) OR (trauma NEXT centre*) OR (trauma NEXT hospital*) OR (acute NEXT service*) OR (acute NEXT care*) OR (acute NEXT center*) OR (acute NEXT centre*) OR (urgency NEXT service*) OR (urgent NEXT service*) OR (urgent NEXT care*) OR (urgent NEXT center*) OR (acute NEXT centre*) OR (urgent NEXT centre*)):ti,ab,kw OR ((trauma* AND (center* OR centre*)) OR (trauma* AND hospital*) OR (acute* AND (service* OR care* OR centre* OR center*)) OR (urgen* AND (service* OR care* OR centre* OR center*))):ti AND ((post NEXT discharge NEXT follow NEXT up*) OR (postdischarge NEXT follow NEXT up*) OR (post NEXT discharge NEXT followup*) OR (postdischarge NEXT followup*) OR (postdischarge NEXT phon*) OR (post NEXT discharge NEXT phon*) OR (postdischarge NEXT telephon*) OR (post NEXT discharge NEXT telephon*) OR (discharge NEXT phon*) OR (discharge NEXT telephon*) OR (phone NEXT follow NEXT up*) OR (phone NEXT followup*) OR (telephone NEXT follow NEXT up*) OR (telephone NEXT followup*) OR (follow NEXT up NEXT phon*) OR (followup NEXT phon*) OR (follow NEXT up NEXT telephon*) OR (followup NEXT telephon*)):ti,ab,kw OR ((interven* AND (phone* OR telephon*)) OR ((phone* OR telephon*) AND (postdischarge* OR discharge* OR (follow NEXT up*) OR followup*))):ti AND (“trial” OR trial’* OR random* OR placebo* OR sham* OR comparison* OR (controlled NEXT clinical NEXT trial*) OR (controlled NEXT clinical NEXT stud*) OR crossover* OR (cross NEXT over*) OR (double NEXT blind*) OR doubleblind* OR “group” OR group’* OR groups* OR “control” OR control’* OR “controls” OR controls’* OR controll* OR controlgroup* OR volunteer* OR ((singl* OR doubl* OR trebl* OR tripl*) AND (mask* OR blind*)) OR (latin NEXT square*) OR multicenter* OR (multi NEXT center*) OR multicentre* OR (multi NEXT centre*) OR (4 NEXT arm*) OR (four NEXT arm*)):ti,ab,kw	199

Additional file 2. Overview of websites that were searched on December 9, 2019 to identify eligible articles and studies:

Netherlands Trial Register: www.trialregister.nl
ClinicalTrials.gov: https://ClinicalTrials.gov/
Australian Clinical Trials: https://www.australianclinicaltrials.gov.au/
Australian New Zealand Clinical Trials Registry: http://www.anzctr.org.au/
World Health Organization's International Clinical Trials Registry Platform: http://apps.who.int/trialsearch/
EU Clinical Trials Register: https://www.clinicaltrialsregister.eu/
OpenGrey: http://www.opengrey.eu/
Google Scholar

Additional file 3. Data extraction template

Form version/date *(eg. Version 1.4, 5 August 2019)*
Review Title
Study ID *(Surname and Year)*
Name of review author completing this form
Date form completed
Name of review author checking the data extracted to this form
Other information and notes

Author contact details for study	
Further information required	
Correspondence with authors successful or not; what information was received and when	
Will any additional unpublished data supplied by the authors be included in the review? **If so, note that the study will include unpublished data**	
Notes *(Unpublished – for own use)* *eg. references to be followed up, source of information especially if multiple reports of same trial, or unpublished data/personal communication included.*	

Section 2: Methods of the study
Details of Study (to be reported in the Characteristics of Included Studies tables)
Aim of study *(As stated in the trial report/s. What was the trial designed to assess?)*
Study design
Number of arms or groups (including control groups); briefly describe each
Consumer involvement *(eg. In design of study and/or intervention; in delivery of intervention; in evaluation of intervention; in interpretation of study findings)*

Funding source (also include any details about possible or explicit conflicts of interest)

Informed consent obtained? *(Yes/No/Unclear)*
Ethical approval *(Yes/No/Unclear)*

Section 3: Risk of Bias assessment

This has been adapted directly from Cochrane Handbook: The Cochrane Collaboration's tool for assessing risk of bias

Domain	Review authors' judgement	Instructions
Random sequence generation[1]	***High risk*** ***Unclear*** ***Low risk***	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.
Allocation concealment	***High risk*** ***Unclear*** ***Low risk***	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment.
Blinding of participants and personnel *Assessments should be made for each main outcome (or class of outcomes)*	***High risk*** ***Unclear*** ***Low risk***	Describe all measures used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. Note that the impact of performance bias must be considered and reported even if blinding of participants and/or personnel is not possible for the type of intervention being evaluated[2,3]
Blinding of outcome assessment *Assessments should be made for each main outcome (or class of outcomes)*	***High risk*** ***Unclear*** ***Low risk***	1. Describe all measures used, if any, to blind outcome assessors from knowledge of which intervention a participant received. 2. Provide any information relating to whether the intended blinding was effective. Blinding of outcome assessment can be feasible even if blinding of participants and personnel is not.

Notes on rating

Quasi-RCTs and Controlled Before and After (CBA) studies must be rated as 'High risk' for random sequence generation as the methods were not, by definition, truly random.
If you are including only RCTs in your review, papers marked 'High risk' should be excluded as they are not truly randomised.
Note that to exclude a study on this basis there must be agreement on this decision by at least two authors.

Quasi-RCTs are likely to be rated 'High risk' but there may be exceptions.
CBA Studies should be rated 'High risk.

Consider:

1. Did the study attempt to blind the participants and/or personnel so that they did not know who received the intervention? Note that it may be possible to blind one but not the other (*eg participants but not personnel, or vice versa*)
2. Were the measures that the study took to blind participants and/or personnel to study groups effective (or not)?

These points will help to make the decision about whether the study is likely to be affected by performance bias (high, unclear, or low risk).
Even in studies of informational or educational interventions it may be possible (though difficult) to effectively blind participants and/or personnel to intervention status (*eg measures such as a 'placebo' video, control information brochure, blank instructional booklet*).
Please note that when making sense of the risk of bias ratings, you will need to consider the effects of blinding and incomplete outcome data by outcome, not just by study.

The implications of whether outcome assessment was blinded, and how effectively, may differ across outcomes. Blinding of outcome assessment should therefore be considered separately for each outcome.[3]
Outcomes may be assessed using subjective or objective measures, and by self-reported or other means. They may be assessed by research personnel or by participants.
To deal with this complexity, the following points are suggested as a guide:
For **personnel-measured** outcomes:
eg case notes, observed medicine taking, rate of participation

- Participants blinded
  - Personnel blinded: LOW risk
  - Personnel not blinded: HIGH risk
- Participants not blinded
  - Personnel blinded: UNCLEAR risk
  - Personnel not blinded: HIGH risk

For **self-reported outcomes:**
eg knowledge, self-reported compliance, anxiety

- Participants blinded
  - Personnel blinded: LOW risk
  - Personnel not blinded or unclear whether blinded: UNCLEAR risk
- Participants not blinded
  - Personnel blinded or unclear whether blinded: UNCLEAR risk
  - Personnel not blinded: HIGH risk

Domain	Review authors' judgement	Instructions
Incomplete outcome data *Assessments should be made for each main outcome (or class of outcomes)*	***High risk*** ***Unclear*** ***Low risk***	Describe the completeness of outcome data for each main outcome, including attrition (loss to follow up, withdrawn) and exclusions from the analysis. Note that the participant numbers and reasons reported in the 'Participants' section of this form (below) should be used as a basis for making these decisions. State whether attrition and exclusions were reported, the numbers in each intervention group (compared with total randomized participants), reasons for attrition/ exclusions where reported, and any re-inclusions in analyses performed by the review authors.

Notes on rating

The following ratings are suggested as a guide for rating this item:

High risk

- Reasons for missing data are related to the outcome, and there is imbalance in numbers or reasons for missing data across study groups (*eg more people dropped out of the intervention than control group because of adverse events of a study medication*).
- The proportion of data missing or plausible effect size is large enough to have a clinically relevant effect.
- Analysis was not performed on an 'intention to treat' basis (where people are analysed in the groups to which they were randomly assigned, irrespective of what happened during the study).
- Imputation (entering substitute data to take the place of missing data) was done inappropriately.

Unclear risk

- The data is poorly reported - it is not clear how many participants/ data were lost from the study groups, and/or what the reasons for missing data were.

Low risk

- No data is missing.
- Reasons for missing data are not related to the outcome.
- Missing data is balanced across the study groups, and reasons for missing data are similar across groups.
- The proportion of data missing or plausible effect size is not large enough to have a clinically relevant effect.

The impact of missing data must be assessed for each outcome (or group of outcomes), as it may vary, and must also be considered at different time points if data was collected at different times. Assessing the completeness of outcome data must take into account:

1. How much data is missing from each group?
2. Why is it missing?
3. How was the data analysed?

Domain	Review authors' judgement	Instructions
Selective reporting	***High risk*** ***Unclear*** ***Low risk***	State how the possibility of selective outcome reporting was examined by the review authors, and what was found.

Notes on rating

1. No simple rule applies across the board; although the overall proportion of missing data is one thing to consider (*eg 50% of data missing would be more of a concern than 5%*). However, a judgement about attrition bias also relies on an assessment of whether enough data is missing that it could meaningfully affect the results. Assessing this means considering:

- For dichotomous data: is the outcome rare or more common? If rare, only a few missing data could change the conclusions, whereas if the outcome is more common much more data could be missing before the conclusions would be altered.
- For continuous data: could the values for the missing participants be extremely different to the calcuated mean for the sample available? If the missing values could not be very different to the mean value, it would take a lot of missing data to alter the mean. On the other hand, if the missing values could be very different to the estimated mean value, fewer missing data could produce a different mean.

2. Reasons for missing data must also be considered. If the reason is not related to the outcome (eg people moved house and could no longer participate), this is described as data missing at random and is unlikely to systematically influence (bias) the results. If the reason for missing data is related to the outcome however, and this is different across study groups (*eg more people dropped out of the intervention than control group because of adverse events of a study medication*), this can introduce bias.
3. Different re-analysis techniques may disrupt the randomisation set up for an RCT and so should be looked at carefully when assessing this risk of bias item. Refer to online training materials and Handbook.

Please note that when making sense of the risk of bias ratings, you will need to consider the effects of blinding and incomplete outcome data by outcome, not just by study.

The following ratings are suggested as a guide:

High risk:

- If a protocol for the study is available, and outcomes identified in the protocol are not reported by the study; and/or
- Outcomes reported in the methods section are not reported as planned (ie as results for the study); and/or
- Expected outcomes are reported but done in such a way that they cannot be included in the review's analyses (*eg the study reports a result as 'statistically significant'; but does not provide the specific numerical or other data that could be included in the analysis of that outcome*).

Unclear risk:

- If no protocol for the study is available (and all expected outcomes reported in the methods are reported as planned)

Low risk:

- A protocol for the study is available and all expected outcomes are identified and reported as planned by the study.

Domain	Review authors' judgement	Instructions
Other sources of bias	***Note: all answers should follow the format:*** ***High risk*** ***Unclear*** ***Low risk***	State any important concerns about bias not addressed in the other domains in the tool.

1 Please note that contact with authors of an included study may mean that some decisions need to be revised. For example, if information from study authors confirms that the allocation method was not truly randomised, even if the study report describes the study as an RCT, (and only RCTs were eligible for inclusion in the review), the study would then need to be excluded from the review.

2 For example: if participants and personnel cannot be blinded effectively to the intervention, this item would be rated as at high risk of bias for performance bias, with a reason for this decision reported as (for example) 'Participants and personnel were not able to be blinded to intervention' in the risk of bias tables.

3 For example, objective outcome measures (eg chart review, electronically recorded medicine taking, mortality) might be less affected by a lack of blinding than the potential effect of unblinded outcome assessment on subjective outcomes (eg pain, self-reported adherence, quality of life). Similarly, for blinding of participants and personnel the risk of bias may be high for some outcomes if unblinded (eg behavioural, socially desirable or some self-reported outcomes) but less likely to affect others such as mortality.

	Notes on rating
	If particular questions/entries were pre-specified in the review's protocol, responses should be provided for each question/entry. Note that any other sources of bias identified here must have the potential to introduce systematic errors in the results of the study (not involve other aspects of the study that should be reported elsewhere in the review). Assessing other sources of bias is not essential but should be guided by the study designs included in the review. Do not assess in this domain aspects of conduct of the study, such as those: • associated with the 'quality' of a study *eg ethical criteria – such as whether the study obtained ethics approval;* • related to precision of the study *eg use of a power calculation* • linked to reporting standards or • related to validity and/or reliability of outcome measures These aspects of the study can be collected and reported in the 'Characteristics of included studies' table.

Section 4: Study characteristics - Participants

Description *(eg. Patients/consumers; carers; parents of patients/consumers; health professionals; well people in the community)*
Geographic location *(eg. City/State/Country)*
Setting (*eg. Community, home, primary health centre, acute care hospital, extended care facility)*
Methods of recruitment of participants *(How were potential participants approached and invited to participate?)*
Inclusion/exclusion criteria for participation in study
Numbers involved:

Study numbers	Number
Eligible for inclusion	
Excluded	
Refused to take part	
Randomised to intervention group(s)	
Randomised to control group	
Excluded post randomisation (for each group; with reasons if relevant)	
Withdrawn (for each group; with reasons if relevant)	
Lost to follow up (for each group; with reasons)	Intervention group (with reasons)
	Control group (with reasons)
Included in the analysis (for each group, for each outcome)	Outcome 1 Intervention Control
	Outcome 2 Intervention Control

Section 5: Study characteristics - Interventions

Data should be extracted for each relevant (included) intervention arm, as well as the control arm. Information on any co-interventions (if applicable) should also be recorded.

Item	Explanation, notes	Intervention	Control and usual care
1 Intervention name	Include a brief name or phrase that describes the intervention (*including definition of any acronyms or abbreviations*)		
2 Aims and rationale ('why?')	Aim(s) of intervention *(as stated in the trial report/s. What was the problem that this intervention was designed to address?)*		
3 What was done?	Materials: Describe the content, format(s) or media, source of materials (if possible, where they can be accessed), and any other information relevant to the physical or information materials provided to participants or in training providers of the intervention. Procedures: Describe each of the processes used in delivering the intervention *(eg education, telephone follow-up, case management)* *Note that some complex interventions require additional support activities to be implemented, and if so details of these should also be reported.* *Note also that some complex interventions require sequencing of activities, whereas for others the order of delivery is less critical.* Mode of delivery: Describe the mode of delivery of the intervention, such as whether it was delivered face-to-face (*eg in patient consultation, educational session, training*) or at a distance *(eg via phone, internet, mail);* and whether the delivery was to individuals or groups of participants. Co-interventions: Describe the delivery of any co-interventions (*Co-interventions may be separate to the intervention of interest, or they may be other similar elements in a suite of interventions which have a common purpose*).		

Item	Explanation, notes	Intervention	control and usual care
4 Who delivered the intervention?	Describe who was involved in delivery of each component of the intervention and/or each different intervention provider. 'Intervention provider' could for example be taken to mean a health professional or it could mean a consumer peer advocate. Include description of any specific training given to providers to deliver the intervention, numbers of providers, professional background, specific pre-existing skills or experience required, quality of any specific training received to deliver the intervention, and any measures of competence or consistency in delivering the intervention recorded before or during the study.		
6 Where was the intervention provided?	Describe the features of the setting (location) that might be relevant to intervention delivery *(eg country, type of clinic, primary or hospital care).* If the location varied this should be described, with relevant features that might affect the intervention delivery; as should any requisite features of the location that might impact on intervention delivery or feasibility *(eg location close to participants' usual doctor, availability of equipment)*		
7 When and how often or how much of the intervention was provided?	Describe how the intervention was delivered, such as stages, timing, frequency, number of sessions, intensity and duration of intervention delivery.		
8 Was the intervention tailored?	If the intervention was meant to be tailored or personalised in the course of the study, describe the rationale for this and the major features of what was done - such as: how? why? when? and what? was done to tailor the intervention. If particular decision rules were used to determine when or how to tailor the intervention details should be provided.		
9 Was the intervention modified or adapted?	If the intervention was changed during the study, this should be described *(eg unforseen modifications required, changes in study circumstances requiring modifications to the intervention).* If such modifications happen, why, what, how and when the intervention was changed should be described.		

Item	Explanation, notes	Intervention	control and usual care
10 How well was the intervention delivered?	Assessment of fidelity: if intervention fidelity was assessed, describe the extent to which the intervention was delivered as intended. (*ie the amount or type of intervention planned for delivery might differ from what was actually delivered*) If strategies to maintain intervention fidelity were planned before intervention delivery, or were used during the study, describe these, along with any materials or tools used.		

**Table is adapted from Hoffman et al (2014). Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ; 348:g1687.

Section 6: Study characteristics - Outcomes and comparison groups

Please also note that it may be useful to include a note about the direction of the effect alongside your extracted data. This may be helpful especially in cases where a number of different scales are used to report findings (across studies) and/or when sometimes an effect of an intervention is framed as a positive effect (eg increased symptom-free days) and as a negative effect (eg decrease in symptoms). This will help to ensure that there are no errors introduced once the extracted data is brought together across different studies (for a given outcome).

Primary outcomes			
Outcome	Method of assessing outcome measures *eg phone survey, questionnaire*	Method of follow-up for non-respondents	Timing of outcome assessment *(including frequency, length of follow up)*

Secondary outcomes			
Outcome	Method of assessing outcome measures *eg, phone survey, questionnaire*	Method of follow-up for non-respondents	Timing of outcome assessment *(including frequency, length of follow up)*

Notes field

For example:

- *Contact with author (Yes (information obtained)/No) (SEE NOTE ON PAGE 1)*
- *Record if the study was translated from a language other than English.*
- *Record if the study was a duplicate publication.*

Section 7: Data and results

All data are numbers (of patients/units), not percentages.

Dichotomous outcomes

Outcome	Timing of outcome assessment (days/ months)	Intervention group*		Control group		Notes
		Observed (n)	Total (N)	Observed (n)	Total (N)	

**Note: add additional columns if there is more than one intervention group, eg. Intervention Group A, Intervention Group B…*

Continuous outcomes

Outcome	Timing of outcome assessment (days/ months)	Intervention group			Control group			Notes
		*Mean / Mean change	Standard deviation	N	*Mean / Mean change	Standard deviation	N	

**delete as appropriate*

Other results or data:

For example:

- additional data collected only for some participants that may be important for understanding the effects of the interventions (particularly if they relate to primary outcomes and/or adverse events)
- qualitative data that sits alongside the evaluation of effectiveness
- statements about the effects of interventions, reported without the numerical or supporting data (eg reported as 'knowledge was significantly higher in the intervention group'). Note that if this kind of data is reported in the review it must be clearly identified as such.

Additional table 1. Risk of bias of the included studies on seven domains

Author, date, country, setting	Biese et al, 2014, USA, academic center ED	Biese et al, 2018, USA, academic center ED
Random sequence generation	Blinded, block randomization	Randomization with randomly generated block sizes of 4, 6 and 8
Allocation concealment	Blinded, using marbles in a bag	Blinded, using random sequence generator, imbedded in the computer program
Blinding of participants/ personnel	Patients were blinded. Nurse who did intervention was not blinded. Telephone calls were scripted.	Patients were blinded. Nurses who did intervention were not blinded. Calls were scripted, recorded and reviewed to ensure adherence to the scripts.
Blinding of outcome assessment	Research assistants who did data collection phone calls were blinded for randomization, but might have known who was in the control group, as they had to perform a mental screening test only in control group patients, whereas other patients were tested earlier.	Investigators were blinded for randomization. Unclear whether nurses who did data collection phone calls after 30 days were blinded for randomization. Statistician was not blinded.
Incomplete outcome data	Incomplete data of 6 (4.5%) patients. 37 (23.6%) Eligible patients were not included, due to refusal or not being reached. Unclear whether patients were analyzed according to intention to treat.	Loss to follow-up was limited (<1%), equally divided over groups and reasons for missing data were described. Many eligible patients were not included, due to decline or not being reached.
Selective reporting	Research protocol published in advance. Methods are followed and expected outcomes reported as planned.	Research protocol published in advance. Methods are followed and expected outcomes reported as planned.
Other bias	Single center Most outcome data were self-reported by patients. Unknown how often the nurse helped patients making follow-up appointments. Exclusion of potentially important individuals: patients not instructed to seek outpatient follow-up, patients visiting the ED in the weekend and patients and caregivers who did not pass the mental cognition screening examination.	Single center Many outcomes were self-reported by patients. Participation bias not excluded as number of hospital admissions in both groups lower than expected. After all underpowered study due to lower number of hospital admissions than predicted. Patients and caregivers who did not pass the mental cognition screening examination were excluded.

ED, Emergency department; *USA*, United States of America

CHAPTER 5

Telephone follow-up to reduce unplanned hospital returns for older ED patients: a randomized trial

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ABSTRACT

Background/objectives

Telephone follow-up calls could optimize transition from the Emergency Department (ED) to home for older patients. However, effects on hospital return rates are not clear. We investigated whether telephone follow-up reduces unplanned hospitalizations and/or unplanned ED return visits within 30 days of ED discharge.

Design

Pragmatic randomized controlled trial with allocation by month; odd months intervention group, even months control group.

Setting

Two ED locations of a non-academic teaching hospital in The Netherlands.

Participants

Community-dwelling adults aged ≥70 years, discharged home from the ED were randomized to the intervention group (N= 4732) or control group (N=5104).

Intervention

Intervention group patients: semi-scripted telephone call from an ED nurse within 24 hours after discharge to identify post-discharge problems and review discharge instructions. Control group patients: scripted satisfaction survey telephone call.

Measurements

Primary outcome: total number of unplanned hospitalizations and/or ED return visits within 30 days of ED discharge. Secondary outcomes: separate numbers of unplanned hospitalizations and ED return visits. Subgroup analysis by age, sex, living condition and degree of crowding in the ED at discharge.

Results

Overall, 42% were males, and median age was 78 years. In the intervention group, 1516 of 4732 patients (32%) consented, and in the control group 1659 of 5104 (33%) patients. Unplanned 30-day hospitalization and/or ED return visit was found in 16% of intervention group patients and 14% of control group patients (odds ratio 1.16; 95% confidence interval: 0.96-1.42). Also, no statistically significant differences were found in secondary outcome measures. Within the subgroups, the intervention did not have beneficial effects for the intervention group.

Conclusion

Telephone follow-up after ED discharge in older patients did not result in reduction of unplanned hospital admissions and/or ED return visits within 30 days. These results raise the question of whether other outcomes could be improved by post-discharge ED telephone follow-up.

INTRODUCTION

The number of older patients visiting emergency departments (EDs) is increasing.[1,2] Studies following older patients after discharge from the ED have reported that 10-22% have an unplanned ED return visit within one month.[1-4] In addition, these patients appeared to be at increased risk of hospitalization, loss of functional independence and death.[1-3,5-7]

In general, ED return visits and hospital admissions are viewed as unfavorable and have been identified as a quality indicator of care.[3,8-10] Although unplanned ED return visits could be solely considered as an indicator of functional decline,[3,11] they may also be a result of inadequate care transitions from the ED to home.[1,2,12,13] The transition to home after ED discharge involves communication of complex information concerning the diagnosis, discharge instructions, medication use and follow-up care at a time when patients are easily distracted by anxiety, stress or discomfort, causing difficulties in perceiving and processing this information.[12,14,15] This may be even more complicated when the ED is crowded and ED personnel experiences time pressure while delivering discharge information.[12,15] Older adults may have a higher risk of poor understanding of discharge instructions, because of cognitive and sensory impairments.[12,16,17]

Telephone follow-up has been identified as a practical and inexpensive method to offer transitional care in the post-ED discharge period.[14,18-21] By repeating discharge information and providing additional care during a telephone follow-up call, it is likely that this intervention could prevent ED return visits that are due to misunderstanding of information, anxiety or lack of support.[12,22-24] Currently an increasing number of hospitals have started to implement this service.[25] However, up to now only few studies examined the feasibility and effectiveness of telephone follow-up for older patients after discharge from the ED.[4,18,20,21,26-28] A recent systematic review on this topic could not demonstrate a benefit of the intervention, but only two high-quality studies met eligibility criteria for this review.[4,21,27] Only one large randomized controlled trial (RCT) assessed the effect of telephone follow-up for older patients on hospitalization and ED return visits within 30 days after ED discharge, reporting no benefit of the intervention.[4] However, the study investigated the effect on both planned and unplanned admissions and ED return visits. These could be considered opposite outcomes, as return to the hospital for a planned admission or ED visit implies discharge plan adherence, while unplanned hospital returns may result from failure to comply with discharge instructions or insufficient (transitional) care. Combining these opposite outcomes could obscure a beneficial effect of telephone follow-up on unplanned hospital returns.

Therefore, the objective of this study was to examine the effects of a telephone follow-up call for community-dwelling patients aged 70 years and older after discharge from the ED on unplanned hospital admissions and/or ED return visits within 30 days.

We also explored whether the effects of telephone follow-up were different for subgroups of patients at high risk for hospital return, including older age,[3,6,29] male sex [3,6,30] and living alone,[1,2,31,32] and for patients who were discharged when the ED was busy.

METHODS

Study design

In this pragmatic RCT, patients aged 70 years and older were randomized according to the month of their ED visit; patients included in odd months received an intervention telephone call and patients included in even months received a satisfaction survey telephone call.

The Medical Ethics Review Committee of Haaglanden Medical Center (HMC) approved the study, which closely followed routine care (METC Zuidwest Holland, nr. 17-028). The trial was conducted in adherence to the Consolidated Standards of Reporting Trials[33] and registered in the Netherlands Trial Register (Trial NL6598).

Participants

Patients were eligible if they were discharged from one of the EDs of HMC to an unassisted living environment during the trial period from February 1, 2018 to July 1, 2019.

The exclusion criteria were: hospital admission, discharge to nursing home or another care facility or assisted living environment and planned follow-up appointment at an outpatient clinic or ED within 24 hours. A planned follow-up appointment was an appointment following the index ED visit that could be foreseen at the time of ED discharge.[34]

Of patients with more than one ED visit during the study period, only the first telephone call was included. If a patient had more than one ED return visit or hospital admission during the 30-day follow up period, only the first unplanned ED return visit or hospital admission was counted.

Hospital admissions and ED return visits were defined as unplanned if they could not be foreseen at the time of discharge from the index ED visit.[34]

Setting

The trial was performed in the two EDs of HMC, a non-academic, inner-city teaching hospital in The Hague, The Netherlands. In 2018, location Westeinde received 53,000 patients of which 18% were 70 years or older and location Bronovo received 28,000 patients, of which 25% were ≥70 years.

Procedures

Telephone follow-up was integrated in the daily practice of the EDs. Every morning ED nurses received a list with hospital numbers and destinations of all patients aged 70 years and older who had been discharged from the ED during the previous 24 hours.

Per patient, trained ED nurses made a maximum of three call attempts at different times of the day during quiet moments of their shift. The nurse explained the nature of the telephone call and asked for consent to participate. If the patient was not available or able to answer the phone, a spouse, family member or caregiver received the explanation and the request to participate. Informed consent was noted in the case report form (CRF), integrated in the patient's electronic medical file. After indicating in the CRF whether it was an even or odd month, the questionnaire of the matching month opened (see Supplementary File 1 and 2).

The calling nurses were not blinded to the intervention.

Telephone follow-up was not possible in case of a non-existing telephone number, lack of a working telephone, missing notes in the electronic medical records (EMR), electronic hospital system (EHS) malfunctioning, advanced impaired cognition, severe language barrier, and deafness in patients without an available spouse or caregiver. A patient was defined as having advanced impaired cognition if the diagnosis dementia or impaired cognition was recorded in the patient's EMR and the patient was not able to understand information or to have a structured conversation during the ED visit. If patients were not reached or not approached, the reason was indicated in the CRF.

In order to investigate healthcare use of participants during the 30 days after ED discharge, we performed a second telephone call after 30 days between October 1, 2018 and March 15, 2019.

Intervention

Participants in the intervention group received a semi-scripted telephone call from a trained ED nurse to identify post-discharge problems and to offer additional information. ED nurses were taught how to adapt the conversation to the patient's health problem (Supplementary File 1). Participants were asked to repeat the discharge instructions to explore whether more explanation was needed. Advice was given if the patient was not feeling well. When indicated, additional assistance was

offered, for example, the pharmacy was called to deliver medication to the patient's home or home care services were arranged. Participants who reported serious symptoms were advised to visit their GP or to revisit the ED.

Participants in the control group received a scripted survey that assessed satisfaction with their ED visit (Supplementary File 2). The five questions were derived from a validated patient satisfaction questionnaire (Picker Patient Experience Questionnaire (PPE-15)).[35] Participants were not asked about their wellbeing or about post-discharge problems. Trained ED nurses performed the satisfaction survey calls, assisted by trained final year medical and nursing students between October 1, 2018 and March 15, 2019. The purpose of these calls was to control for any effect that a telephone call from the hospital might have. Only patients who turned out to be unwell during the satisfaction survey call or who had urgent medical questions received targeted medical advice.

Training and monitoring of telephone calls

The 57 ED nurses and nine medical and nursing students, who made the telephone calls, received a study training. The script questions were explained and interviewers were taught how to interpret and score the patients' answers. In the presence of one researcher, the ED nurses and students performed a number of trial conversations (ranging from 3 to 15, depending on their performance) to familiarize them with the scripts, before they started to include patients. To ensure script adherence, one researcher regularly attended the telephone conversations, reviewed the CRFs, and provided feedback to the interviewers as needed.

Data collection

Demographic data, data related to the patients' ED visits, and data concerning ED return visits and hospitalizations within 30 days after ED discharge were abstracted from the EHS by an information technology specialist, who was not involved in the study, and organized by a researcher who was blinded to the study groups. For data abstraction, we adhered to the methods as described by Worster.[36]

Outcomes

The primary outcome was the total number of unplanned hospital admissions and unplanned ED return visits within 30 days after ED discharge. If a patient was hospitalized via the ED, following an ED return visit, only the hospital admission was counted for the primary outcome.

Secondary outcomes were the separate numbers of unplanned hospitalizations and unplanned ED return visits within 30 days. If a patient was hospitalized following an ED return visit, both the ED return visit and the hospital admission were counted for the secondary outcomes.

One researcher, who was blinded to the patients' study group, checked in the patients' EMR whether or not the hospital admissions and ED return visits were unplanned.

To investigate whether patients returned to other hospitals than HMC, the number of self-reported ED return visits and hospital admissions to other hospitals was asked during the 30-day follow-up calls. To determine the validity of self-reports, an agreement rate was calculated. The agreement rate was the proportion of subjects whose reported ED visit or hospitalization status was similar to that reported in the EHS.

While conducting the study, but prior to analysis, we further specified the primary outcome measure from both planned and unplanned hospital admissions to the combined outcome of unplanned hospital admissions and/or unplanned ED return visits. We believed that reducing only unplanned hospital returns would be beneficial, as these could be a result of nonadherence with discharge instructions, in contrast to planned returns. We have added unplanned ED return visits to the primary outcome, as we expected the intervention to mainly reduce ED return visits for patient-related reasons, such as misunderstanding of discharge information, uncertainty or lack of support, which did not always require hospitalization.

Subgroups of interest

Additionally, we examined the effects of the intervention in subgroups of patients at high risk for hospital return including age[3,6,29] ([3] or < median age of 78 years), sex,[3,6,30] and living condition (whether or not living alone).[1,2,31,32] Although degree of ED crowding was not associated with increased unplanned hospital return in the literature, our experience is that it can negatively influence communication. In a busy ED, personnel experiences time pressure while delivering discharge information and older patients could be more easily distracted.[12,15] Degree of crowding in the ED at discharge was measured with the National Emergency Department OverCrowding Scale (NEDOCS). The NEDOCS converts a data set into a score that correlates accurately with the degree of crowding as perceived by the staff working at that time.[37] If the NEDOCS is 60 or higher, the department is considered to be busy.[38]

Sample size

The sample size was based on a pilot study of 544 patients, conducted in HMC, reporting a difference of 3% in all hospital admissions after 30 days between the intervention and the control group. We considered a 3% difference in unplanned hospital admissions and/or ED return visits between the groups of clinical relevance. With a power of 80% and a significance level of 0.05, we needed a sample size of 2049 patients per group to find a significant difference in unplanned hospital admissions and/or ED return visits within 30 days.

Analyses plan and statistical methods

Per-protocol analysis of the data was performed. If patients in the control group received additional advice during the satisfaction survey call, it was noted in the CRF. These patients were not excluded from analysis, as they did receive the control intervention.

Statistical significance was tested using the Chi-square tests, with a p-value ≤0.05. Results were tabulated with odds ratios (OR) calculated, including 95% confidence intervals (CI).

Data were analyzed using SPSS, version 26.

RESULTS

The trial ran from February 1, 2018 to July 1, 2019, when the study was stopped prematurely due to unforeseen closure of one of the ED locations.

During the study period, 9836 community-dwelling patients aged 70 years and older were discharged home from the ED, 4732 in odd months and 5104 in even months (Figure 1). Due to shortage of staff, trained ED nurses were not able to call 40% of eligible patients in the intervention group and 36% of patients in the control group (p<0.001). In the intervention group, 32% could not be reached, compared with 31% in the control group (p=0.42). In total, 3175 patients (1827 from location Westeinde and 1348 from location Bronovo) were included and allocated to the intervention (n=1516) or the control (n=1659) group as presented in the flowchart in Figure 1.

In both groups, the median age of the participants was 78 years and 42% were males. Other baseline characteristics were also well balanced between the study groups (Table 1). Baseline characteristics of the participants did not differ from those of patients who were not called (data not shown).

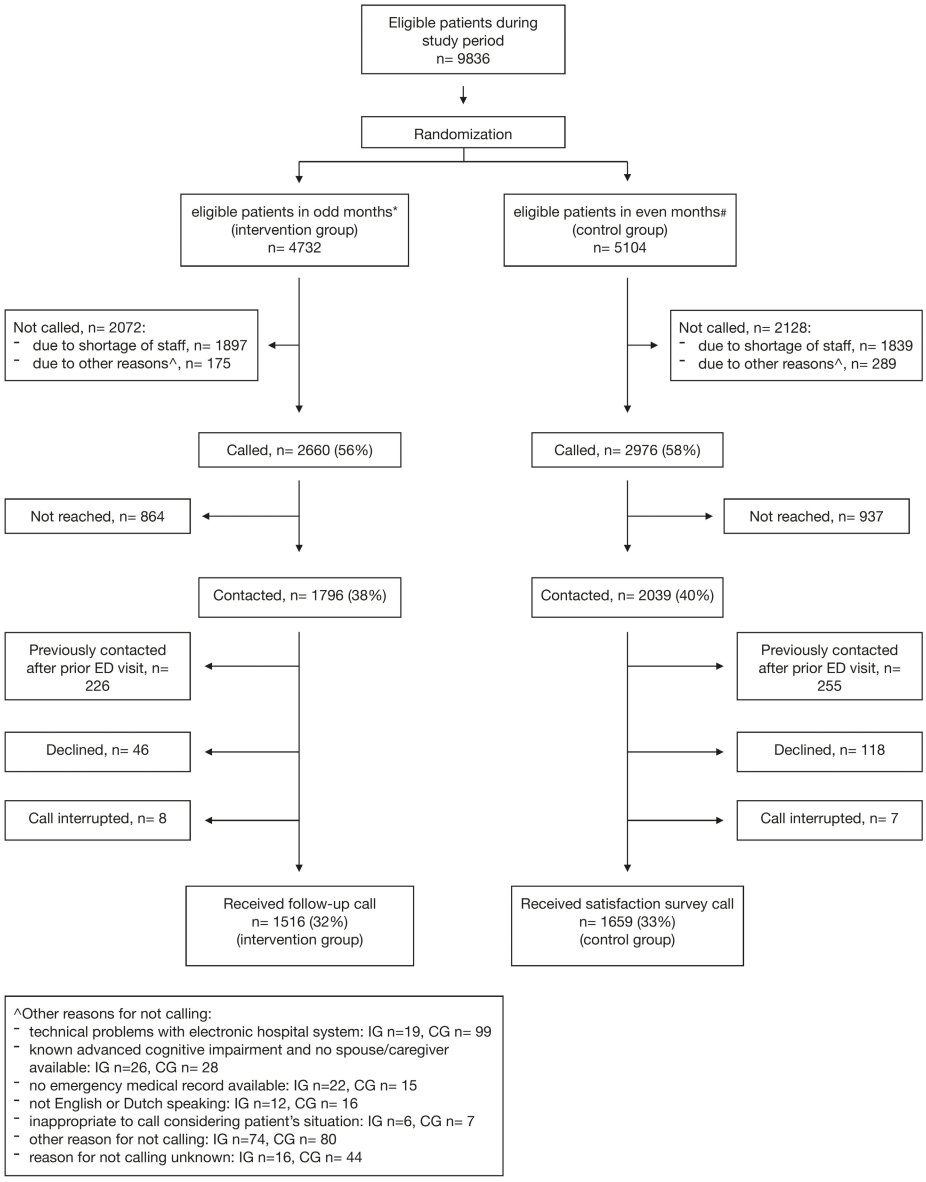

Figure 1. Flow diagram of enrollment and study groups.
*Eight odd months during the study period; #9 even months during the study period
CG, control group; *IG*, intervention group; *n*, number.

Table 1. Baseline patient and ED visit characteristics of patients in the intervention and control groups

	Intervention group (N=1516)	**Control group** (N=1659)
Age in years, median (IQR)	78 (73-83)	78 (73-83)
Male sex, % (n)	42 (635)	42 (694)
Living alone, % (n)*	31 (475)	30 (496)
Mode of referral, % (n)		
- Ambulance	25 (382)	26 (434)
- General practitioner	35 (527)	33 (550)
Transport by ambulance, % (n)	33 (500)	33 (555)
Triage category urgent, % (n)**	72 (1091)	70 (1167)
ED visit at daytime, % (n)	73 (1113)	70 (1162)
Length of ED stay in minutes, median (IQR)	151 (113-210)	154 (108-209)
NEDOCS at discharge ≥ 60^, % (n)	36 (540)	30 (491)

* Living condition unknown in 327 intervention group patients and 367 control group patients
** Triage category urgent: red, orange and yellow according to Manchester Triage System
^ NEDOCS at discharge was missing in 5 intervention group patients and 175 control group patients due to technical malfunction of electronic hospital system on days that patients were discharged from the ED.
ED, Emergency Department; *NEDOCS*, National Emergency Department OverCrowding Scale; *IQR*, Interquartile Range

Of all 3175 patients, 239/1516 (16%) in the intervention group and 230/1659 (14%) in the control group had an unplanned hospital admission and/or unplanned ED return visit within 30 days after ED discharge (OR 1.16, 95% CI: 0.96-1.42)(Figure 2). Separate rates of unplanned hospital admissions and unplanned ED return visits were also not significantly different between the groups (Supplementary Figure 1 and 2).

In both groups, more than half of the hospital admissions and almost all ED return visits were unplanned (Supplementary Table 1 and 2).

In subgroups according to sex and living condition, there was no effect of the telephone intervention on unplanned hospitalization and/or ED return visits (Figure 2). However, in the subgroup of patients aged <78 years, intervention group patients had more unplanned hospital admissions and/or ED return visits than control group patients (18% vs 14%; OR 1.33, 95% CI: 1.01-1.75). A similar effect was seen in the subgroup with NEDOCS<60 at discharge (17% vs 13%; OR 1.32, 95% CI: 1.03-1.70).

	Participants (n)		Unplanned ED revisit/ hospitalization (n)		Odds Ratio (95% CI)
	IG	CG	IG	CG	
All participants	1516	1659	239	230	1.16 (0.96-1.42)
Age, y					
< 78	743	823	130	113	1.33 (1.01-1.75)
≥ 78	773	836	109	117	1.01 (0.76-1.34)
Sex					
Male	635	694	117	110	1.20 (0.90-1.60)
Female	881	965	122	120	1.13 (0.86-1.48)
Living condition*					
Living alone	475	496	91	88	1.10 (0.79-1.52)
Not living alone	714	796	111	116	1.08 (0.81-1.43)
Degree of crowding at discharge^					
NEDOCS < 60	971	993	161	130	1.32 (1.03-1.70)
NEDOCS ≥ 60	540	491	77	66	1.07 (0.75-1.53)

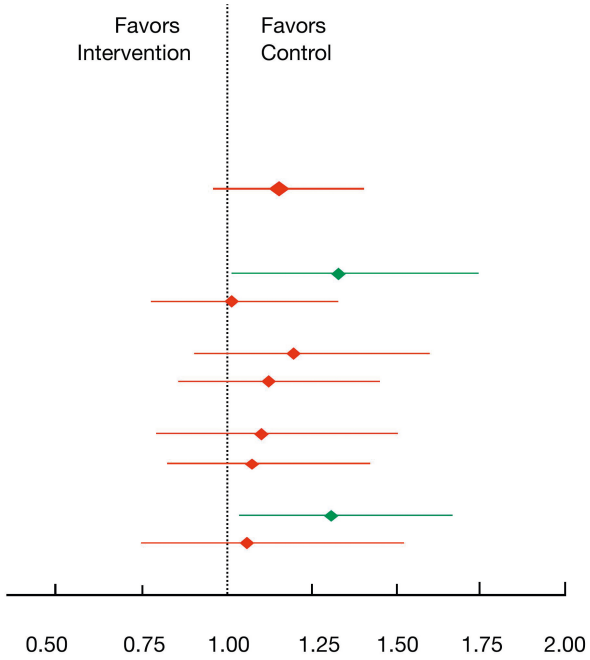

Figure 2. Risk of unplanned hospitalization and/or ED return visit within 30 days, depending on study group. *Living condition unknown in 327 intervention group patients and 367 control group patients

^ NEDOCS at discharge unknown in 5 intervention group patients and 175 control group patients

CG, Control Group; *CI*, Confidence Interval; *ED*, Emergency Department; *IG*, Intervention Group; *NEDOCS*, National Emergency Department OverCrowding Scale.

In the control group, 77 of the 1659 patients (4.6%) received some form of advice or information in addition to the satisfaction survey. After excluding these patients from analysis, the results of the primary and secondary outcomes remained unchanged (data not shown).

None of the 304 patients who were called again after 30 days reported an unplanned hospital admission or ED return visit in another hospital than HMC. The agreement rate between self-reported ED return visits and hospital admissions and EHS data was 96%.

DISCUSSION

This pragmatic RCT examined whether a telephone follow-up call to older community-dwelling adults within 24 hours after discharge home from the ED reduced the number of unplanned hospital admissions and/or ED return visits within 30 days compared to a satisfaction survey telephone call. No difference was found between groups.

In addition, no reduction of unplanned hospital admissions and/or ED return visits was found in any of the subgroups.

These results are in line with the findings of our recent systematic review, examining the effects of telephone follow-up on health-related outcomes in older ED patients, which found no demonstrable effects on health services utilization, and understanding of and compliance with discharge instructions.[27] The results are also in line with the RCT of Biese et al., reporting no effect of a telephone follow-up call for older patients on hospitalization or ED return visits after discharge.

In Biese's trial, patients with cognitive impairment or psychiatric diagnoses were excluded, despite that these patients are at high risk of hospital return. Moreover, the effect of telephone follow-up on unplanned hospital admissions and ED return visits was not investigated.[4] Although these limitations were overcome in our current trial, the results were similar.

The limited telephone accessibility of patients was a limitation of Biese's trial that we could not overcome. Our success rates of reaching eligible patients were in line with other studies.[4,14,39]

In our study, trained ED nurses were not able to call 36% of the eligible patients in the intervention group due to shortage of staff. In the control group more patients were called, as trained students were available during three even months of the study period to conduct satisfaction survey calls. Although some studies reported no time

restrictions, others, especially studies that had not appointed a dedicated nurse to make the telephone calls, mentioned comparable problems.[40]

Although we found no effect of telephone follow-up in the total group of patients, subgroup analysis revealed that in patients aged <78 years and those who left the ED when the NEDOCS was below 60, intervention group patients returned more often to the ED within 30 days than control group patients. Although this effect is reported in previous studies,[41] these results ask for further investigation, as our subgroup analysis was not powered to detect differences between subgroups.

Although a beneficial effect on hospital returns was not found, there is data suggesting that telephone follow-up improves patient satisfaction,[20] and feelings of loneliness and depressive symptoms in older patients at risk, who were discharged from the ED.[42] This could be examined in future research.

In a short review, Nasser et al. reported that telephone follow-up could identify non-compliance with discharge instructions in older ED patients,[28] which may provide insight into which patients may need extra support.

Strengths and weaknesses

To our knowledge, this is the largest study investigating the effects of telephone follow-up in older adults after discharge from the ED. Moreover, this is the first study that focused on the effect of telephone follow-up on unplanned hospital admissions and unplanned ED return visits and explored the effects in subgroups of patients at high risk for hospital return. Patients were included all year round and the telephone calls were integrated in the daily routine of the ED nurses.

In this pragmatic RCT, participants were randomized according to the month of their ED visit. Since telephone follow-up was integrated into the daily practice of our EDs and multiple nurses were conducting the telephone calls at the same time, it was not feasible to allocate participants randomly to the study groups. However, baseline characteristics of the study groups were found to be similar. More importantly, outcome measures were abstracted from the EHS by researchers who were blinded to the study groups.

We had no data on hospital admissions and ED visits in other hospitals. However, based on the interviews after 30 days with 304 study patients, we found that none of them had an unplanned hospital admission or ED visit in any hospital other than HMC. Moreover, the agreement rate between self-reported hospital returns and EHS data was high.

It could be seen as a methodological limitation that we changed the primary outcome measure during the study from all hospital admissions to unplanned hospital admissions and/or ED return visits. However, we think that focusing on unplanned hospital admissions and/or ED return visits is a strength, as we believed that reducing only unplanned hospital returns would be beneficial.

Due to the closure of one of the study sites, we were able to reach only 77% of the calculated sample size. With the current sample size, we would have been able to find a statistically significant difference of 4% in unplanned hospital admissions and/or ED return visits between the study groups. However, based on the results that tend to show an adverse effect of the intervention, it is unlikely that we would have shown a 3% benefit of the intervention with the full sample size.

During the patients' index ED visits, we were not able to collect more health determinants that could have identified individuals at high risk of hospital return and potentially poor-quality transitions.[43,44] These include comorbid health conditions, medication burden, cognitive and physical functioning, health literacy, and living circumstances. Patients at risk and their caregivers may have high needs for social support and additional explanations and care, which could be addressed with telephone follow-up. Evaluating the effects of a telephone intervention in these subgroups in future research is important.

Telephone follow-up and communication of discharge information in the ED can be regarded as socially complex interventions that could be influenced by patient and contextual factors, but also by confounders at the level of the healthcare providers.[41,45,46] Training ED physicians and nurses in geriatric competences, including communication skills and shared decision making, could enhance a potential beneficial effect of telephone follow-up.

Conclusion

This study did not find a beneficial effect of a telephone follow-up call on reducing unplanned hospital admissions and/or ED return visits. Based on the results of this large study, a previous RCT and a systematic review, we advise not to introduce telephone follow-up to reduce unplanned hospital admissions and ED return visits in older patients.[4,21,27] Future studies could evaluate the effects of this intervention on other health-related outcomes.

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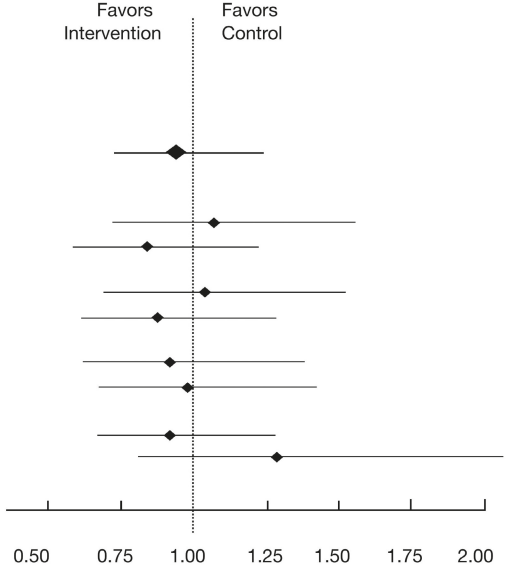
Supplementary figure 1. Risk of unplanned hospitalization within 30 days, depending on the study group

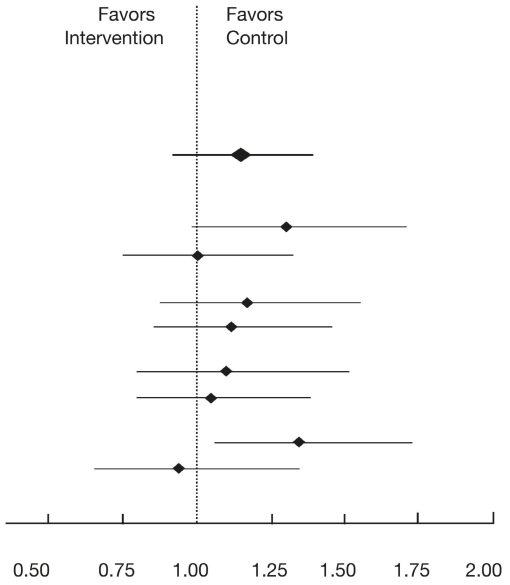
	Participants (n)		Unplanned hospitalization (n)		Odds Ratio (95% CI)
	IG	CG	IG	CG	
All participants	1516	1659	107	123	0.95 (0.73-1.24)
Age, y					
< 78	743	823	56	58	1.08 (0.73-1.57)
≥ 78	773	836	51	65	0.84 (0.57-1.23)
Sex					
Male	635	694	53	56	1.04 (0.70-1.54)
Female	881	965	54	67	0.88 (0.60-1.27)
Living condition*					
Living alone	475	496	49	55	0.92 (0.61-1.39)
Not living alone	714	796	54	61	0.99 (0.67-1.44)
Degree of crowding at discharge^					
NEDOCS < 60	971	993	65	72	0.92 (0.65-1.30)
NEDOCS ≥ 60	540	491	42	30	1.30 (0.80-2.11)



* Living condition unknown in 327 intervention group patients and 367 control group patients
^ NEDOCS at discharge unknown in 5 intervention group patients and 175 control group patients
CG, Control Group; *CI,* Confidence Interval; *ED,* Emergency Department; *IG,* Intervention Group; *NEDOCS,* National Emergency Department OverCrowding Scale

Supplementary figure 2. Risk of unplanned ED return visit within 30 days, depending on the study group

	Participants (n)		Unplanned ED return visit (n)		Odds Ratio (95% CI)
	IG	CG	IG	CG	
All participants	1516	1659	229	223	1.15 (0.94-1.40)
Age, y					
< 78	743	823	124	109	1.31 (0.99-1.73)
≥ 78	773	836	105	114	1.00 (0.75-1.33)
Sex					
Male	635	694	111	106	1.18 (0.88-1.57)
Female	881	965	118	117	1.12 (0.85-1.47)
Living condition*					
Living alone	475	496	87	84	1.10 (0.79-1.53)
Not living alone	714	796	106	113	1.05 (0.79-1.40)
Degree of crowding at discharge^					
NEDOCS < 60	971	993	159	125	1.36 (1.06-1.75)
NEDOCS ≥ 60	540	491	69	66	0.94 (0.66-1.36)



* Living condition unknown in 327 intervention group patients and 367 control group patients
^ NEDOCS at discharge unknown in 5 intervention group patients and 175 control group patients
CG, Control Group; *CI,* Confidence Interval; *ED,* Emergency Department; *IG,* Intervention Group; *NEDOCS,* National Emergency Department OverCrowding Scale

Supplementary table 1. Number of unplanned and planned hospital admissions per study group

Hospital admissions per study group	Unplanned hospital admissions, n=230	Planned hospital admissions, n=198	*p*-value	OR (95% CI)
Intervention group, n= 203/1516 n (%)	107 (53)	96 (47)	0.69	0.92 (0.63-1.35)
Control group, n=225/1659 n (%)	123 (55)	102 (45)		

CI, confidence interval; *n*, number; *OR*, odds ratio

Supplementary table 2. Number of unplanned and planned ED return visits per study group

ED return visits per study group	Unplanned ED return visits, n=452	Planned ED return visits, n=27	*p*-value	OR (95% CI)
Intervention group, n= 242/1516 n (%)	229 (95)	13 (5)	0.80	1.11 (0.51-2.41)
Control group, n=237/1659 n (%)	223 (94)	14 (6)		

CI, confidence interval; *ED*, emergency department; *n*, number; *OR*, odds ratio

Supplementary file 1. Translation of the telephone follow-up questionnaire in the emergency medical records of emergency department patients aged ≥ 70 years

•Reason for follow-up call o Geriatrics

•Reason not approached o Living in nursing home o [*space for recording other reason*]

[The nurses were instructed to read the patient's emergency medical records (EMR) before calling the patient. If they found an exclusion criterium for not calling, they could indicate that here. Other reasons for not calling, that were considered as reasonable during the teaching sessions, could also be indicated here.]

Call date 1 (date) (time) *[is automatically filled in by the electronic hospital system (EHS)]*

Call date 2 (date) (time)

Call date 3 (date) (time)

First call attempt	Second call attempt	Third call attempt
o Patient is reached	o Patient is reached	o Patient is reached
o Wrong telephone number	o Wrong telephone number	o Wrong telephone number
o Telephone not connected	o Telephone not connected	o Telephone not connected
o Telephone not answered	o Telephone not answered	o Telephone not answered
o Voicemail/answering machine	o Voicemail/answering machine	o Voicemail/answering machine
o Call other telephone number, namely….[*space for free text*]	o Call other telephone number, namely….[*space for free text*]	o Call other telephone number, namely….[*space for free text*]
o Otherwise, namely… [*space for free text*]	o Otherwise, namely… [*space for free text*]	o Otherwise, namely… [*space for free text*]

[Above, the nurse choses the right option]

[If the nurse has indicated that the patient is reached, the following introduction text appears]

"Good morning. My name is…..and I am a nurse working at the Emergency Department of Haaglanden Medical Center (HMC). I am calling regarding the visit of Mr./Mrs./Ms…….at the Emergency Department. Is this Mr./Mrs/Ms…….?

If not, ask: "Is Mr./Mrs./Ms. ……available and able to answer questions about his/her care?

If not, ask: "Are you his/her caregiver/partner?"

If not, ask: "May I speak to his/her caregiver/partner?"

If this is possible, ask relationship of caregiver to the patient when talking to caregiver.

If this is not possible, ask for best time to call back and if other telephone number is preferred.

• Talked to o patient him-/herself o patient's caregiver
o patient's partner o someone else, namely….[*space for free text*]

•Even or odd month number? • odd (January, March, May, etc) o Even (February, April, June, etc.)
[*After clicking "odd" or "even", the next question of the questionnaire of the corresponding month opens. As this document shows the telephone follow-up questionnaire, we click "odd".*]

Follow-up call (intervention group)

"You were/Mr./Mrs./Ms. was at the Emergency Department yesterday. I would like to ask how you are/he/she is doing. Is this okay with you?"

•Permission to participate with telephone follow-up call: o Yes o No

[Here the nurse indicates whether or not the patient gives permission to participate. If the nurse clicks "Yes", the subsequent questions of the questionnaire will appear.]

[If the nurse clicks "No", the following text will appear:]

•No consent for participation. Wish the patient a good day and end the conversation.

[If the patient has consented to participate, the nurse continues with the following question. In case the nurse does not talk to the patient, but to someone else, "you" is replaced by the patient's name. After the nurse has listened to the interviewee's answer, he/she asks which of the following 5 answers fits best with the interviewee's experience.]

•"You were at the Emergency Department yesterday. How are you doing today?"

o Very well o Reasonable o Very bad

o Well o Bad

[Now the nurse has to indicate whether or not he/she notices a language barrier, hearing impairment or other communication problem while talking to the interviewee.]

Is there a language barrier, hearing impairment or other problem with communication?

o Language barrier o Other communication problem

o Hearing impairment o No problems noticed

•"Did you experience any problems?" o No o Some o Yes

•Explanation: [*space for free text*]

["Explanation" and space for free text appears if the nurse clicks "Some" or "Yes". Here the nurse can fill in which problems the patient has experienced.]

•"To what extent did you understand the advice that you received?"

[The nurse asks which of the following 5 answers fits best with the interviewee's experience.]

o Very well o Reasonable o Very bad

o Well o Bad

o "Can you tell me what the doctor has advised you?"

o Very well o Reasonable o Not at all

o Well o Not quite

[Here the nurse scores to what extent the interviewee is able to repeat the information and advice that has been given in the emergency department by comparing the interviewee's answer with the discharge information and instructions reported in the patient's medical records. If it becomes clear that the interviewee has not properly understood or remembered certain instructions or information, the nurse provides further explanations and repeats or clarifies instructions.]

[If something has been changed in the patient's medication (e.g. new medication was started, change of dose) the nurse asks the next question. Nurses were taught to ask whether the interviewee has understood the new dosing schedule, indication for the medication change, what the medication is for and whether the

patient will be able to acquire the medication. If the patient is not able to acquire the medication, the nurse explores why this is not possible and helps to find a solution. E.g. he/she can offer to phone the pharmacy to ask them to deliver the medication at the patient's home.]

•"I see something has been changed in your medication. Do you have any questions about that?"

[*space to fill in the interviewee's answer and to register any problems*]

[Besides the next question, the nurse checks whether the interviewee has understood whether, when and where the patient has a follow-up appointment. The nurse checks in the EHS whether follow-up appointments are scheduled and if not, he/she can arrange to schedule one. The nurse also checks whether the interviewee has understood what to do if he/she notices alarm symptoms or signs. If the patient reports alarm symptoms, the nurse advises to contact the general practitioner, to return to the ED or, when in doubt, asks the emergency physician on call to contact the patient.]

•"Do you have any questions about follow-up appointments?"

[*space to fill in the interviewee's answer and to register any problems*]

• "Do you know when you have to contact your general practitioner or the emergency department?"

[*space to fill in the interviewee's answer and to register any problems*]

•"Do you have any other questions?"

[*space to fill in the interviewee's answer and to register any problems*]

[The nurse will fill in the following items]:

Indicate on which topic additional information or care was required:

0 Medication change or use 0 Self-care advice 0 Follow-up appointments

0 Alarm symptoms 0 Referral (to e.g. general practitioner, dentist , physiotherapist,

0 Other home care)

Explain what additional information or care was given: [*space for free text*]

•"Do you feel insecure now that you are back home?"

[The nurse asks which of the following 3 answers fits best with the interviewee's experience.]

o No o A little o Yes

• Explanation: [*space for free text*]

["Explanation" and space for free text appears if the nurse clicks "A little" or "Yes". Here the nurse can fill in why the patient feels insecure and which actions were undertaken to support the patient. The nurse discusses with the patient whether he/she can help to offer more support. E.g. by contacting the patient's caregiver or general practitioner or by arranging home care.]

•"Do you feel supported?" o No o A little o Yes

•"If you feel supported, by whom do you feel supported?"

0 People around me/caregiver(s) 0 The hospital 0 Pets/animals

0 People from home care 0 Mental supporter 0 Nobody

"Now I would like to ask you some questions about how you experienced the Emergency Department visit."

•"Did you receive the care that you expected at the Emergency Department?"

[The nurse asks which of the following 4 answers fits best with the interviewee's experience.]

oYes, completely o Mostly o A little o Not at all

o"What score do you give your stay in this Emergency Department of Haaglanden Medical Center (HMC)?"

o1, very bad	o 4	o 7	o 10, excellent
o2	o 5	o 8	
o3	o 6	o 9	

o"To what extent would you recommend this Emergency Department to relatives and friends if they would need emergency care?"

o1, certainly not	o 4	o 7	o 10, certainly
o2	o 5	o 8	
o3	o 6	o 9	

- Remarks [*space for free text*]

[Here the nurse can explain the interviewee's score, for instance if he/she had any complaints or problems and whether these need further action.]

[From September 2018 to March 2019, we asked patients the following question before ending the conversation:]

"Currently we are conducting a scientific study on healthcare use by patients who have visited our Emergency Departments. May we call you again to ask questions about this in one month? The data will be processed anonymously."

•Permission to call again in one month o Yes o No

Thank the patient for his/her time, wish the patient a good day and end the conversation.

Supplementary file 2. Translation of the satisfaction survey questionnaire in the emergency medical records of emergency department patients aged ≥ 70 years

•Reason for follow-up call o Geriatrics

•Reason not approached o Living in nursing home o [*space for recording other reason*]

[The nurses were instructed to read the patient's emergency medical records (EMR) before calling the patient. If they found an exclusion criterium for not calling, they could indicate that here. Other reasons for not calling, that were considered as reasonable during the teaching sessions, could also be indicated here.]

Call date 1 (date) (time) *[is automatically filled in by the electronic hospital system (EHS)]*

Call date 2 (date) (time)

Call date 3 (date) (time)

First call attempt	Second call attempt	Third call attempt
o Patient is reached	o Patient is reached	o Patient is reached
o Wrong telephone number	o Wrong telephone number	o Wrong telephone number
o Telephone not connected	o Telephone not connected	o Telephone not connected
o Telephone not answered	o Telephone not answered	o Telephone not answered
o Voicemail/answering machine	o Voicemail/answering machine	o Voicemail/answering machine
o Call other telephone number, namely….[*space for free text*]	o Call other telephone number, namely….[*space for free text*]	o Call other telephone number, namely….[*space for free text*]
o Otherwise, namely… [*space for free text*]	o Otherwise, namely… [*space for free text*]	o Otherwise, namely… [*space for free text*]

[Above, the nurse choses the right option]

[If the nurse has indicated that the patient is reached, the following introduction text appears]

"Good morning. My name is…..and I am a nurse/medical student/nursing student working at the Emergency Department of Haaglanden Medical Center (HMC). I am calling regarding the visit of Mr./Mrs./Ms…….at the Emergency Department. Is this Mr./Mrs/Ms…….?

If not, ask: "Is Mr./Mrs./Ms. ……available and able to answer questions about his/her care?

If not, ask: "Are you his/her caregiver/partner?"

If not, ask: "May I speak to his/her caregiver/partner?"

If this is possible, ask relationship of caregiver to the patient when talking to caregiver.

If this is not possible, ask for best time to call back and if other telephone number is preferred.

•Talked to o patient him-/herself o patient's caregiver

o patient's partner o someone else, namely….[*space for free text*]

•Even or odd month number? o odd (January, March, May, etc) • Even (February, April, June, etc.)

[After clicking "odd" or "even", the next question of the questionnaire of the corresponding month opens. As this document shows the satisfaction survey questionnaire, we click "even".]

Satisfaction survey call (control group)

"You were/Mr./Mrs./Ms. was at the Emergency Department yesterday. I would like to ask how you have experienced the emergency department visit, so that we can improve our care with that information. Are you okay with that?"

- Permission to participate with satisfaction survey call: o Yes o No

[Here the nurse indicates whether or not the patient gives permission to participate. If the nurse clicks "Yes", the subsequent questions of the questionnaire will appear.]

[If the nurse clicks "No", the following text will appear:]

- No consent for participation. Wish the patient a good day and end the conversation.

[Now the nurse has to indicate whether or not he/she notices a language barrier, hearing impairment or other communication problem while talking to the interviewee.]

Is there a language barrier, hearing impairment or other problem with communication?

o Language barrier o Other communication problem

o Hearing impairment o No problems noticed

"I would like to ask you five questions. For each question, please choose from the answers that I mention the one that fits best with your experience."

- "Did you receive the care that you expected at the Emergency Department?"

  o Yes, completely o Mostly o A little o No, not at all

- "Did the healthcare provider give you clear information about your treatment during your stay at the Emergency Department?"

  o Yes, completely o A little o Not applicable

  o Mostly o No, not at all

- "Did the healthcare provider tell you what signs or symptoms you had to be aware of after leaving the Emergency Department?"

  o Yes, completely

  o Mostly

  o A little

  o No, not at all

  o Not applicable (my health problem was solved)

- "What score do you give your stay in this Emergency Department of Haaglanden Medical Center (HMC)?"

  o 1, very bad o 4 o 7 o 10, excellent

  o 2 o 5 o 8

  o 3 o 6 o 9

- "To what extent would you recommend this Emergency Department to relatives and friends if they would need emergency care?"

o1, certainly not	o 4	o 7	o 10, certainly
o2	o 5	o 8	
o3	o 6	o 9	

- Remarks [*space for free text*]

  [Here the nurse can explain the interviewee's score, for instance if he/she has any complaints or problems and whether these need further action.]

[From September 2018 to March 2019, we asked patients the following question before ending the conversation:]

"Currently we are conducting a scientific study on healthcare use by patients who have visited our Emergency Departments. May we call you again about this in one month? The data will be processed anonymously."

- Permission to call again in one month o Yes o No

Thank the patient for his/her time, wish the patient a good day and end the conversation.

CHAPTER 6

Frequencies and reasons for unplanned emergency department return visits by older adults

Merel van Loon-van Gaalen
Ilje E. Voshol
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Roos C. van der Mast

Submitted ■

ABSTRACT

Background

As unplanned Emergency Department (ED) return visits (URVs) are associated with adverse health outcomes in older adults, many EDs have initiated post-discharge interventions to reduce URVs. Unfortunately, most interventions fail to reduce URVs, including telephone follow-up after ED discharge, investigated in a recent trial. To understand why these interventions were not effective, we analyzed patient and ED visit characteristics and reasons for URVs within 30 days for patients aged ≥ 70 years.

Methods

Data was used from a randomized controlled trial, investigating whether telephone follow-up after ED discharge reduced URVs compared to a satisfaction survey call. Only observational data from control group patients were used. Patient and index ED visit characteristics were compared between patients with and without URVs. Two independent researchers determined the reasons for URVs and categorized them into: patient-related, illness-related, new complaints and other reasons. Associations were examined between the number of URVs per patient and the categories of reasons for URVs.

Results

Of the 1659 control group patients, 222 (13.4%) had at least one URV within 30 days. Male sex, ED visit in the 30 days before the index ED visit, triage category “urgent”, longer length of ED stay, urinary tract problems, and dyspnea were associated with URVs. Of the 222 patients with an URV, 31 (14%) returned for patient-related reasons, 95 (43%) for illness-related reasons, 76 (34%) for a new complaint and 20 (9%) for other reasons. URVs of patients who returned ≥3 times were mostly illness-related (72%).

Conclusion

As the majority of patients had an URV for illness-related reasons or new complaints, these data fuel the discussion as to whether URVs can or should be prevented.

INTRODUCTION

With demographic change, there is an increase in Emergency Department (ED) presentations by patients aged 70 years and older worldwide.[1] Up to 25% of these older patients have an unplanned ED return visit (URV) within one month.[2-6] Since URVs in older adults are associated with adverse health outcomes, they are often viewed as negative.[3,7] Therefore, many EDs have initiated post-discharge interventions in order to reduce URVs.[8,9]

Many post-ED discharge intervention programs are focused on older patients at high risk for hospital return. However, prediction tools that have been developed to identify patients at risk have poor predictive accuracy, contain different predictors, and are often not suitable for clinical use.[4,10-13] However, all previous studies consistently report that the majority of older adults who return to the ED suffer from chronic and often comorbid health conditions, functional dependency or cognitive problems.[2,10,14,15] In addition, several (psycho)social factors, such as living alone, lack of social support and uncertainty about the health condition, as well as insufficient understanding or provision of discharge information are found to be associated with URVs in older adults.[2,6,7,11,14-19]

Several of these predicting factors could be addressed through specific interventions, such as patient education and community follow-up by a geriatric nurse. However, systematic reviews evaluating the effects of post-discharge interventions initiated in the ED have found that many were not effective in reducing ED re-attendances.[8,9] In a pragmatic randomized controlled trial, our research group also failed to find a beneficial effect of a transitional care program, consisting of post-ED discharge telephone follow-up for older adults, on the reduction of unplanned hospital admissions and URVs within 30 days after ED discharge.[20]

In order to understand why these interventions are not effective in reducing URVs, more insight is needed into the reasons why older patients return to the ED. Therefore, we investigated the frequencies, associated patient and ED visit characteristics and reasons for URVs within 30 days after the index ED visit among patients aged ≥70 years. In addition, we examined whether specific categories of reasons for URVs were associated with the number of URVs per patient.

METHODS

Study design and setting

For this study, we used data from a pragmatic randomized controlled trial (RCT). The research question of this RCT was whether a telephone follow-up call reduces unplanned hospitalizations and URVs within 30 days of ED discharge, compared to

a satisfaction survey call. The trial was conducted in the EDs of Haaglanden Medical Center (HMC), a non-academic teaching hospital in the Netherlands, from February 1, 2018 to July 1, 2019. In this RCT, 3175 patients were allocated to either the intervention (n=1516) or the control (n=1659) group, according to the month of their ED visit; patients included in odd months received an intervention telephone call to identify post-discharge problems and to offer additional information, and patients included in even months received a satisfaction survey telephone call.[20] The Medical Ethics Review Committee of HMC waived the necessity for formal approval of the study as it closely followed routine care (METC Zuidwest Holland, nr. 17-028).

Participants

For this study, only observational data from control group patients were used to exclude a possible effect of the intervention telephone follow-up call. Patients aged ≥70 years who were discharged from one of the EDs of HMC to an unassisted living environment were eligible for inclusion. Exclusion criteria were: admission to the hospital, discharge to a nursing home, another care facility or assisted living environment, and planned follow-up appointment at an outpatient clinic or at the ED within 24 hours.[20]

Data collection and measurements

Unplanned ED return visits (URVs)

Data on ED return visits were collected from the electronic hospital system (EHS). ED return visits that could not be foreseen were defined as URVs.[21] The index ED visit was the first ED visit during the study period that was followed by a telephone call.

Baseline data

We collected baseline data that were associated with URVs in previous studies, including demographics (age,[4,10,13] gender,[4,5,10] whether or not living alone,[2,3,11,22]) and ED visit characteristics (mode of arrival, Manchester Triage System triage urgency level,[23] chief complaint, ED length of stay[2,10,11,24]). We also used data concerning level of ED crowding at discharge, measured by the National Emergency Department OverCrowding Scale (NEDOCS).[25] Data were abstracted from the EHS by an information technology specialist, who was not involved in the study.[20]

Determination of reasons for URVs

Prior to the start of the study, reasons for URVs were defined and categorized, based on findings in the literature (see Supplementary file 1).[4,7,15,19,26] Two investigators (MvLvG and IEV), both medical doctors, independently determined and categorized the reason for each URV by reviewing the emergency medical records (EMRs). In case of disagreement, the EMR was reviewed and reasons for ED return were discussed until consensus was achieved. In case of no agreement, the EMR was reviewed by a

third investigator (MCvdL) for the final decision. This study method has been used in previous studies on URVs.[16,26-28] During analyses, we found that only few URVs were categorized as physician-related, system-related or not classifiable. Therefore, these three categories have been merged into the "other reasons" category. This resulted in the following four main categories: 1. patient-related reasons, 2. illness-related reasons, 3. new complaints and 4. other reasons (see Supplementary file 1). The study was conducted in adherence to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement.[29]

Statistical analysis

Categorical data are presented as numbers and percentages. Continuous data were skewed and therefore presented as median and interquartile ranges (IQR). Differences in characteristics of patients with and without URVs were analyzed using X^2-tests and univariable logistic regression.

The X^2-test was used to examine the association between number of URVs per patient and the categories of reasons for URVs. Odds ratios (ORs) were calculated with 95% confidence intervals (95% CIs). If a patient had multiple URVs during the 30-day follow up period, only the first URV was included to determine the reason for unplanned return and to assess associations between patient and index ED visit characteristics and occurrence of an URV. To investigate whether specific categories of reasons for URVs were associated with the number of URVs per patient, all URVs within 30 days after the index ED visit were included in the analysis.

Inter-rater reliability regarding the initial determination of reasons and categories of URVs was measured with Cohen's kappa coefficient.

Statistical analyses were performed using the Statistical Package for the Social Sciences (IBM Corp. Released 2019. IBM SPSS Statistics, Version 26.0. Armonk, New York, USA).

RESULTS

Of the 1659 control group patients, 222 (13.4%) had at least one URV within 30 days. The total number of URVs within 30 days was 279.

Patient and ED visit characteristics associated with URVs

Table 1 shows the differences in baseline patient and index ED visit characteristics between patients with and without an URV. In univariate analysis, the following factors were associated with an URV within 30 days: male sex, ED visit in the 30 days before the index ED visit, triage category "urgent", longer length of ED stay, and the chief complaints "urinary tract problems" and "dyspnea".

Table 1. Baseline patient and index Emergency Department (ED) visit characteristics of patients with and without an URV

	Unplanned ED return visit (URV) ≤30 days		
	Yes (n=222)	No (n=1437)	OR (95% CI)
Demographics			
Age in years, median (IQR)	78 (73-83)	78 (73-83)	1.0 (1.0-1.0)[#]
Male sex, n (%)	106 (47.7)	588 (40.9)	1.3 (1.0-1.8)
Living without partner, n (%)*	83 (42.3)	413 (37.7)	1.2 (0.9-1.7)
Characteristics of index ED visit			
Mode of referral, n (%)			
- Self-referral	52 (23.4)	307 (21.4)	1.1 (0.8-1.6)
- General practitioner	65 (29.3)	485 (33.8)	0.8 (0.6-1.1)
- Medical specialist	44 (19.8)	246 (17.1)	1.2 (0.8-1.7)
ED visit ≤ 30 days before index visit, n (%)	45 (20.3)	164 (11.4)	2.0 (1.4-2.8)
Arrival by ambulance, n (%)	79 (35.6)	476 (33.1)	1.1 (0.8-1.5)
Triage category urgent, n (%)**	168 (76.4)	999 (70.0)	1.4 (1.0-1.9)
ED visit at daytime, n (%)	153 (68.9)	1009 (70.2)	0.9 (0.7-1.3)
Length of ED stay (minutes), median (IQR)	179 (128-242)	151 (106-204)	1.0 (1.0-1.1)[#$]
NEDOCS at discharge ≥ 60, n (%)^	66 (34.6)	425 (32.9)	1.1 (0.8-1.5)
Chief complaint, n (%)			
- Urinary tract problems	16 (7.2)	47 (3.3)	2.3 (1.3-4.1)
- Headache or neurological problems	10 (4.5)	55 (3.8)	1.2 (0.6-2.4)
- Wounds	11 (5.0)	76 (5.3)	0.9 (0.5-1.8)
- Abdominal pain	16 (7.2)	76 (5.3)	1.4 (0.8-2.4)
- Syncope or palpitations	8 (3.6)	90 (6.3)	0.6 (0.3-1.2)
- Dyspnea	29 (13.1)	116 (8.1)	1.7 (1.1-2.6)
- Malaise	19 (8.6)	131 (9.1)	0.9 (0.6-1.5)
- Chest pain	28 (12.6)	177 (12.3)	1.0 (0.7-1.6)
- Limb complaints	37 (16.7)	299 (20.8)	0.8 (0.5-1.1)
- Fall or trauma	48 (10.7)	358 (13.1)	0.8 (0.6-1.1)
- Other complaints	17 (7.7)	152 (10.6)	0.7 (0.4-1.2)

[#] In univariable logistic regression model

* Living condition unknown in 26 patients with URV and in 341 patients without URV

** Triage category urgent: red, orange and yellow according to Manchester Triage System. Triage category missing in 2 patients with URV and in 10 patients without URV

[$] Per 10 minutes increase in length of stay

^ If the NEDOCS at discharge is ≥ 60, the ED is considered to be busy. NEDOCS at discharge was missing in 31 patients with URV and 144 patients without URV, due to technical malfunction of electronic hospital system on days that patients were discharged from the ED.

ED Emergency Department, *NEDOCS* National Emergency Department OverCrowding Scale, *IQR* Interquartile Range, *n* number, *URV* unplanned emergency department return visit

Reasons for unplanned ED return

Figure 1 shows the number of URVs per reason for return. Patient-related reasons for URVs were found in 31 (14%) of the 222 patients with one or more URVs. The two most frequently occurring patient-related reasons for URVs were non-compliance with

discharge instructions (n=7), and worrying about health (n=19). Illness-related reasons for URVs were found in 95 (43%) of the 222 patients, of which recurrent complaints/disease (n=28) and progression of disease (n=38) were the two largest subgroups. A new complaint was the reason for URV in 76 (34%) of the 222 patients, and 20 (9%) out of the 222 patients had an URV for other reasons. Within the latter category, 6 of the 20 patients were misdiagnosed during the index ED visit, resulting in inappropriate treatment. Other physician-related and system-related reasons occurred in <2% of the 222 patients. Five URVs could not be classified and were therefore coded as "undefined".

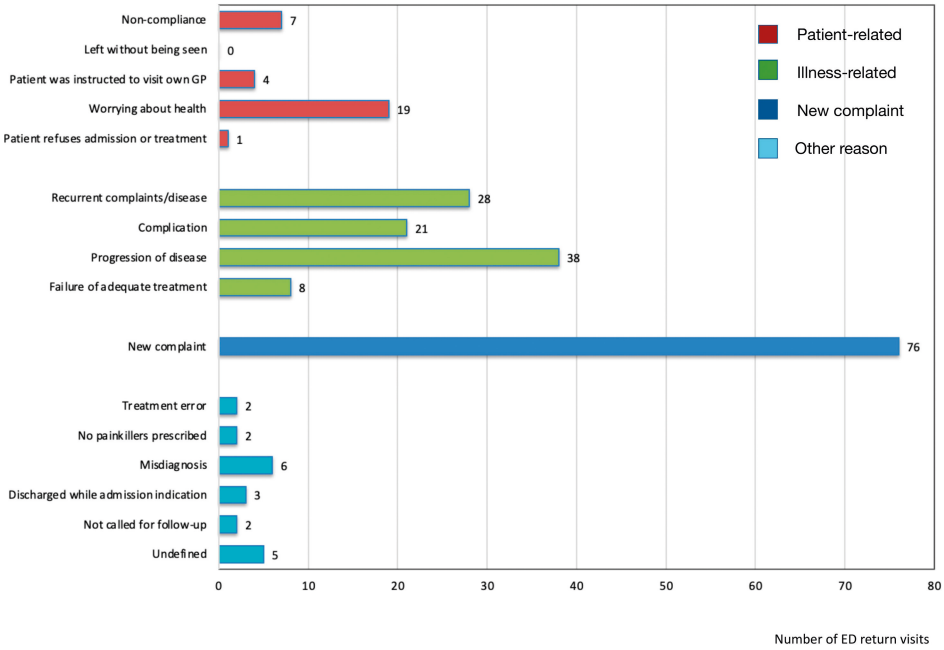

Figure 1. Reasons for unplanned Emergency Department (ED) return visits (n=222), divided into four categories. *ED*, emergency department; *GP*, general practitioner

Multiple URVs and reasons for ED return

Of the 222 patients with URVs, 176 (79.2%) had one URV, 39 (17.6%) had two URVs and 7 (3.2%) had three or more URVs within 30 days (Table 2). Most URVs in patients with one or two URVs were illness-related (40.9% and 46.2%, respectively) or because of a new complaint (38.0% and 30.8%, respectively). Patients with three or more URVs also returned mainly for illness-related reasons (72.0%), followed by patient-related reasons (24.0%), while new complaints were less common (4.0%).

Table 2. Association between the number of URVs per patient and per category of reasons for URVs

	Number of URVs per patient			
	1	2	≥ 3	Total
Number of patients, n (%)	176 (79.2)	39 (17.6)	7 (3.2)	222
Total number of URVs, n (%)	176 (63.1)	78 (28.0)	25 (9.0)	279
Category reasons for URV:				
Patient-related, n (%)	22 (12.5)	10 (12.8)	6 (24.0)	38
Illness-related, n (%)	72 (40.9)	36 (46.2)	18 (72.0)	126
New complaint, n (%)	67 (38.0)	24 (30.8)	1 (4.0)	92
Other, n (%)	15 (8.5)	8 (10.3)	0 (0.0)	23

ED, emergency department; *n,* number; *URV,* unplanned emergency department return visit

Inter-rater reliability regarding assessment of reasons for URVs

The inter-rater reliability after initial independent determination and categorization of the reasons for the URVs, measured with Cohen's kappa coefficient, was 0.57. All disagreements concerning the determination of the reasons for URVs were solved by discussion between the two researchers and hence, the judgement of a third researcher for the final decision was not needed.

DISCUSSION

In this study, we found that 222 of the 1659 (13.4%) older adults had at least one URV within 30 days after being discharged from the ED. Of them, 171 (77%) returned for medical reasons, including 95 (43%) for problems related to the same illness of the index ED visit and 76 (34%) for a new medical complaint unrelated to the presenting problem of the index ED visit. URVs for patient-related reasons occurred in only 31 (14%) patients. Also, patients with three or more URVs returned mainly for problems related to the same illness of the index ED visit.

The URV rate in our study was comparable with URV rates among older adults reported in other studies.[2-4,10,30] We also found that male sex,[2,4,14,15] an ED visit in the 30 days before the index ED visit,[2,10,11,14] triage category "urgent", and a longer length of ED stay[24] were more common in patients with an URV. In accordance with other studies, we found that the chief complaints "urinary tract problems"[26] and "dyspnea" [15,19,26,31] were associated with URVs.

Although transitional care programs that focus on patient education and post-discharge support may have a positive effect on the patient's capacity for self-care, disease control, and perceived support,[32-34] the limited number of patient-related URVs found in our study may explain why many of these programs do not reduce URVs. Our finding that most older adults returned to the ED for illness-related reasons or new problems indicates that the majority of these patients needed diagnostic work-

up of their health problem and/or acute care. This fuels the discussion of whether URVs can and need to be prevented. If the aim is to divert older patients from the ED, it will have to be sorted out where else diagnostic work-ups can be performed and patients can receive the necessary (acute) care outside the ED. This will depend on the organization of the health care system and should therefore be investigated locally. An example is the organization of an acute geriatric community hospital for older adults.[35] On the other hand, as the ED is organized and equipped to conduct targeted diagnostic work-ups and deliver acute care, it may be more feasible to make existing EDs more senior-friendly by applying the initiatives already described.[36-39] Interventions focusing on close collaboration between primary care, hospital care, and community services may be more successful in reducing unplanned ED visits for older adults than interventions involving only the ED. Within these collaborations, it may be easier to deliver the best care for the patient at the most suitable location. It would be interesting to explore such collaborations in future studies.[40,41]

STRENGTHS AND LIMITATIONS

We were able to compare an extensive set of patient and ED visit characteristics between patients with and without URVs. Although previous studies mentioned reasons for URVs in older adults, this is one of the few studies that investigated the frequencies of the different reasons for URVs in older adults.[2,7] Data were prospectively collected and derived from the hospital database to diminish confounding by recall bias.

Some limitations, however, could be considered. The reasons for URVs were defined and categorized prior to the start of the study and based on explicit criteria, used in previous studies. However, the reasons for URVs were determined retrospectively. By having the URVs assessed by two independent researchers, we tried to comply with the classification criteria as much as possible. The Cohen's kappa coefficient of 0.57, reflecting a moderate inter-rater reliability of the categorization system, may be a limitation.

Furthermore, not all data about health determinants that are associated with hospital return were available. Finally, this study was conducted in two EDs of a non-academic hospital in the Netherlands. The findings may not be generalizable to all EDs. However, two studies, one conducted in a Dutch academic ED and one in two Australian large referral hospital EDs, reported comparable percentages of URVs for illness-related and patient-related reasons,[7] and for new complaints.[2]

CONCLUSION

In this study, most older patients returned unplanned to the ED for medical reasons, whereas URVs for patient-related reasons, such as uncertainty about health or misunderstanding of discharge instructions, were less common. These findings may explain why many transitional care programs that focus on patient education and post-discharge support are ineffective in reducing URVs. In addition, the results suggest that most patients who return to the ED require urgent care. This fuels the discussion as to whether URVs can or need to be prevented.

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Supplementary file 1. Definitions of reasons used to analyze unplanned emergency department return visits (URV) and categorization of the reasons.

Reasons for ED return per category	Definition
Patient-related ED return	
Non-compliance	There is evidence in the medical records that the patient did not follow instructions. The patient returned to the ED for the same problem.
Left without being seen	The patient was registered in the ED but left before being seen by a physician. The patient returned to the ED for the same problem.
Left against medical advice	The patient was seen by a physician and left the ED against medical advice. The patient returned to the ED for the same problem.
Patient was instructed to visit own GP	The patient was instructed to return to the GP for re-evaluation but did not go and returned to the ED instead.
Psychiatric disorder / substance abuse	The patient has a psychiatric disorder and/or uses drugs or alcohol, which causes him/her to repeatedly visit the ED for the same or similar problems. Mentally, the patient is in a chronic stable state.
Worrying about health	The patient's anxiety caused him/her to return to the ED for the same or similar problem. After re-evaluation in the ED, there was no change in diagnosis or treatment and medical management consisted of reassurance only.
Patient refuses admission or treatment	The patient refused the treatment advised by the treating physician during the index ED visit or refused hospital admission. The patient returned to the ED for the same problem.
Illness-related ED return	
Recurrent complaints/disease	The patient was diagnosed and treated appropriately during the index ED visit, with resolution of symptoms, but later returned with a second exacerbation of the disease or with recurrence of the same or similar problem.
Complication	The patient was diagnosed and treated appropriately during the index ED visit, but returned to the ED because of a complication of the disease or side effect of treatment (e.g., allergic drug reaction).
Progression of disease	The medical records reveal that the patient was treated appropriately at the index ED visit and that admission was not indicated. Appropriate follow-up was arranged, but the patient's disease or problem got worse, and he/she returned to the ED as instructed.
Failure of adequate treatment	The patient was diagnosed and treated appropriately during the index ED visit, but the symptoms did not resolve, neither progressed (e.g., persistent pain due to fracture despite adequate use of pain medication). The patient returned to the ED because of persistent complaints.
New complaint	The patient returned to the ED with a new complaint, which was different from the disease or complaint presented at the index ED visit and not determined as a complication or different presentation of the disease, presented during the index ED visit.

Other	
Physician-related ED return	
Treatment error	The physician made the right diagnosis during the index ED visit, but made an error in treatment. The patient returned to the ED for the same or similar problem or progression of disease.
No painkillers prescribed	The disease or injury warranted pain medication but no prescription or advice for the use of pain medication was given. The patient returned primarily because of continued pain.
Misdiagnosis	Medical record review reveals a diagnosis or problem missed by the physician who saw the patient during the index ED visit. The patient returned to the ED for the same problem.
Discharged while admission indication	Medical record review reveals a hospital admission indication, considering the severity of the patient's complaints, but the physician judged that admission was not indicated. The patient returned to the ED because of the severity of the complaints.
System-related ED return	
Not admitted due to lack of hospital capacity	Hospital admission was indicated, but the patient was sent home due to lack of hospital admission capacity. The patient returned to the ED for the same problem.
Not called for follow-up	The patient did not receive a follow-up appointment within the time limit set upon discharge after the index ED visit, due to system-related reasons (e.g., miscommunication, waiting list). The patient returned to the ED for the same problem or progression of disease.
Undefined ED return	The reason for the patient's return cannot be classified in one of the other reasons for an URV.

ED, Emergency Department; *e.g.*, exempli gratia; meaning "for example"; *GP,* General Practitioner; *URVs,* Unplanned emergency department return visits

CHAPTER 7

| General discussion

SUMMARY OF THE MAIN FINDINGS

In this thesis, we evaluated the effectiveness and feasibility of two proactive care programs in a large Dutch inner-city ED to contribute to optimization of ED care.

In the first part (**chapter 2 and 3**), we evaluated a program focusing on screening and intervention for hazardous alcohol use in ED patients. In **chapter 2**, the implementation and effect of routine screening and intervention for hazardous alcohol use on alcohol consumption in adult ED patients were examined. During the one-year study period, approximately half of the ED patients were screened during triage, using the AUDIT-C. Of them, 10% had an elevated AUDIT-C score of whom less than half received an intervention from an ED nurse or physician: most patients received an educational leaflet and about a third received both an educational leaflet and a brief, motivational intervention. In the subset of patients with an elevated AUDIT-C score available for follow-up, a third either reduced or stopped their alcohol use. Risk factors for hazardous alcohol use were male sex, alcohol-related ED visit, any form of intoxication, head injury, gastro-intestinal bleeding and a wound. In **chapter 3**, screening failures were examined. In this study, only the first ED visit of each patient during the study period was included. We found that two-thirds of the ED patients was screened for hazardous alcohol use. Of the unscreened patients, the majority were not screened for staff-related reasons and only a quarter for patient-related reasons, (i.e., refusal or not being able to cooperate). Strikingly, patients with risk factors for hazardous alcohol use were less often screened than patients without risk factors.

In the second part of this thesis (**chapter 4, 5** and **6**), we examined the effect of post ED discharge telephone follow-up for community-dwelling older adults on health-related outcomes. In a systematic literature review, with a limited number of high-quality studies available (**chapter 4**), we found no benefits of telephone follow-up on health services utilization and discharge plan adherence, compared to control interventions. Subsequently, we conducted a large pragmatic randomized controlled trial, presented in **chapter 5**, in which patients received either a telephone follow-up call (after an ED visit in odd months; intervention group) or a satisfaction survey call (after an ED visit in even months; control group). Due to shortage of staff, many eligible patients were not called. Furthermore, about a third could not be reached by telephone. Finally, only about a third of the eligible patients consented to participate.

In the trial, we found no statistically significant difference in the rate of unplanned 30-day hospitalization and/or ED return visits between patients in the intervention group and the control group. Additionally, the intervention showed no beneficial effect within the subgroups (divided by age, sex, living condition, and degree of crowding in the ED at discharge).

To understand why many post-ED discharge interventions fail to reduce ED return visits, we analyzed patient and index ED visit characteristics and reasons for unplanned ED return visits of control group patients in **chapter 6**. Of the study patients, 13% had at least one unplanned ED return visit within 30 days after ED discharge. Several patient and ED visit characteristics were found to be associated with unplanned ED return visits. Of the patients with an unplanned ED return visit, the majority returned for medical reasons, being problems related to the same illness of the index ED visit, or a new complaint, whereas returns for patient-related reasons were less common. In addition, patients with three or more unplanned ED return visits most often returned for problems related to the same illness of the index ED visit. The limited number of patient-related reasons for unplanned ED return visits may explain why transitional care programs that focus on patient education and post-discharge support, like telephone follow-up, are ineffective in reducing unplanned ED return visits.

In conclusion, none of the proactive care programs in the ED were effective. Moreover, feasibility of the programs in the ED was limited, as many eligible patients were not reached, due to both staff-related and patient-related reasons.

METHODOLOGICAL CONSIDERATIONS

Strengths

In the set-up of our programs, we followed conceptual models of implementation of healthcare innovations and examples of other successful intervention programs.[1-5]

Pragmatic study design

An important strength is that both programs were integrated into the daily routine of the ED staff. With this approach, we aimed for the programs to be low-threshold, easy to apply and available 24/7. During the study periods, no additional personnel (e.g., research nurses) were deployed to conduct the interventions. This pragmatic study design, reflecting the current ED practice, made it easier to assess not only the effectiveness but also the feasibility of the interventions in the daily practice of the ED.

Another strength was the representation of a wide range of professionals in the coordinating project teams (e.g., ED nurses, an addiction healthcare worker, an EP, an epidemiologist, a psychiatrist and a gastroenterologist). These multidisciplinary project teams established the study procedures and trained all nurses involved in the studies on these procedures and on how to perform the interventions. In the alcohol screening and intervention program, low-threshold referral appointments were made with the addiction treatment center in the city.

For both projects, the questionnaires were integrated in the electronic hospital system (EHS). The patients' answers could be entered directly into the EHS, ensuring secure data storage. For project evaluation, data were abstracted from the EHS by information technology specialists who were not involved in the studies, which prevented potential confirmation bias.

Well-defined study populations

For both programs, the target population was clearly defined. In the alcohol project, a screening instrument (AUDIT-C) that was validated for ED settings was used to detect patients with hazardous alcohol use. Cut-off values defining a positive screening result were determined, based on validation studies on the screening instrument and studies examining the effectiveness of motivational interventions.[6-9] In the telephone follow-up program, patients aged 70 years and older who were discharged home were asked about their living circumstances during their ED visit to determine whether they were eligible for the program.

Limitations

The limitations of the individual studies included in this thesis, have been discussed in the accompanying chapters. The most important limitations are highlighted here.

Controlled studies

The alcohol screening and intervention program was not set up as a controlled clinical trial. Hence, AUDIT-C scores of patients who had received an intervention were not compared with AUDIT-C scores of patients in a planned control group who did not receive an intervention. However, it has been argued that even controlled clinical trials may not be appropriate for evaluating complex interventions, such as motivational interventions; a motivational intervention can be viewed as a complex mix of uncontrollable, independent variables embedded in what is more of a social conversation than a specific treatment. In other words, the success of motivational interventions may depend on many factors, such as the ability to build a relationship with the patient, the patient's perceived need for care, past experiences with healthcare, etc. Even with a controlled trial, the influence of these factors on the effect of the intervention is difficult to measure. Therefore, a negative study result does not always mean that the study is ineffective.[10] On the other hand, the telephone follow-up study was designed as a pragmatic randomized controlled trial. Semi-structured questionnaires were used to limit inter-individual variations in communication between ED nurses.

Many eligible patients did not receive an intervention

According to the protocol, all patients with a positive AUDIT-C score would be offered a leaflet and a motivational intervention. However, many patients received none or only one of the interventions. Unfortunately, ED staff generally did not provide an

explanation in the patients' emergency medical records why they choose to perform only one specific intervention or why they decided to leave out an intervention. It is possible that ED staff did not perform the interventions randomly, which may have led to bias.

In the telephone follow-up study, only one third of the eligible patients received a telephone intervention, because many patients were not called by ED staff or could not be reached by telephone. However, the fact that baseline characteristics of the patients who were contacted did not differ from those of patients who were not contacted, suggests that this did not lead to extensive selection bias. For the telephone follow-up study, the calculated sample size was not obtained. With only 77% of the required sample size, the results tended to show a negative effect of the intervention. Therefore, it is not likely that we would have demonstrated a benefit of the intervention with the required sample size.

Limited response at follow-up

In the alcohol screening and intervention study, only a subset of patients with a positive AUDIT-C score was able and willing to cooperate with follow-up. Cooperating patients were more often female and of older age than patients who did not cooperate. As patients were asked again about their alcohol use at follow-up, it is possible that patients who did not reduce their alcohol use refused to cooperate or gave a socially desirable response. As patients were counseled to reduce their alcohol consumption, follow-up questioning on this topic may have resulted in response bias. Therefore, the positive results of the interventions found in this study should be interpreted with some caution.

CLINICAL IMPLICATIONS

Target group patients and their receptivity to interventions in the ED

Each of the proactive care programs described in this thesis was aimed at a patient group that is at an increased risk for adverse events and unplanned ED return. The presence of these patients in the ED contributes to ED crowding, due to the extra attention they require from ED staff and their frequently longer lengths of ED stay.[11-13] We hypothesized that the programs would reduce the number of ED return visits of these patients and could therefore be beneficial for both the patients and the level of crowding in the ED.

Both studies, however, showed no beneficial effects of the interventions. Moreover, many eligible patients did not receive an intervention. This was mainly due to staff-related reasons, although a substantial number of patients turned out not to be receptive for the intervention, because they were not able or willing to cooperate

(**chapter 3**), or could not be reached by telephone (**chapter 4** and **5**). While patients in the ED may be open to education and initiation of further support, they may also be distracted by pain, stress, or discomfort, or influenced by medications or intoxications.[12,14-16] As a result, many patients may not be receptive to educational or motivational interventions in the ED. Several studies have reported that trials that took place in the ED showed less impact than trials based in other settings, like the general practice, a hospital ward or in the community.[9,17] Therefore, educational and motivational interventions should preferably be performed in these settings, as there is more time to assess the patient and the opportunity to create a confidential, quiet and private setting which may facilitate the conversation.[4,17]

In the telephone follow-up program, patients received the telephone intervention after discharge from the ED. However, the finding that a third of the eligible patients could not be reached by telephone suggests that the telephone is not a suitable medium for interventions for all older adults. Moreover, the finding in **chapter 6** that most patients return to the ED for medical and not for patient-related reasons indicates that lack of education and support does not play a major role in unplanned return to the ED.

ED staff-related impeding factors for conduction of interventions

The finding that in both programs many eligible patients did not receive an intervention for staff-related reasons suggests that the conduction of educational and motivational interventions by ED staff was not feasible in the ED, even when carefully planned during off-peak hours. It is likely that the continuous time pressure that ED staff experience and the need to give priority to medically urgent issues were the most important reasons why the interventions were not performed. Other barriers, mentioned in the literature concerning the implementation of alcohol screening programs, are the uncomfortable nature of the topic, doubt about conversation skills and not feeling responsible for the conduction of the interventions.[3,18-21]

Considerations regarding continuation of interventions by ED staff

Considering the aforementioned findings, it is questionable whether these proactive care programs are worth the invested time, costs, and efforts. Due to the widespread shortage of ED nurses and increased crowding in the ED, ED staff work under continuous time pressure. The interventions of the programs described in this thesis increase the work burden for these professionals as they are time consuming, require special skills, repeat training, dedication and preparedness to overcome barriers.[22] Moreover, it is possible that an ED professional who is working under time pressure will provide a suboptimal intervention, which may be less effective and could even be harmful for the patient involved, for example if it results in feelings of stigmatization.[22,23] Based on the criteria for appraising the validity of a screening program by Wilson and Jungner,[24] continuing these proactive care programs routinely

in all target group patients cannot be justified if the interventions are not effective in patients identified by screening. In contrast, it is valuable to educate ED staff about patients at risk and how to detect them. In addition, by providing staff with tools to initiate a dialogue, they will be able to offer assistance when they feel it is necessary and appropriate.[22]

FUTURE CLINICAL AND RESEARCH PERSPECTIVES

Considering the complicated social situation of many patients with hazardous alcohol use and the multiple health problems of older adults with unplanned ED return visits, it may not be realistic to expect that their situation would be improved by a single intervention in the ED. Societal and community-based programs and cross-organizational cooperation within healthcare organizations are likely to be more effective.

Possible interventions outside the ED

Societal programs and governmental interventions

Education and campaigns about risks of alcohol use could influence social norms on alcohol consumption. Interventions initiated by the government that limit the availability of alcoholic beverages and prohibit alcohol consumption in specific circumstances may also be effective. Examples are the ban on the serving of alcohol on airplanes and in sports club canteens, prohibiting the sale of alcohol in supermarkets, and drink-driving penalties. Increasing taxes on and prices of alcoholic beverages and banning commercials may also be of benefit.[25] Several of these measures are included in the National Prevention Agreement (Nationaal Preventieakkoord) that was composed in 2018. Apart from governmental measures, this National Prevention Agreement contains arrangements from more than 70 organizations, including the healthcare sector, business community and educational organizations, in order to reduce and prevent smoking, obesity and problematic alcohol use.[26]

More governmental investments in healthcare, specifically for regular primary, geriatric, and psychiatric care to increase capacity and personnel, would improve a number of issues.

Governmental education campaigns that point out to citizens that care outside office hours is only intended for acute health problems may reduce pressure on the acute healthcare system. These campaigns can refer to applications and websites that help people assess whether their complaint is urgent and can provide self-management advice. Strengthening self-management skills appears to be especially useful in reducing the number of ED visits in older adults. When older adults have more

control over their illnesses, they may better recognize possible deterioration and can anticipate the associated problems.[27,28]

Cross-organizational cooperation

Collaboration between organizations can also be effective in reducing adverse events for patients at risk. An example is the development of multidisciplinary Alcohol Care Teams (ACTs) that offer integrated alcohol treatment pathways across primary, secondary and community care. These ACTs are mainly developed in acute hospitals in the United Kingdom and have shown to reduce acute hospital admissions, readmissions and mortality, but also improve the quality and efficiency of care for patients with hazardous alcohol use.[29] Despite the positive results of the ACT programs, maintenance and further development of these programs are a challenge, due to budget cuts and shortage of sufficiently trained addiction and social workers.[29]

Better detection of patients with risky drinking patterns could also be achieved by creating more awareness among clinicians in general about the limits for responsible alcohol consumption and harmful physical and mental health consequences of hazardous alcohol use. Referral agreements with addiction treatment centers or deployment of addiction workers in lifestyle outpatient clinics, which are initiated in an increasing number of hospitals, will facilitate low-threshold referral to specialists who can provide specific guidance and treatment. Unfortunately, since there is currently a widespread shortage in all branches of healthcare, it must be carefully considered whether transferring a health care worker to another location provides more health benefits for the entire target population.

In a Scottish model, cooperation between primary care, hospital care and community services reduced the rate of emergency admissions of older adults.[30] This program illustrates that interventions that involve more organizations within the healthcare system, and not only the ED, are more likely to decrease the pressure on the ED.

However, since many older adults have multiple health problems and mostly return to the ED for medical reasons,[27,31] ED return visits in this patient population may be difficult to prevent. Reduction of the number of unplanned ED return visits in these older adults may be achieved if the necessary care can be provided at another location outside the ED, for instance in an acute geriatric community hospital.[27,32] However, striving for a reduction in ED return visit rate without collaboration with other organizations that can ensure the patient's chronic care or provide acute care facilities elsewhere, does not seem realistic and may even be dangerous. Dutch examples of such collaborations are the "Draaideur" project for older adults who visit the ED after a fall, and "Pallisupport", a collaboration project between transmural palliative care teams and primary and hospital care organizations, aimed at older adults with palliative care needs.[27]

Future proactive care programs in the ED

The described proactive care programs in the ED highlight important points of consideration when developing new programs in the ED:

Determine aim of the programs, outcome measures and target group patients

Outcome measures of the programs should be well-defined and suitable. For instance, programs that focus on procedures in the ED that could have a direct reducing effect on crowding may be suitable. An example is the lean-driven radiology project in which bottlenecks throughout the imaging process at the ED were identified, and several lean strategies were implemented.[33] Programs focusing on specific patient groups to reduce their ED length of stay and to improve their comfort in the ED may also be feasible. Examples are the acutely presenting older patient (APOP) screening program,[34,35] and the presence of an acute psychiatric intervention team in the ED.[13] By focusing on a specific patient group, this group should be well detectable, e.g., with a short, validated screening instrument, and likely to respond well to the offered intervention. For these screening programs, the Wilson and Jungner criteria should also be taken into account.[24]

Consider the feasibility

When defining the goals of the programs, their feasibility must be carefully considered. Due to the increased pressure on acute healthcare in the last decade, it is important that the patients' ED length of stay is as short as possible in order to retain enough capacity for all patients who need acute care. Therefore, performing interventions in the ED that are not necessary in the acute setting are undesirable.

Consider enabling factors

Factors that are likely to enable the implementation of new proactive care programs are the composition of a multidisciplinary project team, involvement of the information technology department, adequate funding to cover implementation costs, and additional resources and personnel. In a project team in which all involved professionals and organizations are represented, it is more likely that the project procedures will be feasible for the executing staff. Moreover, it will improve collaboration between departments and facilitate referral of patients. Ongoing education of executing staff, motivation by physician and nurse "champions" and providing regular performance feedback are crucial to keep staff skilled and motivated.[1-5,18]

Implications for future research and policy

Due to the increased pressure on the Dutch healthcare system in general and on acute healthcare in particular, there is an ongoing need to optimize the organization and quality of care in the ED. Objective scientific data is needed for informed future policy

choices. Therefore, more research concerning ED processes and the characteristics of ED patients, particularly in Dutch EDs, is needed.[36]

The results of the two programs in this thesis emphasize the importance of scientific evaluation of processes and interventions in the ED, including those that appear favorable. This is illustrated by the fact that the interventions, examined in our projects, are recommended in several guidelines,[37,38] while their effectiveness has not been clearly demonstrated.[9,39-41]

CONCLUSION

In this thesis, we evaluated two proactive care programs, targeting two groups of ED patients who are at high risk of adverse outcomes. We found that the interventions provided no clear benefit to the patients, nor to the ED. Moreover, feasibility of the programs was limited, as many eligible patients were not reached, due to both staff-related and patient-related reasons. When developing new proactive care programs in the ED, the objectives, target groups and feasibility must be carefully considered. Detection of patients may be feasible in the ED, but given the current pressure on the ED, interventions should be performed at a later stage outside the ED, if possible. This requires good collaboration between the involved organizations. Better coordination of care for patients at risk could be the key to improving the quality of care and well-being of these patients and could also contribute to reducing the pressure on emergency care. However, this thesis demonstrates the importance of scientific evaluation of future programs prior to their implementation as routine care.

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CHAPTER 8

| English summary

The Emergency Department (ED) is visited by a broad variety of patients of all ages when they experience an acute health problem. Generally, patients are receptive to help and education in the ED and may be open to acknowledge their behavior or their physical impairments as a causative factor for the ED visit. This makes the ED a potentially suitable setting for the detection of hazardous behavior and physical or social frailty, and for subsequent patient education and initiation of further support.

In the last decade, an increasing number of Dutch EDs have started programs within existing ED care to detect patients at risk for certain health problems. These patients are offered additional care and targeted interventions, aimed at improving their care in the ED and/or initiating follow-up after discharge. These programs can be considered as proactive care programs, as patients at risk are proactively detected and treated. This is in contrast to reactive care, which is provided in response to the patient's acute health problem.

In this thesis, the effectiveness and feasibility of two proactive care programs that were implemented in the EDs of Haaglanden Medical Center (HMC) in The Hague are evaluated, in order to contribute to the optimization of emergency care.

In the first part of this thesis, we evaluated a program focusing on screening and intervention for hazardous alcohol use in adult ED patients.

In **chapter 2**, the implementation and effect of routine screening and subsequent interventions for hazardous alcohol use on alcohol consumption in ED patients were examined. During the one-year study period, more than half of the consecutive 41,900 ED patients aged 18 years and older were screened for hazardous alcohol use during triage, using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). Of the screened patients, 10% had an elevated AUDIT-C score. According to the study protocol, all these patients should receive an information leaflet and a brief, motivational intervention from a trained ED nurse or physician. However, less than half finally received an intervention. Of them, two-thirds received an information leaflet only and about a third received both a leaflet and a motivational intervention. Less than half of the patients with an elevated AUDIT-C score were available for telephone follow-up three months after ED discharge. Of the patients who did not receive any intervention, a third either reduced or stopped their alcohol consumption in the three months after ED discharge. These percentages were higher in patients who had received an information leaflet, a motivational intervention, or both. Male sex, an alcohol-related ED visit, and ED presentations for any form of intoxication, head injury, gastro-intestinal bleeding, or a wound were associated with hazardous alcohol use.

As we found that almost half of the ED patients were missed with routine screening for hazardous alcohol use in the ED, we investigated in **chapter 3** whether patient-and staff-related factors caused screening failures. We also examined whether unscreened patients had risk factors for hazardous alcohol use. For this study, we used data from the alcohol screening and intervention study in chapter 2. Only the first ED visit of each patient during the study period was included in this study. Of the 28,019 included ED patients, two-thirds underwent routine screening for hazardous alcohol use. Of the unscreened patients, the majority were not screened for staff-related reasons and only a quarter for patient-related reasons, (i.e., refusal or not being able to cooperate). Strikingly, patients with risk factors for hazardous alcohol use were less often screened than patients without risk factors. The highest prevalence of risk factors was found in patients unable or unwilling to cooperate.

In the second part of this thesis, we examined the effect of telephone follow-up after ED discharge for community-dwelling older patients on health-related outcomes.

In **chapter 4**, we described a systematic review of the literature to evaluate the effect of telephone follow-up for patients aged 65 years and older on health-related outcomes, compared to control interventions or standard care. Only two high-quality, controlled trials met the review selection criteria, including a total of 2120 patients. No demonstrable benefits of telephone follow-up were found on ED return visits, hospitalization, acquisition of prescribed medication, and compliance with follow-up appointments. However, the majority of the eligible patients were not reached or refused to participate.

We also conducted a large pragmatic randomized controlled trial, presented in **chapter 5**, in which we investigated the effect of telephone follow-up on unplanned hospitalizations and unplanned ED return visits within 30 days of ED discharge. In this study, community-dwelling patients aged 70 years and older were divided into two groups: patients who visited the ED in odd months received a telephone follow-up call (intervention group), and patients who visited the ED in even months received a satisfaction survey call (control group) within 24 hours after ED discharge. More than a third of the eligible patients were not called and a third were not reached by ED staff after a maximum of three calling attempts, mainly due to a shortage of ED nurses. Finally, a third of the 9836 eligible patients were reached and consented to participate. We found no statistically significant difference in the rate of unplanned 30-day hospitalization and/or ED return visits between the intervention group and the control group. Additionally, the telephone follow-up intervention showed no beneficial effect within the subgroups, divided by age, sex, living condition, and degree of crowding in the ED at discharge.

To understand why many post-ED discharge interventions fail to reduce unplanned ED return visits, we investigated the association between patient and index ED visit characteristics and unplanned ED return visits in community-dwelling patients aged 70 years and older in **chapter 6**. In addition, we investigated the reasons for unplanned ED return visits in these patients. For this study, we used observational data from control group patients of the pragmatic randomized controlled trial, described in chapter 5. Of the 1659 control group patients, 222 (13.4%) had at least one unplanned ED return visit within 30 days after ED discharge. We found several patient and ED visit characteristics that were associated with unplanned ED return visits. The majority of patients returned for medical reasons, being either related to the same illness of the index ED visit, or a new complaint. ED return visits for patient-related reasons were less common. In addition, patients with three or more unplanned ED return visits returned most often for problems related to the same illness of the index ED visit.

Chapter 7 constitutes the general discussion, methodological considerations, clinical implications of the main findings and future perspectives. Although we hypothesized that the two proactive care programs, evaluated in this thesis, would be effective, we were not able to demonstrate a clear patient benefit. Moreover, feasibility of the proactive care programs was limited, as many eligible patients were not reached, due to both staff-related and patient-related reasons. The findings suggest that detection of patients at risk may be feasible in the ED, but performing extra interventions by ED staff in addition to routine care is not feasible and has not been proven effective. Additional interventions could be better performed outside the ED at a later stage. This requires good collaboration between the involved organizations. Moreover, better coordination of care for patients at risk could be the key to improving the quality of care and well-being of these patients and could also contribute to reducing the pressure on emergency care.

The findings in this thesis emphasize the value of scientific evaluation of healthcare intervention programs in the ED, including those that appear clearly favorable from the outset. More research concerning ED processes, interventions and characteristics of ED patients is needed in order to optimize the organization and quality of ED care and to make informed future policy choices.

CHAPTER 9

| Nederlandse samenvatting

De Spoedeisende Hulp (SEH) is een afdeling die wordt bezocht door patiënten van alle leeftijden en uit alle lagen van de bevolking, wanneer zij een acuut gezondheidsprobleem hebben. Over het algemeen staan patiënten op de SEH open voor hulp en voorlichting. Wanneer er een relatie bestaat tussen de reden van het SEH-bezoek en hun gedrag of fysieke beperkingen, zijn veel patiënten bereid om dit te erkennen als de oorzaak van hun SEH-bezoek. Dit maakt de SEH een potentieel geschikte plek voor het signaleren van risicovol gedrag en fysieke of sociale kwetsbaarheid, en voor daarop aansluitende patiëntenvoorlichting en het initiëren van verdere ondersteuning.

In de afgelopen tien jaar zijn steeds meer Nederlandse SEHs met programma's gestart binnen de reguliere SEH-zorg om patiënten op te sporen die risico lopen op bepaalde gezondheidsproblemen. Deze patiënten krijgen dan extra zorg en interventies aangeboden, die gericht zijn op het verbeteren van de kwaliteit van zorg op de SEH en/of het in gang zetten van nazorg na ontslag. Deze programma's kunnen worden beschouwd als proactieve zorgprogramma's, aangezien patiënten met een verhoogd risico proactief worden opgespoord en behandeld. Dit in tegenstelling tot reactieve zorg, die wordt verleend als reactie op het acute gezondheidsprobleem van de patiënt.

In dit proefschrift zijn de effectiviteit en de haalbaarheid geëvalueerd van twee proactieve zorgprogramma's die zijn uitgevoerd op de SEHs van het Haaglanden Medisch Centrum in Den Haag, met als doel een bijdrage te leveren aan het optimaliseren van de spoedeisende zorg.

In het eerste deel van dit proefschrift evalueerden we een programma dat was gericht op screening en interventie voor risicovol alcoholgebruik bij volwassen SEH-patiënten.

In **hoofdstuk 2** werd onderzocht wat het effect was van routine screening op en het verrichten van interventies bij risicovol alcoholgebruik op de alcoholconsumptie van SEH-patiënten. Daarnaast werd de haalbaarheid van het programma op de SEH onderzocht. Gedurende de studieperiode van een jaar werd meer dan de helft van de 41900 SEH-patiënten van 18 jaar en ouder gescreend op risicovol alcoholgebruik met behulp van de Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). Van de gescreende patiënten had 10% een verhoogde AUDIT-C score. Volgens het onderzoeksprotocol zouden al deze patiënten een informatiefolder moeten ontvangen en kwamen ze in aanmerking voor een kort, motiverend gesprek met een daarvoor opgeleide SEH-verpleegkundige of arts. Echter, minder dan de helft van deze patiënten kreeg uiteindelijk een interventie. Twee derde ontving alleen een informatiefolder en ongeveer een derde ontving zowel een folder als een motiverend gesprek. Minder dan de helft van de patiënten met een verhoogde AUDIT-C score

werd bereikt voor telefonische follow-up drie maanden na het bezoek aan de SEH. Van de patiënten die geen enkele interventie hadden gekregen, had een derde het alcoholgebruik verminderd of gestaakt in de drie maanden na ontslag vanaf de SEH. Deze percentages waren hoger bij de groepen patiënten die een informatiefolder, een motiverend gesprek, of beide hadden gekregen. Mannelijk geslacht, een alcohol-gerelateerd SEH-bezoek en SEH-presentaties vanwege een intoxicatie, hoofdletsel, gastro-intestinale bloeding of een wond bleken geassocieerd met risicovol alcoholgebruik.

Omdat we ontdekten dat bijna de helft van de SEH-patiënten werd gemist bij het routinematig screenen op risicovol alcoholgebruik op de SEH, onderzochten we in **hoofdstuk 3** in hoeverre patiënt-en personeelsgerelateerde factoren zorgden voor het falen van de screening. Daarnaast onderzochten we of patiënten die niet waren gescreend risicofactoren hadden voor risicovol alcoholgebruik. Voor deze studie gebruikten we gegevens uit de alcohol screening en interventiestudie in hoofdstuk 2. In deze studie werd van elke patiënt alleen het eerste SEH-bezoek tijdens de studieperiode geïncludeerd. Van de 28019 SEH-patiënten werd twee derde gescreend op risicovol alcoholgebruik. Als patiënten niet werden gescreend, was dat meestal vanwege personeelsgerelateerde redenen en slechts in een kwart van de gevallen vanwege patiënt-gerelateerde redenen (weigeren of niet in staat zijn om mee te werken). Opvallend was dat patiënten met risicofactoren voor risicovol alcoholgebruik minder vaak gescreend werden dan patiënten zonder risicofactoren. De hoogste prevalentie van risicofactoren werd gevonden bij patiënten die niet konden of wilden meewerken met de screening.

In het tweede deel van dit proefschrift onderzochten we het effect van telefonische nazorg voor zelfstandig wonende, oudere patiënten na ontslag vanaf de SEH op gezondheidsgerelateerde uitkomsten.

In **hoofdstuk 4** beschreven we een systematisch literatuuronderzoek, waarin het effect van telefonische nazorg na een bezoek aan de SEH voor patiënten van 65 jaar en ouder op gezondheidsgerelateerde uitkomsten werd geëvalueerd, vergeleken met controle interventies of standaard zorg. Slechts twee gecontroleerde onderzoeken van hoge kwaliteit voldeden aan de selectiecriteria, met in totaal 2120 patiënten. Er werd geen effect gevonden van telefonische nazorg op het aantal herbezoeken op de SEH, ziekenhuisopnames, het verkrijgen van voorgeschreven medicatie of het naleven van vervolgafspraken. Echter, de meerderheid van de patiënten die in aanmerking kwam voor telefonische nazorg kon niet worden bereikt of weigerde deel te nemen aan het onderzoek.

In **hoofdstuk 5** presenteerden we onze eigen pragmatische, gerandomiseerde, gecontroleerde studie, waarin we het effect van telefonische nazorg op het aantal

ongeplande ziekenhuisopnames en ongeplande herbezoeken op de SEH binnen 30 dagen na ontslag hebben onderzocht. In deze studie werden zelfstandig wonende patiënten van 70 jaar en ouder verdeeld in twee groepen: patiënten die in de oneven maanden de SEH bezochten, kregen een telefonisch nazorggesprek (interventiegroep) en patiënten die in de even maanden de SEH bezochten kregen een telefonische tevredenheidsenquête (controlegroep) binnen 24 uur na ontslag vanaf de SEH. Ruim een derde van de patiënten die in aanmerking kwam voor een telefoongesprek werd niet gebeld en een derde werd niet bereikt door het SEH-personeel na maximaal drie belpogingen, met name door een tekort aan beschikbaarheid van SEH-verpleegkundigen. Uiteindelijk werd een derde van de 9836 patiënten telefonisch bereikt en was bereid deel te nemen aan het gesprek. Tussen de twee patiëntengroepen werd geen statistisch significant verschil gevonden in het aantal ongeplande ziekenhuisopnames en/of herbezoeken binnen 30 dagen na ontslag vanaf de SEH. Er werd eveneens geen gunstig effect van telefonische nazorg aangetoond binnen subgroepen, uitgesplitst naar leeftijd, geslacht, woonsituatie en mate van drukte op de SEH tijdens ontslag.

Om te begrijpen waarom veel interventies, die worden geïnitieerd tijdens of na ontslag vanaf de SEH geen reductie geven van het aantal ongeplande herbezoeken op de SEH, onderzochten we in **hoofdstuk 6** of er een associatie bestond tussen karakteristieken van patiënten en het SEH-bezoek van zelfstandig wonende SEH-patiënten van 70 jaar en ouder en ongeplande herbezoeken op de SEH. Daarnaast onderzochten we de redenen voor de ongeplande herbezoeken op de SEH van deze patiënten. Voor deze studie werden observationele data van controlegroep patiënten uit de pragmatische gerandomiseerde gecontroleerde studie gebruikt, die is beschreven in hoofdstuk 5. Van de 1659 patiënten in de controlegroep hadden er 222 (13,4%) minstens één ongepland herbezoek binnen 30 dagen na ontslag vanaf de SEH. We vonden verschillende patiëntkenmerken en karakteristieken van het SEH-bezoek die geassocieerd waren met ongeplande herbezoeken op de SEH. De meerderheid van de patiënten die retour kwamen naar de SEH, deden dat om medische redenen, namelijk vanwege dezelfde ziekte als het voorafgaande SEH-bezoek of vanwege een nieuwe klacht. Herbezoeken vanwege patiëntgerelateerde redenen kwamen minder vaak voor. Ook patiënten met drie of meer ongeplande herbezoeken kwamen het vaakst terug vanwege dezelfde ziekte als het voorafgaande SEH-bezoek.

Hoofdstuk 7 bevat de algemene discussie, methodologische overwegingen, klinische implicaties van de belangrijkste bevindingen en een perspectief voor toekomstig onderzoek en toekomstige interventies en programma's. Hoewel de hypothese was dat de twee proactieve zorgprogramma's die werden geëvalueerd in dit proefschrift effectief zouden zijn, konden we er geen duidelijke voordelen van aantonen voor de patiënt. Bovendien bleek de haalbaarheid van de proactieve zorgprogramma's beperkt, aangezien veel patiënten die ervoor in aanmerking kwamen niet werden

bereikt, zowel om personeels-als patiëntgerelateerde redenen. De bevindingen suggereren dat detectie van risicopatiënten mogelijk is op de SEH, maar dat het uitvoeren van extra interventies door SEH-personeel, naast de reguliere zorg, niet haalbaar en niet effectief blijkt. Aanvullende interventies kunnen wellicht beter in een later stadium en op een andere locatie dan de SEH worden uitgevoerd. Dit vraagt om een goede samenwerking tussen de betrokken zorgorganisaties in de keten. Daarnaast zou een betere coördinatie van de zorg voor risicopatiënten de sleutel kunnen zijn tot het verbeteren van de kwaliteit van de zorg en het welzijn van deze patiënten. Het zou bovendien kunnen gaan bijdragen aan het verminderen van de druk op de spoedeisende zorg.

De bevindingen in dit proefschrift benadrukken de waarde van wetenschappelijke evaluatie van interventieprogramma's op de SEH, ook van programma's die bij aanvang evident zinvol lijken. Meer onderzoek naar SEH-processen, interventies en karakteristieken van SEH-patiënten is nodig om de organisatie en de kwaliteit van de zorg op de SEH te optimaliseren en om in de toekomst weloverwogen beleidskeuzes te maken.

APPENDICES

ABBREVIATIONS

ACT	Alcohol Care Team
AUDIT	Alcohol Use Disorders Identification Test
AUDIT-C	Alcohol Use Disorders Identification Test-Consumption
CEN	Certified emergency nurses
CI	Confidence Interval
CRF	Case Report Form
ED	Emergency Department
e.g.	Exempli gratia, meaning “for example”
EHS	Electronic Hospital System
EMR	Electronic Medical Records
EP	Emergency Physician
et al.	Et alii, meaning “and others”
GP	General Practitioner
GPC	General Practitioners Cooperative
HMC	Haaglanden Medical Center
i.e.	Id est, meaning “that is”
IQR	Interquartile Range
MCH	Medical Centre Haaglanden
METC	Medical Ethics Review Committee
MI	Motivational intervention
N	Number
NEDOCS	National Emergency Department OverCrowding Scale
NY	New York
OR	Odds Ratio
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
RCT	Randomized Controlled Trial
SBI	Screening and Brief Intervention
SBIRT	Screening, Brief Intervention and Referral to Treatment
SIREN	Screening and brief InteRvention for hazardous alcohol use in an inner-city Emergency department in the Netherlands
SPSS	Statistical Package for the Social Sciences
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology
TFU	Telephone follow-up
URV	Unplanned emergency department return visit
USA	United States of America

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CURRICULUM VITAE

Merel van Loon was born on the 15th of June 1977 in Nijmegen. After graduating from secondary school at the Kandinsky College in Nijmegen in 1995, she started studying Architecture at the Delft University of Technology. After finishing her propaedeutic year in Architecture, Merel was admitted to study Medicine at Leiden University in 1996. In January 2003, Merel finished her internships cum laude.

After graduation, she worked as a resident in Rumah Sakit Dian Harapan in Waena, Papua, Indonesia and as a Gynecology and Obstetrics resident in the Sint Franciscus Gasthuis in Rotterdam. Afterwards, Merel worked as a Pediatric resident in Medical Center Rijnmond Zuid (currently Maasstad Hospital) in Rotterdam, and continued as a Pediatric registrar in Sophia Children's Hospital in Rotterdam, and in Queen Elizabeth Central Hospital in Blantyre, Malawi.

In Malawi, inspired by her capable and versatile Emergency Physician colleagues, she decided to change her field of practice. After returning from Blantyre in 2008, Merel worked as a resident at the Emergency Department of the Erasmus Medical Center in Rotterdam. In 2009, after four months working as a resident in Internal Medicine, she started her training in Emergency Medicine at Medical Center Haaglanden in The Hague (currently Haaglanden Medical Center). Since 2013 she works there as a certified Emergency Physician.

In 2015 Merel started working on analyzing the Haaglanden alcohol screening and intervention program for which she was awarded with a Spoedeisende Geneeskunde Onderzoeksfonds (SGO) grant and a grant by the Landsteiner Institute in 2016. In 2017 she received a thesis grant from the Jacobus Foundation in The Hague. With the help of this grant, she was able to develop the telephone follow-up project for older ED patients and to elaborate the two projects into this thesis.

Merel is married to Floris van Gaalen since 2009. Together they have two sons, Jasper (2010) and Crispijn (2012).

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