



Full length article

Making a bridge between general hospital and specialised community-based treatment for alcohol use disorder—A pragmatic randomised controlled trial

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ABSTRACT

Aim: To investigate if more patients in the intervention group attended specialized alcohol treatment compared with a treatment-as-usual group (TAU).

Methods: Pragmatic randomized controlled trial where consecutive patients, admitted to somatic hospitals, filled out a lifestyle questionnaire with the Alcohol Use Disorder Identification Test (AUDIT) embedded. Patients scoring 8+ on AUDIT were included in the study. Included patients were randomized to either a Danish screening brief intervention and referral to treatment (SBIRT) called the Relay model or TAU depending on date of admission. The Relay group was offered a brief alcohol intervention by an outreach alcohol therapist. Patients scoring 16 points and above on the AUDIT test also received referral to alcohol treatment. Outcome was attendance at specialized outpatient alcohol treatment centres after discharge from hospital. Information on patients was gathered from municipal databases at 18 months follow-up.

Results: A total of 3534 patients completed the questionnaire, and 609 patients (17%) scored AUDIT 8+. 48 patients were lost to follow-up, and the final sample had 561 patients. Only 33 patients (6%) attended outpatient treatment at 18-months follow-up, but significantly more patients in the Relay group sought alcohol treatment than in the TAU group (OR = 2.5 [1.2;5.2] ($p = 0.017$)). Number needed to treat (NNT) was 20 [95% CI 11.2;112.3].

Conclusion: The Relay intervention was associated with more patients attending specialized treatment, but further research is needed to establish if general hospitals are an excellent platform for performing SBIRT.

1. Introduction

Alcohol use disorder (AUD) is responsible for considerable morbidity, mortality, and accidents, and many patients with alcohol problems are admitted to general hospitals (Mdege et al., 2013). In a systematic review of hospital-based screening studies, the proportion of inpatients with AUD was found to range between 16% and 26% (Roche et al., 2006). Health problems and hospital admissions may open a window for reviewing and affecting alcohol consumption, and general hospitals may be in an outstanding position to perform early interventions to inpatients with AUD. Thus, Screening, Brief Intervention and Referral to specialized Treatment (SBIRT) for AUD is considered to be a suitable intervention developed, in particular, for use in primary care and general hospitals (Babor et al., 2007). When identified (the Screening (S) component), the next step is to address the patients' awareness of their alcohol use and increase their motivation (the Brief

Intervention (BI) component) based on the principles of Motivational interviewing (Miller and Rollnick, 2012). The final part of the intervention is referring patients with a need for further treatment to specialized alcohol treatment following discharge from hospital (the Referral to Treatment (RT) component). Thus, the RT-component is aimed at building a bridge from the hospitals within the health services to specialized treatment for AUD, typically offered by the communities.

Hospitalized patients seem open to BI. Studies have shown that patients receiving BI during hospitalization reduce their alcohol consumption compared with control groups (Kaner et al., 2018). The difference, however, is no longer present a year after the intervention (DiClemente et al., 2017), and BI does not seem to have an impact on alcohol use among patients with very heavy use or dependence (Saitz, 2010). Therefore, the findings from RCTs on somatic inpatients are inconclusive in relation to long-term drinking outcomes. Furthermore, a meta-analysis indicated that the referral component of SBIRT does not

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seem to increase the proportion of patients attending specialized treatment for AUD after discharge from hospital (Glass et al., 2015). Hence, there is also a lack of evidence for the effect of SBIRT's ability to build a bridge between hospital and specialized treatment.

The present study is designed to specifically investigate the possibility of developing a bridge between general hospital and specialized community-based treatment for AUD by means of applying a Relay Model (Schwarz et al., 2016). In the Relay Model, a therapist from the community-based alcohol treatment centre meets identified risky drinkers at the hospital and offers BI, informs them about treatment possibilities, and invites the patients to continue treatment at the community-based alcohol treatment centre following their discharge from hospital. The rationale for the Relay Model is that it allows the therapist to build an alliance with the patient and thus make it more likely that the patient will meet at the alcohol treatment centre after discharge. In addition, the Relay model also ensures that BI is delivered by a trained professional specialized in treating AUD rather than nurses and doctors at the hospital. Several studies have shown that hospital staff, for a number of reasons, find it difficult to address AUD among patients (Hellum et al., 2016). The Relay model presents an alternative in that respect. Unlike traditional SBIRT models, in the Relay model it is the outpatient treatment therapist who implements the intervention instead of the staff at the hospitals.

Here, we present the first results from the Relay Study (Schwarz et al., 2016). The target group in the Relay Study was wider than ordinary SBIRT, as it included both patients with heavy alcohol use and with AUD. The rationale behind the Relay study was that 1) Outreach therapists from the alcohol treatment centres do not have barriers preventing them from speaking with patients about alcohol, and 2) it is easier for patients to seek out treatment when they have already met the alcohol therapists and had a good experience.

In the Relay Study, patients admitted to somatic departments, where alcohol-related illnesses are especially prevalent, were randomized to either a Relay Model intervention or to treatment-as-usual during an inclusion period of 2.5 years.

1.1. Aim of the study

The aim of the study was to investigate if more hospitalized somatic patients attended specialized alcohol treatment after their discharge from hospital when offered a brief alcohol intervention and referral to treatment performed by outreach alcohol therapists (the Relay model) compared with patients who received treatment-as-usual.

2. Method and material

2.1. Setting

Denmark has a public, tax-financed health care system for all residents. Most health care is delivered from five regional jurisdictions operating public hospitals and contracting with GPs and other independent health care providers. Community-based alcohol treatment centres are operated separately from the hospitals and general practitioners in Denmark.

Patients referred to or seeking treatment for alcohol treatment are free to choose between the community-based alcohol treatment centres, and by law, the municipalities shall offer patients treatment within 14-days of the patient contacting the treatment facility (Schwarz et al., 2017).

2.2. Sample

The study was a single-blind pragmatic randomized controlled trial where patients admitted to gastrointestinal, neurological, or orthopaedic departments at Odense University Hospital or to the emergency department at Aabenraa Hospital were included from October 2013 to

June 2016. When patients had been hospitalized for 24 h at the departments, they received a lifestyle questionnaire containing questions about their: 1) eating habits, 2) tobacco use, 3) alcohol use, and 4) physical activity. The Alcohol Use Disorder Identification Test (AUDIT) (Babor et al., 2001) was embedded in the questionnaire.

Patients included in the Relay Study were those scoring 8 and above on the AUDIT test (O'Flynn, 2011), aged 18 and above, hospitalized for a minimum of 24 h, residing in the uptake area of either the alcohol treatment clinic in Odense or the alcohol treatment clinic in Aabenraa (In Aabenraa the inclusion ended in November 2015), and who gave consent to participate in the study. Patients who had received any alcohol-specific treatment for alcohol use disorders in the previous 6 months or who were psychotic or not cognitively and/or physically capable of participating were excluded from the Relay Study. The exclusion was based on clinical judgement by the staff at the hospital.

Patients were asked for their consent as part of the lifestyle questionnaire and again when the patients were allocated to the Relay intervention.

2.3. Randomization

Participating patients received either Relay Model or treatment-as-usual (TAU) at random. The randomization was performed by a computer algorithm which allocated days to be either intervention days or TAU days. Therapists from the two alcohol treatment centres showed up at the hospital departments on intervention days and offered the patients included in the study on that particular day the Relay intervention. Therapists did not show up on TAU days, and, thus, the patients included in the study on TAU days did not receive the intervention. The staff at the hospital departments were unaware of which days were randomized to be intervention days or TAU days. The researcher performing the analysis was blinded to the allocation of randomization.

2.4. Relay group

Outreach alcohol therapists from the alcohol treatment clinics in Odense and Aabenraa went to the departments at the somatic hospitals on randomly allocated intervention days to offer patients included in the study that particular day the Relay Model, which consisted of a brief intervention (BI) dealing with their alcohol use and receiving a brochure with information about the alcohol treatment. The duration of the BI was 20 min; it was based on the principles of motivational interviewing (Miller, 1983) and aimed at motivating patients to reduce their alcohol consumption. Alcohol therapists were trained in motivational interviewing, and to insure a high quality, some of the conversations between staffs and patients were recorded, and these were sporadically checked for adherence. In addition to the BI, patients scoring 16 points and above on the AUDIT test also received a referral to the local public alcohol treatment centre by means of an attendance contract including a specific appointment for showing up for alcohol treatment. Should the patients fail to show up at the agreed-upon time, they received two reminders at two-week intervals offering a new appointment.

2.5. Treatment as usual

At somatic hospitals in general, nurses and doctors are required to address unhealthy alcohol use. However, this does not always happen due to time constraints and fear of stigma (Hellum et al., 2016). Thus, TAU most often consisted of no intervention in relation to the patients' alcohol use, or at most the patients received a brochure about the community-based alcohol treatment centre as the nurses themselves described it.

2.6. Clinical end-point

The clinical end-point was patients who were registered as having attended treatment at the alcohol treatment centres in Odense and Aabenraa. Attendance was defined as those who showed up. It was not a requirement that they initiated treatment but only that they had an introductory conversation with an alcohol therapist. In our protocol (Schwarz et al., 2016), we stated that we would report attendance 30 days after discharge from hospital, but during the analysis process more data were available, and follow-up was expanded to 3 and 18 months. The information about attendance in outpatient treatment at alcohol treatment centres during the 3 and 18 months since discharge from hospital was gathered from the local register in the alcohol treatment centre in Odense and by manually looking through the local register at the alcohol treatment centre in Aabenraa.

2.7. Statistics

The analysis was based on intention-to-treat. We used logistic regression to calculate the odds ratio (OR) of showing up for alcohol treatment at 18-months follow-up and test for statistical significance. We performed t-tests for differences between the Relay group and the TAU groups to investigate if the randomisation had been successful. We also tested for differences between those who met for treatment and those who did not. To describe attendance in alcohol treatment over time in the two groups we computed Kaplan-Meier cumulative-event curves. Patients who died during the follow-up period were censored, and the follow-up period is defined as patients' discharge date plus 18 months (547 days). Test statistics were considered significant at 0.05 and below. To assess the potential benefit of the Relay intervention we calculated the Number Needed to Treat (NNT) (Laupacis et al., 1988).

A more thorough description of the randomized controlled trial is found in the study protocol for the Relay Study (Schwarz et al., 2016). The project was approved by the Danish Data Protection Agency (The Region of Southern Denmark 'Paraply anmeldelse' 2008-58-0035). All calculations were conducted in SAS 9.4 and STATA 15.1 on the secure research server at Statistics Denmark, ensuring data confidentiality.

3. Results

During the study period, a total of 6102 adult patients from the uptake areas of the alcohol treatment centres were admitted to the somatic hospital departments involved in the study; of these, 2568 patients were excluded, and thus a total of 3534 patients completed the lifestyle questionnaire. Of those, 609 patients scored 8 points or more in the AUDIT test and were included in the study. The treatment-as-usual (TAU) group consisted of 333 patients and the Relay group of 276 patients (see Fig. 1).

Twenty-six percent of the patients ($n = 72$) randomised to the Relay group did not receive the intervention. The alcohol therapists noted that the reasons most often were that the patients had been discharged before the alcohol therapists arrived or they were in surgery. Since we do not know if any patients from the TAU group also received different treatment than normal, these 72 patients in the Relay group were not excluded from the analysis. A total of 30 patients from the TAU group and 18 from the Relay group were lost to follow-up. The remaining 561 patients were used in the present analysis (see Fig. 1).

A significant difference in the AUDIT score groups between the Relay group and the TAU group ($p = 0.011$) was found (See Table 1). More patients in the Relay group had AUDIT 16+ (39%) compared with the TAU group (27%). A total of 19 patients accepted a meeting contract arranging for them to show up at alcohol treatment centres following discharge (it was optional). In addition, according to the alcohol therapists' notes, 18 patients wanted to arrange their own alcohol treatment visit. Everyone who received the Relay intervention received a brochure about the local alcohol treatment.

A total of 33 patients in the study sample attended outpatient treatment during the 18 months after being discharged from hospital. Of these, 22 patients (8.5%) belonged to the Relay group and 11 (3.6%) to the TAU group. The number-needed-to-treat was 20 [95% CI 11.2;112.3]. The AUDIT scores for patients who met for treatment were significantly higher than the scores for patients who did not ($p = 0.002$).

Fig. 2 shows unadjusted Kaplan-Meier cumulative-event curves for attending alcohol treatment in the Relay group and the TAU group. In the unadjusted analysis at 3 months follow-up, significantly more patients in the Relay group attended treatment (OR = 4.9(1.4–7.5) $p = 0.015$). After 18 months follow-up, the significant difference between the groups was still present (OR = 2.5(1.2–5.2) $p = 0.017$). The difference was still significant after adjusting for AUDIT scores at both 3 months (OR = 3.8 (1–13.8) $p = 0.04$) and 18 months (OR = 2.1 (1–4.5) $p = 0.05$).

In Fig. 3A and B the sample is stratified depending on whether patients had AUDIT scores of 8–15 (Fig. 3A) or 16+ (Fig. 3B). As shown in Fig. 3A, after 18 months 9 patients (5.7%) in the Relay group had attended treatment compared to 3 patients (1.4%) in the TAU group (OR = 4.4[1.2–16.6] ($p = 0.028$)). Among patients with an AUDIT score of 16+ there was no significant difference between the groups at 18 months' follow-up (Relay group: 13 patients (12.8%) versus TAU group: 8 patients (9.8%)).

4. Discussion

The present study is, to the authors' knowledge, the first randomized controlled study of the effect of outreach alcohol therapists meeting patients with risky alcohol intake during their somatic hospitalization and offering them Brief Intervention (BI) and a Relay Model intervention (RT). The aim of the study was to improve the transition from hospital to community-based outpatient treatment. We found that the likelihood of inpatients attending alcohol treatment 18 months after discharge was significantly higher if patients had received the Relay intervention compared with treatment-as-usual.

Previously, a small pilot study investigated whether outreach visits from a community-based outpatient treatment centre to patients during hospitalization had an impact on the following treatment attendance for alcohol use disorder (AUD). Berger et al. found that 56% met for treatment; however, their sample was small (9 persons), consisted of patients who were all suffering from alcohol related illness, and the participants were paid (Berger et al., 2017).

In a meta-analysis (Glass et al., 2015), Glass et al. investigated the association between brief alcohol intervention and post-intervention utilization of alcohol-related care. No statistically significant differences between intervention and control groups were detected. Interventions in the included studies were carried out by staff at the participating departments. In contrast, we used outreach staff from the alcohol treatment centres to perform the intervention, thus strengthening the bridge between hospital and alcohol treatment centre by the Relay Model.

In the present study, we found when calculating NNT (Laupacis et al., 1988) that in addition to the effort of systematic screening for excessive use of alcohol, 20 hospitalized patients suffering from AUD needed to receive the Relay intervention for each extra patient to show up for community-based outpatient alcohol treatment compared to TAU. Hence, it is a question of whether the impact of the intervention justifies the effort. The Relay intervention demands considerable resources from the alcohol treatment centres, which perform the outreach visits, and in addition to performing screening procedures the hospital departments need to adjust their clinical routines to make sure that patients are present when staff from the alcohol treatment centres meet at the departments. Furthermore, we do not know whether patients identified by means of the systematic screening at hospitals have the same outcome of alcohol treatment compared to patients who approach

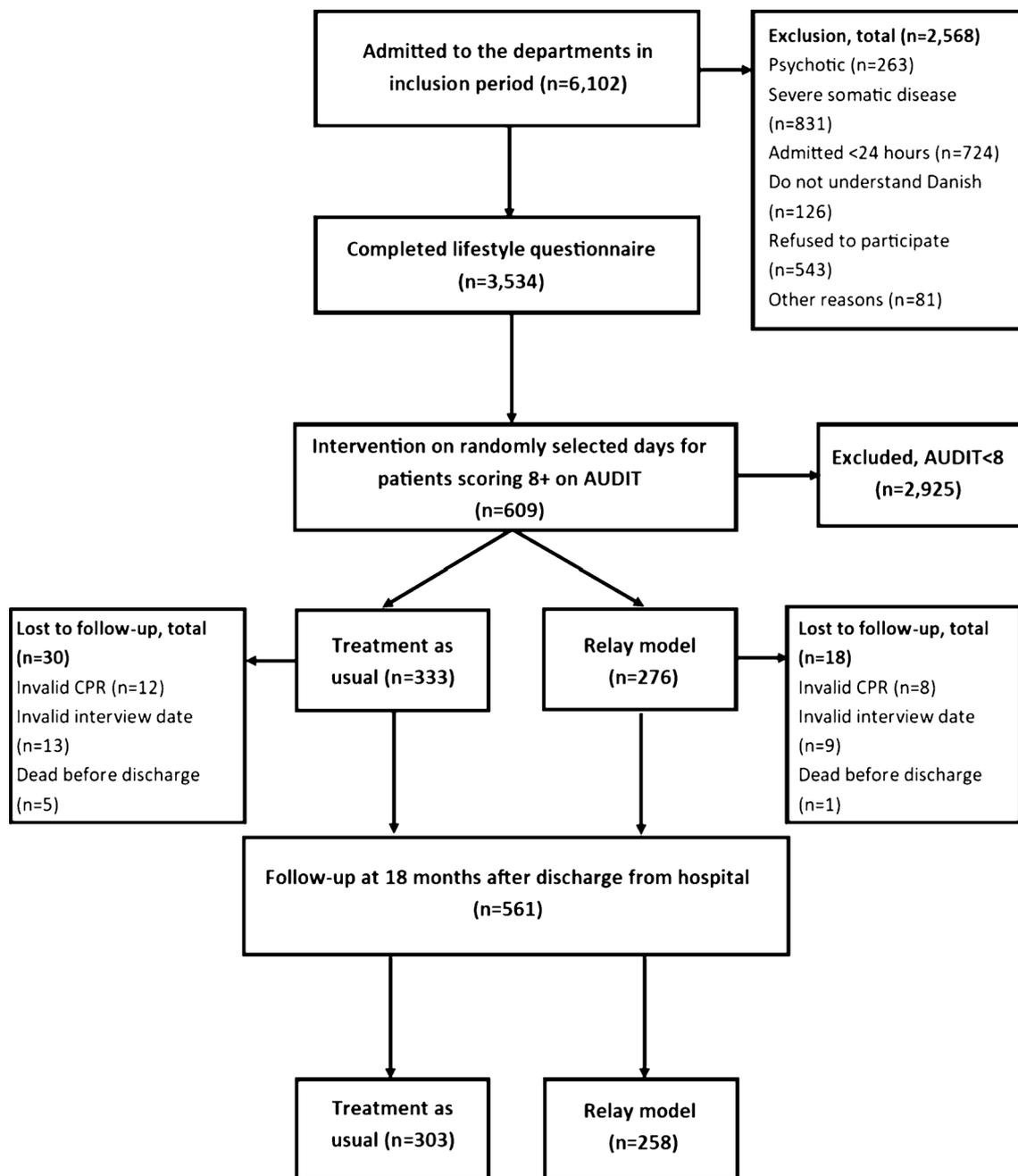


Fig. 1. Flow-chart of the Relay Study.

treatment themselves due to a wish to change their drinking (Saitz, 2015).

Although significantly more patients receiving the Relay Model showed up for outpatient treatment compared to TAU, the total number of patients attending treatment was low. However, since it was primarily the patients who scored AUDIT 16+ who received the referral to outpatient treatment, and since a quarter of the patients randomised to the Relay group did not receive the intervention due to logistic problems, we cannot make any final conclusions. Further, we do not know if the intervention triggered a response for the other patients (AUDIT 8–15), as it is not measured in our outcome. A study by Freyer-Adam et al. (2018) suggests that counselling via proactive phone-calls or computer systems might be a more effective way of capturing these patients with low-level alcohol problems.

The barriers for implementing SBIRT in general hospitals are many. They comprise provider and system barriers such as high workload, fear

of creating a conflict with patients, poor training, the need to focus on medical issues, and communication and collaboration between hospital and alcohol treatment centres (Vendetti et al., 2017). Hence, one of the most important facilitators in the study by Vendetti et al. (2017) was the use of specialists rather than nurses and doctors. In our study, we made use of exactly this type of facilitator and had staff from the community-based centres come to the hospitals to deliver the BI and RT-intervention. The outreach staff was experienced and used to talking about alcohol problems, had relatively more time with patients, and could inform patients properly about alcohol treatment. In addition, since the therapists came from the alcohol treatment centres, they were able to secure coordination between the hospital and the community-based alcohol treatment centre. Hence, the Relay Model should be able to overcome the provider-system barrier, but there may still be many patient-level barriers that need to be addressed.

It has been suggested that a reason for low treatment attendance

Table 1
Baseline characteristics of population (n = 609).

	Relay group (n = 276)	TAU (n = 333)	p value
Female n [%]	71 [26]	90 [27]	0.717
Age mean [SD]	53 [11]	52 [11]	0.520
AUDIT score n [%]			
8 to 15	168 [61]	244 [73]	0.001***
16 +	108 [39]	89 [27]	
Area n (%)			
Urban (Odense)	237 [90]	244 [86]	0.108
Rural (Aabenraa)	26 [10]	41 [14]	
Smoking status			
Never	47 [17]	84 [25]	0.085
Former	79 [29]	97 [29]	
Current	148 [54]	151 [45]	
Physical activity status			
Active	63 [23]	89 [27]	0.629
Moderate	145 [53]	165 [51]	
Inactive	64 [24]	70 [22]	
Diet status*			
Healthy	85 [31]	115 [35]	0.329
Unhealthy	191 [69]	218 [65]	

* According to the Danish Dietary Recommendations (Ministry of Environment and Food of Denmark, 2015).

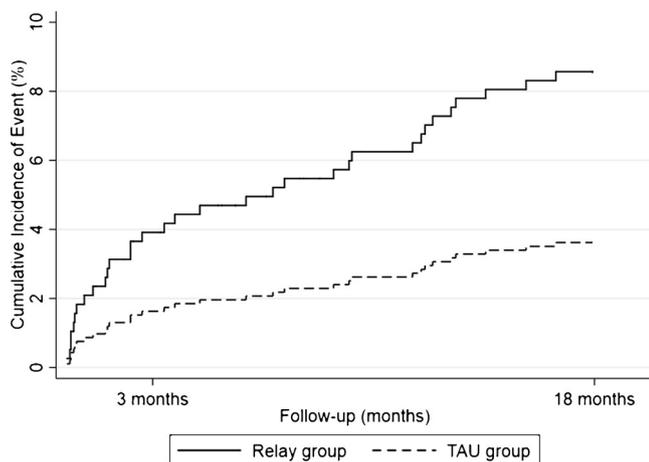


Fig. 2. Unadjusted Kaplan-Meier cumulative event curve for attending alcohol treatment for patients in the Relay group (n = 258) and TAU group (n = 303) for the entire sample. (Significant difference between groups (p = 0.017)).

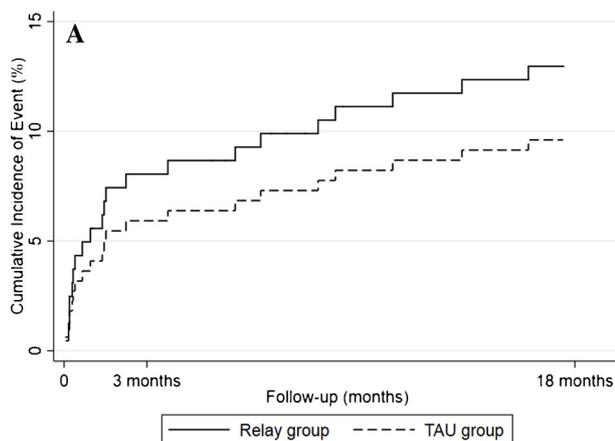


Fig. 3. Unadjusted Kaplan-Meier cumulative event curve for attending alcohol treatment for patients with AUDIT scores 8–15 and AUDIT scores 16 + . (A) Patients with AUDIT score 8–15. The Relay group (n = 157) and TAU group (n = 221) (Significant difference between groups (p = 0.028)). (B) Patients with AUDIT score 16 + . The Relay group (n = 101) and TAU group (n = 82) (Non-significant difference between groups (p = 0.512)).

may be that specialized treatment for AUD is simply not attractive to patients (Wallhed Finn et al., 2014; Watson et al., 2015b). It is also possible that patients, while hospitalized, are so worried and physically affected by their hospitalization that they are not able to properly consider and make decisions about what should happen when they are discharged from the hospital.

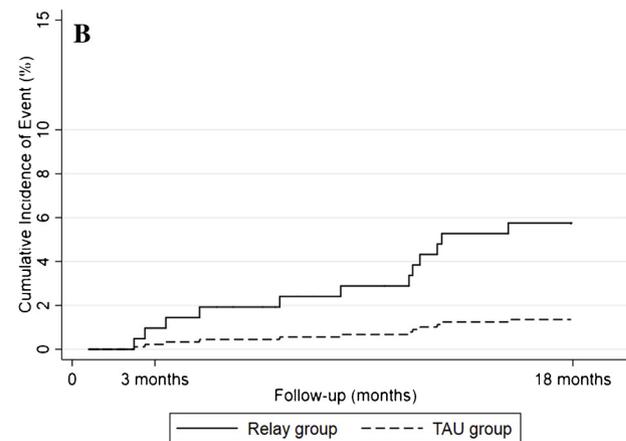
In a previous RCT, we investigated the effect of a Relay intervention similar to the one in the present study among patients hospitalized at a detoxification unit at a mental health hospital. Among patients who received the Relay intervention in mental health hospital study, 84% met for community-based outpatient for AUD within 12 months after discharge from hospital compared to only 58% in the TAU group (Nielsen and Nielsen, 2018). The success of the Relay model in the mental health hospital, compared with the present study, may be because patients in the prior study were hospitalized because of the AUD, in contrast to patients in the present study who were hospitalized for other reasons than alcohol.

Our results suggest that a somatic hospital setting may work as a platform for identifying and referring patients with AUDIT16+ to specialized treatment but may not be adequate for identifying patients with AUDIT8-16 and motivating them to change their behaviour. However, as mentioned, our findings are not conclusive. In order to fully investigate the effects of the intervention it is, of course, relevant to look at other outcomes at follow-up. This will be done in future studies investigating health care costs, productivity costs, and social costs of the patients included in the Relay Study.

We suggest that future research in SBIRT and SBIRT components, including the Relay model, focuses on performing SBIRT in platforms other than inpatient stays at general hospitals. Although SBIRT when making use of the Relay model may work at general hospitals, other platforms for SBIRT such as hospital ambulatory treatment, prior to or following hospitalization, community-based rehabilitation courses following hospitalization, or hospital-based detoxification units should be investigated further. In other words: we recommend widening the focus for when and where best to implement SBIRT. We thus encourage future research in the field to investigate these and to develop interventions that take the findings from qualitative studies on patient-level barriers to treatment-seeking into account.

4.1. Strengths and limitations

The study has considerable strengths. It is a pragmatic study reflecting daily practice. Staff in the hospital departments were not trained in SBIRT interventions, and their task was to inform patients and give and collect the lifestyle questionnaires, a task that is already a



part of their daily work, mandatory as part of the Danish Quality Model, and required in order to be accredited. Therapists from the community-based alcohol treatment centres were experienced in Motivational Interviewing, which they used during their daily work at the treatment centres. Our study had only a few exclusion criteria and included both men, women, younger and older patients, and patients with high-risk drinking and alcohol dependency.

When comparing our sample size with previous studies, ours is by far the largest sample. Most of the previous studies were carried out in emergency rooms, whereas in our study we included a wider selection of departments. Furthermore, only 9% of the patients eligible for inclusion refused to participate, which is considerably lower than what is reported in other studies (Watson et al., 2015a).

Of patients in the Relay group, 26% did not receive the intervention due to a number of reasons such as discharge or that they were in surgery/ out of the room when the alcohol therapists arrived. We chose to keep them in the sample and use an intention to treat approach, since it must be expected to miss some patients during a normal work day at the departments due to various reasons such as miscommunication, time constraints, etc.

There were, however, also potential biases in our study. First, we found that the AUDIT scores were skewed in our two groups. Upon closer examination, we found that it was only one (the neurological department) that contributed to the distortion. Second, many patients admitted to the departments in the inclusion period were too ill to participate and excluded before receiving a questionnaire. Information on patients' contact with the community-based alcohol treatment centres is usually found through the National Alcohol Treatment Register (Schwarz et al., 2017); however, the register has a two-year delay on data, and the data on our entire follow-up period were therefore not available for all of the included patients. Therefore, our data were gathered from local registers in the specialized alcohol treatment institutions in Odense and Aabenraa. However, since data are reported to the register from these sources, we do not expect any validity problem with the data used in this article. This was confirmed when checking available data from the two sources with the national register.

5. Conclusion

In our study, we found an effect of our brief alcohol intervention performed by outreach staff from the alcohol treatment centre. However, future studies need to ascertain if general hospitals are a good place to provide Screening and Brief Intervention and Referral to Treatment (SBIRT) to patients with only minor alcohol problems. Other methods should be explored to help bridge the gap between general hospitals and community-based alcohol treatment centres, and other platforms for performing SBIRT should be investigated.

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Contributors

ASC performed the analysis and preparation of the data as well as participated in writing the article. JS participated in writing the article. ANS and BN came up with the study and helped write the article. All authors contributed to and approved of the final version of the manuscript.

Conflict of interest

No conflict declared.

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