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Improving screening and brief intervention activities in Primary Health Care: secondary analysis of professional accuracy based on the AUDIT-C.

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ABSTRACT

Introduction and objective The ODHIN trial found that training and support and financial reimbursement increased the proportion of patients that were screened and given advice for their heavy drinking in primary health care. However the impact of these strategies on professional accuracy in delivering screening and brief advice is under-researched and is the focus of this paper. **Method** From 120 primary health-care units (24 in each jurisdiction: Catalonia, England, the Netherlands, Poland and Sweden), 746 providers participated in the baseline and the 12-week implementation periods. Accuracy was measured in two ways: correctness in completing and scoring the screening instrument, AUDIT-C; the proportion of screen negative patients given advice, and the proportion of screen positive patients not given advice. Odds ratios of accuracy were calculated for type of profession, and for intervention group: training & support; financial reimbursement; and, internet-based counselling. **Results.** 32 of 36,711 questionnaires were incorrectly completed, and 65 of 29,641 screen negative patients were falsely classified. At baseline, 27% of screen negative patients were given advice, and 22.5% screen positive patients were not given advice. These proportions halved during the 12-week implementation period, unaffected by training. Financial reimbursement reduced the proportion of screen positive patients not given advice (OR = 0.56, 95% CI=0.31 to 0.99, $p<0.05$). **Conclusion.** Although the use of AUDIT-C as a screening tool was accurate, a considerable proportion of risky drinkers did not receive advice, which was reduced with financial incentives.

INTRODUCTION

Screening and brief interventions (SBI) delivered in primary health care are typically effective in reducing heavy alcohol consumption and alcohol-related problems, with reductions in alcohol consumption between 20 and 41 grams of alcohol per week [1-3]. Furthermore, these interventions have been shown to be cost-effective in tackling alcohol-related harms in high-income countries, regardless of the type of professional who delivers them [4].

The Alcohol Use Disorders Identification Test (AUDIT) was developed by the World Health Organization (WHO) as a screening instrument for use in primary health care [5]. The AUDIT contains ten questions and can be used to identify individuals drinking at hazardous and harmful levels (identified as an alcohol use disorder). A shorter form of AUDIT is the AUDIT-C, which includes only the three alcohol questions of the full AUDIT, has been validated for use in primary health care in the United States [6,7], Spain [8], Sweden [9], Japan [10], Finland [11] and Australia [12] and has been used for different population groups, including university students [13], patients with a diagnosis of depression [11] and patients admitted to trauma hospitals [14].

The ODHIN randomized controlled trial (RCT) [15] used the first three questions of the AUDIT (AUDIT-C) as a screening tool to promote early identification of hazardous and harmful drinking and tested three strategies alone, and in combination, to encourage clinicians to give brief alcohol advice to patients as follows: training and support (TS), financial incentives (FR) and internet-based counselling (eBI). While the most commonly used cut off points in the AUDIT-C are ≥5 for men and ≥4 for women [5], the ODHIN trial used cut off points of ≥5 for men and women in Catalonia and England. These cut offs avoid the risk of excessive false positives among women [15], where a score of 5 is equivalent to a consumption level of about 20 grams of alcohol per day [16].

Further, despite its validity as a screening instrument for use in primary health care, the use of AUDIT-C has shown some inconsistencies between the final classification result of either a positive or negative score. One study showed that up to 21% of men and women were misclassified, because of either an underestimation of alcohol consumption, stigma, or a previous alcohol use disorder (a diagnosis that does not require passing a drinking threshold) [17]. A further study found that patients responded differently to AUDIT-C when asked by mail, or face-to-face during a clinical visit. Nearly two thirds of those that screened positive in the mail survey subsequently screened negative in the clinical setting [18]. This is important because as a consequence of being incorrectly classified, drinkers who do not need brief advice may be offered it, and at-risk drinkers who should receive brief advice may not be offered it.

To our knowledge, published studies to date have focused on the inconsistencies between the classifications as risky or non-risky drinkers according to the AUDIT-C and reported drinking limits as reported by patients, but none have assessed inconsistencies in professionals' performance. We collected nearly 36,000 screening questionnaires during the ODHIN baseline and 12-week implementation periods from the included questionnaires. All questionnaires included completed AUDIT-C questions as well as information relating to whether or not brief advice was delivered. Our main objective was to assess the accuracy of screening tool completion, errors in its scoring, and the incorrect provision of brief advice at both baseline and 12-week ODHIN implementation periods.

METHODS

This paper represents a secondary analysis of findings from the ODHIN trial, which tested the impact of a range of strategies on primary health care-based screening and advice activity to reduce heavy drinking [15,16]. The trial studied the effectiveness of training and support, financial reimbursement,

and the option of referral to internet-based brief interventions (e-BI) - targeted singly or in combination to primary health care units - on screening and brief advice activities compared to treatment as usual. ODHIN used a cluster randomised factorial trial, with 120 primary health care units (PHCUs) randomised to eight groups. The study recruited professionals (general practitioners, nurses and other practice assistants) working in 120 primary health care units (PHCUs) with approximately 5,000 to 20,000 registered patients from five jurisdictions (Catalonia, England, the Netherlands, Poland, and Sweden).

Outcomes

Accuracy of completing AUDIT-C

The accuracy of completing AUDIT-C was assessed by two different indicators: the accuracy of the AUDIT-C scoring, in which any noted/recorded value other than between 0 and 4 (correct response categories for AUDIT-C) for any of the three AUDIT-C questions was considered incorrect; and, the accuracy of the professionals' scoring of the AUDIT-C for each of the three separate AUDIT-C questions, compared to the authors' scoring, with any deviation considered wrong. In both cases, the proportion of patient questionnaires with an error was calculated.

Accuracy of advice

The accuracy of advice was assessed by calculating the proportion of screen negative patients that received advice, and the proportion of screen positive patients that did not receive advice.

Statistical methods

The original trial was conceived and analysed as a factorial design. A generalised linear model utilizing logistic models for binary data was used employing a multi-level approach using country and

PHCU with random intercepts and slopes. Analysis was conducted using IBM SPSS V23, procedure GENLIN.

RESULTS

During the study, 746 providers from 120 primary health care units (24 per each of the five jurisdictions) participated in the study. During the four-week baseline measurement period, 6,091 questionnaires were available for analysis, and during the 12-week implementation period, 30,623. Two-thirds of questionnaires were completed by doctors, and one third by non-doctors (nurses and practice assistants). Table 1 shows the proportion of the different errors in the AUDIT-C scoring, summing, and giving advice by the groups of profession, country and intervention strategy.

Table 1, here.

Errors in marking AUDIT-C questions

Out of 36,714 questionnaires across the baseline and 12-week implementation periods we found only 32 questionnaires in which one or more of the three AUDIT-C questions were incorrectly completed. This was 16 of 6,091 (0.26%) during the baseline period and 16 of 30,623 (0.05%) during the 12-week implementation period.

Errors in summing AUDIT-C scores

For completed questionnaires, incorrect scoring occurred in 111 of 6,091 (1.82%) questionnaires during the baseline period and in 397 of 30,623 (1.30%) during the 12-week implementation period. Overall, 86% of the errors did not affect screen positive classification. Errors led to 65 of 29,641 (0.22%) screen negative patients being falsely classified and 5 of 7,073 (0.07%) screen positive patients being falsely classified.

Advice given to screen-negative and not given to screen-positive patients

During baseline, 1,217 of 4,523 (26.9%) AUDIT-C negative patients were erroneously given brief advice. During the 12-week implementation period, this proportion reduced to 3,501 of 25,118 (13.9%), which was a statistically significant reduction, p<0.01 (Odds Ratio [OR] for giving advice to screen-negative patients during 12-week implementation compared to baseline = 0.44; 95% CI=0.26 to 0.74). During baseline, 353 of 1,568 (22.5%) screen positive patients were not given advice and this proportion almost halved to 635 of 5,505 (11.5%) during the 12-week implementation period, which was a statistically significant reduction, p<0.001 (Odds Ratio [OR] for not advising screen-positive patients during 12-week implementation compared to baseline = 0.45; 95% CI=0.31 to 0.65).

During baseline, there was no statistically significant difference between doctors (23%) and non-doctors (29%) in the proportion of screen negative patients given advice. Doctors (14%), however, were less likely not to advise screen positive patients than non-doctors (30%) p<0.001 (OR for not giving brief advice to screen positive patients by doctors compared to non-doctors = 0.37 (95% CI=0.23 to 0.59).

During the 12-week implementation period, the proportion of screen negative patients given advice was less for doctors (8%) than for non-doctors (28%), which was statistically significant, p<0.001 (OR for giving brief advice to screen negative patients by doctors compared to non-doctors = 0.22 (95% CI=0.11 to 0.44). Doctors (9%) were also less likely not to advise screen positive patients than non-doctors (18%) p<0.001 (OR for not advising screen positive patients by doctors compared to non-doctors = 0.42 (95% CI=0.27 to 0.66).

The proportion of screen negative patients given advice differed by country. At baseline, the proportions were: Catalonia 42%, England 20%, Netherlands 21%, Poland 2%, and Sweden 21%. During the 12-week implementation period, the proportions were: Catalonia 28%, England 21%, Netherlands 20%, Poland 1%, and Sweden 30%. Furthermore, the proportion of screen positive patients not given advice differed by country. At baseline, the proportions were: Catalonia 16%, England 14%, Netherlands 28%, Poland 6%, and Sweden 34%. During the 12-week implementation period, the proportions were: Catalonia 15%, England 9%, Netherlands 24%, Poland 5%, and Sweden 24%.

During the 12-week implementation period, the proportion of screen negative patients given advice was 13% amongst patients whose providers had received training and support compared with 18% amongst patients whose providers had not received training and support (OR in favour of training and support =0.72, 95% CI=0.31 to 1.66, ns); the proportion of screen positive patients not given advice was 10% amongst patients whose providers had received training and support compared with 16% amongst patients whose providers had not received training and support (OR in favour of training and support = 0.61, 95% CI=0.35 to 1.07, ns).

During the 12-week implementation period, the proportion of screen negative patients given advice was 13% amongst patients whose providers had received financial reimbursement compared with 18% amongst patients whose providers had not received financial reimbursement (OR in favour of financial reimbursement = 0.66, 95% CI=0.34 to 1.28, ns); the proportion of screen positive patients not given advice was 10% amongst patients whose providers had received financial reimbursement compared with 17% amongst patients whose providers had not received financial reimbursement (OR in favour of financial reimbursement = 0.56, 95% CI=0.31 to 0.99, $p<0.05$).

During the 12-week implementation period, the proportion of screen negative patients given advice was 15% amongst patients whose providers had the option of e-BI compared with 16% amongst patients whose providers did not have the option of eBI (OR in favour of e-BI = 0.91, 95% CI=0.40 to 2.09, ns); the proportion of screen positive patients not given advice was 16% amongst patients whose providers had the option of eBI compared with 11% amongst patients with providers who did not have the option of eBI (OR in favour of eBI = 1.60, 95% CI=0.89 to 2.85, ns).

DISCUSSION

Overall findings

This study confirms the feasibility and accuracy in completion of using AUDIT-C for screening alcohol problems in primary health care and the ease of use in these settings. Patients screened as positive were not all advised about their alcohol consumption: 11% at the follow-up and (22%) at the baseline. This reduction was greater in the presence of financial reimbursement and with the profession (higher among doctors compared with non-doctors). In contrast, more than a quarter of patients that screened negative at baseline (29.9%) were given brief advise, with this proportion halving during the 12-week implementation period (13.9%), independent of the intervention group. However, when comparisons were made between doctors and non-doctors, the provision of advice to screen negative patients at follow-up was much higher among non-doctors (8% vs. 28%, p-value<0.01).

Comparisons with other studies

The analysis of the use AUDIT-C as a screening tool during the ODHIN study demonstrated that in addition to the validity shown in previous studies [1,4,5] it is easy to use by providers, achieving high levels of completion accuracy and showing small and not clinical significant implications for

professional practice. The completion of AUDIT-C was almost perfect, with hardly any errors in completing the three questions and only small errors in summing of AUDIT-C scores (1.3% in the follow-up) showing that if they occurred, these errors had little clinical significance. Training and support is potentially useful for increasing the screening of alcohol problems [16] and to promote the delivery of alcohol interventions among risky drinkers [19]. However in our study the delivery of training and support to PHC professionals did not result in changes to either the accuracy of the provision of advice to screen-positive patients or its omission with screen-negative.

Further data from Catalonia has shown that professionals tend to have the same intervention rates, regardless of the screening result [20]. Other studies have shown that when primary care practitioners are asked to screen and intervene for alcohol in all primary care patients, some professional and patient variables modified the provision of advice with only 50% of those categorized as risky drinkers receiving a brief intervention [19]. No patient variables were included in our analysis as predictors of accurate provision of advice, but when professionals received financial reimbursement, their accuracy in the provision of advice was higher than those that did not receive this incentive.

Strengths and weaknesses

There are some strengths and weaknesses in our study. To our knowledge, our study is the first to analyse some aspects of the fidelity to alcohol SBI guidelines in PHC services. Furthermore the study benefits from using an experimental design, consisting of the implementation of different types of strategies and using a large multi-centric design. In addition, it included a large number of practices, providers, and patients, giving confidence in the findings across five different European jurisdictions. The study does however have some weaknesses; firstly, there is no information about the reasons why professionals did not provide advice to those patients that screened positive or why they did

provide advice to those who screened negative. Non-controlled factors may have played an important role in the professional decision-making, such as patients' characteristics, including gender, employment status and level of education as described in previous studies [19]. Secondly, we did not perform a validation of AUDIT-C against any other tools. In previous European studies, researchers have demonstrated discrepancies between the use of two screening and diagnostic tools with fewer than one-fifth of alcohol-dependent cases being identified by two different methods [21]. Finally, PHC centres that took part in the RCT were volunteers and no information is available from those that refused to participate. This might have added a bias in the form of inclusion of PHC centres whose professionals are more motivated in working with drinkers.

CONCLUSION

Previously we have shown that / the ODHIN RCT demonstrated that training and support and financial reimbursement were associated with improvements in screening for heavy drinking in PHC settings [16]. In this secondary analysis study, we have demonstrated that providing training and support was not associated with the proportion of screen-positive patients who did not receive advice, whereas receipt of financial reimbursement was associated. However, a gap/discrepency of 11% remains of screen-positive patients that did not receive advice. This might have implications for policy makers who not only need to promote the use of SBI, but ensure that it is implemented accurately to tackle alcohol-related problems in PHC settings. The impact of these interventions on individuals' health has been shown elsewhere [22,23], but if such strategies are not implemented appropriately, they might represent a waste of PHC resources.

The challenge is finding strategies that result in high rates of SBI implementation, whilst ensuring that accuracy of screening and advice is also high. The fact that financial incentive was associated with the

proper provision of advice to risky drinkers could be significant from a policy perspective as a way to promote the reduction of alcohol consumption and implement public health measures aimed at these professionals.

Declaration of interest

Antoni Gual has received honoraria, research grants and travel grants from Lundbeck, Abbvie and D&A Pharma, outside the submitted work. Other co-authors do not declare conflicts of interest.

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Table 1. Accuracy in screening and brief intervention activities in the ODHIN study at baseline and 12-week implementation periods.

Proportion of accuracy in SBI	Baseline Period	12 week-implementation period
Errors in marking AUDIT-C questions, %	0.26	0.05
Errors in summing AUDIT-C scores, %	1.82	1.30
Advice given to AUDIT-C negative, n (%)	1,217 (26.9)	3,501 (13.9) OR=0.44; (95% CI=0.26 to 0.74). Compared to baseline*
By profession		
Doctors, %	23	8, OR=0.22;(95% CI=0.11 to 0.44) Compared to non-doctors**
Non-doctors, %	29	28
By Country		
Catalonia, %	42	28
England, %	20	21
The Netherlands, %	21	20
Poland, %	2	1
Sweden, %	21	30
By intervention		
Training and support, %	-	13
No training and support, %	-	18, OR=0.72; (95% CI=0.31 to 1.66) Compared to training and support
Financial reimbursement, %	-	13, OR=0.66; (95% CI=0.34 to 1.28) Compared to no financial reimbursement
No Financial reimbursement, %	-	18
e-BI, %	-	15, OR=0.91; (95% CI=0.40 to 2.09) Compared to no e-BI
No e-B, %I	-	16
Screen Positive not given advise, n (%)	353 (22.5)	635 (11.5), OR=0.45;95% CI=0.31 to 0.65*, Compared to baseline
By profession		
Doctors, %	14, OR=0.37; (95% CI 0.23 to 0.59)** Compared to non-doctors	9
Non-doctors	30	18
By Country		
Catalonia, %	16	15
England, %	14	9
The Netherlands, %	28	24
Poland, %	6	5
Sweden, %	34	24
By intervention		
Training and support, %	-	10, OR=0.61; (95% CI=0.35 to 1.07) Compared to no training and support
No training and support, %	-	16
Financial reimbursement, %	-	10, OR=0.56; (95% CI=0.31 to 0.99) Compared to no financial reimbursement*
No Financial reimbursement, %	-	17
e-BI, %	-	16, OR=1.60; (95% CI=0.89 to 2.85) Compared to no e-BI
No e-BI, %	-	11

* p<0.01, **p<0.001