Comparison of different methods assessing the contribution of alcohol to emergency room visits

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Abstract – Introduction. The main objective of research was to compare different methods of assessing the contribution of alcohol to injuries and medical conditions treated in the emergency room (ER) in Poland. Four methods are discussed, including breathalyser readings, clinical appraisal following Y91 ICD-10 codes, interviewer’s observations and self-reports.

Methods. In two Polish cities, Warsaw and Sosnowiec, probability samples of patients admitted to the ER were selected and interviewed face-to-face by trained interviewers. Close to 1500 patients were interviewed with a response rate of 67%. To identify injuries and medical conditions associated with drinking (preceded by alcohol consumption), four methods were used: clinical observations made by nurses trained in applying Y91 ICD-10 codes (in the Sosnowiec ER only), observations by interviewers who did not receive such training, breathalyser readings and patient self-reports of drinking within six hours prior to the event.

Results. Breathalyser readings identified 4.4% under the influence of alcohol among all patients, and 5.7% among those who were breathalysed. Clinical assessment in Sosnowiec and interviewers’ observations in both cities identified almost the same proportion: 5.1% and 4.7%, respectively, while self-reports identified almost 10%. All four measures for identifying potentially alcohol-related ER visits found a total of 11.5% cases among sampled patients.

Key words: alcohol involvement measures, emergency room, Poland

INTRODUCTION

From the 1980s when the World Health Organisation began to promote the development of methods efficient for early alcohol intervention before alcohol-related consequences became severe, a large number of researchers conducted studies in primary care and other out-patient services, and subsequently in a variety of treatment...
sites [1]. From the time of implementation of the international Emergency Room Collaborative Alcohol Analysis Project (ERCAAP) [2], more and more countries have used a similar methodology for conducting emergency room (ER) studies [3, 4]. Poland joined ERCAAP in 2001 with emergency room (ER) studies in Warsaw and Sosnowiec. Prior to that, little information was available on the prevalence of alcohol-related disorders at emergency services in Poland. Two unpublished reports were commissioned in the mid-1990s by local authorities, one in Warsaw and one in a small city located in southern Poland. The study carried out in Warsaw on ambulance services showed that about 10% of interventions were alcohol-related. The study carried out in southern Poland found that one-fifth of general hospital admissions consisted of patients with alcohol-related problems. More data were provided by studies carried out in primary care and out-patient health services. In 1997, AUDIT screening of about 42,000 patients showed that more than 18% could be classified as high-risk drinkers. Among men the proportion was much higher, reaching 35% [5]. Another study conducted in 20 primary care clinics covering 4373 adults aged 18–80 found 12% were problem drinkers and 19% were assessed as dependent [6].

In Poland, specialised alcohol treatment, alongside school prevention, are commonly perceived as major strategies in addressing alcohol-related problems. Therefore, there have been few studies on the burden of alcohol on general health services, and there are no standards and procedures on how to treat patients with alcohol-related problems in ERs [7]. The Polish ERCAAP studies in Warsaw and Sosnowiec represent the first attempts in Poland to assess the extent and nature of problem drinking among ER patients. Like in other countries involved in the ERCAAP and the World Health Organisation's Collaborative Study on Alcohol and Injuries [8], a strong relationship between alcohol and casualties has been confirmed [9, 10] in Poland. Another study aimed at comparison of prevalence of lifestyle risks in trauma populations in Warsaw and Berlin found that 25% patients admitted to Warsaw orthopaedic wards were hazardous drinkers. [11]

For many years research has suggested that routine measures of alcohol involvement in reporting systems on casualties is highly needed to improve epidemiological evidence [12]. Concerns about limitations of self-reports have led to calls for more objective measures of estimating blood alcohol levels.

Such measures were developed and implemented in ICD-10 coding revision as Y90 and Y91 codes [13]. According to Room [14], these codes should be treated “as optional extra codes to be used in either morbidity or mortality coding”. Y90 is based on measurement of blood alcohol concentration (BAC) in terms of blood alcohol volume from breathalyser tests, while Y91 is based on observational clinical assessment and is treated as a backup when BAC is not available or possible. In his paper reviewing findings drawn from studies on applying the ICD-10 Y90 and Y91 codes, Room concluded that Y91 was not a satisfactory substitute for Y90 and suggested that it either be reformulated or dropped altogether.

Recommendations for implementation of a routine surveillance system in the ER by utilizing the Y91 codes have met many barriers including lack of staff, resources,
work pressures, additional paperwork and, last but not least, the varying manners and
dbehaviours in which people react to alcohol may bias assessment of level of alcohol
intoxication [15].

Epidemiological studies conducted in ERs and aimed at assessment of the bur-
den of alcohol-related cases on the ER work load have used breathalyser readings to
estimate BAC, clinical assessment and sometimes interviewer observations. All these
measures are believed to be more reliable than patient self-reports. Each method,
however, has its specific limitation. Proportions of BAC measurement refusals, and
results of clinical assessment as well as interviewer observations may be biased by
many societal and personal factors such as cultural differences in intoxicated behav-
iour, the level of alcohol tolerance of observed individuals, and the degree of an
observer’s experience with intoxicated individuals [16].

Analysis of the data drawn from the WHO Collaborative Study on Alcohol and
Injuries conducted in 10 countries (Argentina, Brazil, Belarus, Canada, China, Czech
Republic, India, Mexico, Mozambique, New Zealand, South Africa and Sweden)
showed that agreements (Tau B) of breathalyser readings and clinical assessments
varied substantially from 0.35 in the Czech Republic to 0.76 in Sweden [17]. Addition-
ally, the direction of misclassification was different across countries. In some of
them, clinical assessment over-classified intoxication, and in others it under-classified
[18]. In four countries (Belarus, Brazil, China and India), in addition to clinicians
trained in Y91 codes to assess patients’ intoxication level, there were interviewers
untrained in Y91 codes who also assessed patients’ intoxication, and assessments
made by both were very similar. Agreement (Tau B) ranged from 0.71 in India to 0.99
in China. The level of agreement between breathalyser readings and both clinicians
and interviewers observations was visibly lower, especially in India [18].

Epidemiological evidence of alcohol-related casualties is usually an important
argument for implementation of preventive actions such as brief intervention in
primary health care and in ERs. Usually breathalyser readings, and additionally, dif-
frent screening tests, are used to identify patients who are likely to benefit from brief
intervention. The assumption exists that BAC positive patients are more likely to be
risky drinkers. Contrary to such assumptions, some studies have not confirmed that
intoxication associated with injury is a good predictor of risky or hazardous drink-
ing, as a significant proportion of at risk drinkers can be found among those who are
BAC negative. For example, a study among Mexican-American ER patients at a large
U.S. urban trauma center found that 36% of those who were BAC negative screened
positive for at risk drinking [19].

Some studies suggest that many alcohol-related casualties in the ER are not identi-
fied as related to alcohol, which results in an underestimation of alcohol attribution
to injuries and deaths. In a study conducted in a Swiss ER, the authors compared
self-reported drinking within 6 hours before injury to positive breathalyser read-
ings in the same patients. Self-reports were consistent with breathalyser readings
in 88% of the patients. However, significant proportions of those with negative
breathalyser readings also reported drinking during this 6-hour period before injury,
supporting earlier findings [20, 21]. The authors concluded that from an epidemiological perspective self-reports seem to be a more relevant measure [22] than breath testing in determining alcohol's presence in the injury event. After years of searching for “objective” measures of alcohol presence in injury, self-report is increasingly gaining status as a reliable epidemiological indicator.

The main aim of the present paper is to compare different methods of assessing the contribution of alcohol to injuries and medical conditions treated in the ER. Four methods will be discussed:

- interviewer’s assessment,
- clinical assessment,
- breathalyser reading,
- self-report.

MATERIAL AND METHODS

The study was carried out at two large hospitals located in different urban centres: Warsaw and Sosnowiec, Poland in 2002. Warsaw, as the capital of Poland, represents a relatively well-off region rarely affected by economic hardships. Sosnowiec is located in a large industrial mining region, which, at the time of the study, was suffering economic depression, including high unemployment and widespread poverty.

During the study emergency treatment was being provided by hospitals in a rotating system across a number of hospitals to assure access to such services and to distribute the emergency service burden among all existing hospitals in the country. Each hospital in a given region provided a certain number of emergency days (on a 24 hour basis) per month for different medical specialties. To ensure equal representation of each type of specialty in emergency service at both sites, probability samples of patients admitted to the ER were selected, with proportional representation of emergency days offered in each specialty by a given hospital in each month. On average, six emergency days were covered per month in Warsaw and eight in Sosnowiec. Patients younger than 18 were excluded from the study (the only exclusion criterion). In Warsaw, in a 7-month period, completed interviews were obtained from 734 patients, representing a 68% completion rate. In Sosnowiec, the data collection period lasted 6 months and resulted in 759 completed interviews, reflecting a 65% completion rate.

Data were collected by interviewers trained by the authors and supervised by a research team from the Polish Institute of Psychiatry and Neurology. In Sosnowiec, a group of nurses received additional training on the application of ICD-10 Y91 codes.

To identify injuries and medical conditions associated with drinking (preceded by alcohol consumption), four methods were used: clinical observations made by nurses trained in applying Y91 codes of ICD-10 (in the Sosnowiec ER only), and in both sites, observations by interviewers who did not receive the Y91 training, breathalyser readings, and patient self-reports on drinking within six hours prior to the event.
The instrument used in all of the ERCAAP studies [23] was translated and adopted to Polish culture and circumstances. Data were collected using a 25-minute face-to-face interviewer-administered questionnaire. The interview aimed at the sought to identify patients whose ER visit was associated with drinking prior to the injury or medical condition. The instrument included a five-level intoxication scale:

- entirely sober,
- intoxicated, though not obviously so on brief contact,
- intoxication visible on direct contact or in situations requiring motor co-ordination,
- intoxicated at first glance even without direct contact, though verbal contact is possible,
- no possibility of direct verbal communication due to insobriety or medical condition or both.

All patients who were diagnosed by nurses as being at least mildly intoxicated (Y91.0 or higher), or assessed by interviewers who were at least intoxicated, though not obviously so on brief contact or had a breathalyser reading above zero, were classified as alcohol-related cases. Self-report was obtained in response to: In the six-hours before your injury/medical condition, did you consume any alcoholic beverages – even one drink? Clinical and interviewer observations were made before the breathalyser measurement while self-reports were obtained following the breath test.

RESULTS

A breathalyser reading above 0 mg/ml as an objective method of estimating the presence of alcohol in ER patients identified 4.4% under the influence of alcohol among all patients, and 5.7% among those who were breathalysed. Failure to be breathalysed was due to arriving at the ER more than six hours after the injury or medical condition (8.3%), refusing to be breathalysed (12.5%) and failure for other reasons (2%), resulting in almost 23% of the sample being excluded from breath testing.

Clinical assessment and interviewers’ observations identified almost the same proportions of patients under the influence of alcohol at 5.1% and 4.7% respectively. Self-reports of drinking within six hours before the injury or medical condition identified the highest proportion of almost 10% for alcohol-related ER visits (table 1).

<table>
<thead>
<tr>
<th>METHOD</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathalyser</td>
<td>66</td>
<td>4.4</td>
</tr>
<tr>
<td>Clinical assessment (Y91)*</td>
<td>35</td>
<td>5.1</td>
</tr>
<tr>
<td>Interviewer’s observation</td>
<td>70</td>
<td>4.7</td>
</tr>
<tr>
<td>Self-reports of drinking before the event</td>
<td>143</td>
<td>9.6</td>
</tr>
</tbody>
</table>

* Clinical assessment was only conducted in Sosnowiec
All negative breathalyser readings were confirmed by the interviewers; no patient with a zero BAC was assessed as intoxicated, however only 55% of those who had a positive BAC were assessed intoxicated, with more than 40% of BAC positive patients assessed by interviewers as sober (table 2). The interviewers also assessed 30 additional patients as intoxicated besides the 66 identified by breathalyser, including 22 who refused to be breathalysed and 8 who arrived at the ER more than 6 hours following the event (injury or medical condition).

Similar results were obtained in Sosnowiec with a relatively low concordance of BAC and clinical assessment by Y91 code trained nurses and interviewers’ observations. However, the concordance between clinical assessment by the nurses and interviewers’ observation was high (TAU B 0.807) (table 3).

### Table 2. Concordance of interviewers’ observations and BAC

<table>
<thead>
<tr>
<th></th>
<th>Positive observation</th>
<th>Negative observation</th>
<th>Positive self-report</th>
<th>Negative self-report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>BAC negative</td>
<td>0</td>
<td>0</td>
<td>1085</td>
<td>100.0</td>
</tr>
<tr>
<td>BAC positive</td>
<td>36</td>
<td>54.5</td>
<td>30</td>
<td>45.5</td>
</tr>
<tr>
<td>Refusal of breath analysis</td>
<td>22</td>
<td>11.8</td>
<td>164</td>
<td>88.2</td>
</tr>
<tr>
<td>More than six hours</td>
<td>8</td>
<td>6.5</td>
<td>116</td>
<td>93.5</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>4.7</td>
<td>1423</td>
<td>95.3</td>
</tr>
</tbody>
</table>

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### Table 3. Agreement between breathalyser readings, clinical assessment and interviewer’s observation – TAU-B

<table>
<thead>
<tr>
<th>Sample</th>
<th>BAC vs. interviewer’s observation</th>
<th>BAC vs. clinical assessment</th>
<th>Clinical assessment vs. interviewer’s observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warsaw and Sosnowiec</td>
<td>0.447</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sosnowiec only</td>
<td>0.368</td>
<td>0.807</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Combinations of positive measures

<table>
<thead>
<tr>
<th>Combinations of positive measures</th>
<th>Number</th>
<th>Percent among all positive cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-report, observation and BAC</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>Self-report and observation</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Self-report and BAC</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Observation and BAC</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Self-report only</td>
<td>72</td>
<td>42</td>
</tr>
<tr>
<td>Observation only</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>BAC only</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>172</td>
<td>100</td>
</tr>
</tbody>
</table>
In comparison with other methods, self-reported consumption identified a much larger proportion of patients whose ER visit was associated with alcohol. According to self-reports, 9.6% of respondents reported drinking before either the injury or medical condition that brought them to ER (table 2).

All four methods for identifying alcohol-related ER visits identified a total of 172 patients, or 11.5% of those sampled (table 4).

DISCUSSION

The findings from the Polish ER study in Warsaw and Sosnowiec supported current discussion on the epidemiological efficiency and reliability of routine measures of alcohol involvement in ER patients, that many alcohol-related cases are not identified either by breathalyser or by clinical assessment and/or interviewers’ observation. This under-counting by both subjective and objective measures is related to a number of factors that cannot be overcome. Breathalysing (except for driving misdemeanours and criminal procedures) requires the patient’s consent, which was not given by more than 10% of the patients in this study, and this percentage may vary depending on the potential consequences of a positive breathalyser reading for the patient. In addition, some patients had to be excluded because of their health status, while others come to the ER long after an injury (or awareness of their medical condition) and consequently, the breathalyser may not have provided a valid reading as to alcohol involvement at the time of the event.

This study found both the interviewer’s observation and the more sophisticated clinical appraisal giving similar results at the same breathalyser level. Both appear to be reliable measures as no false negatives were identified. They confirmed breathalyser readings and identified more alcohol-related cases among those who were not breathalysed due to refusal or other reasons. However, both methods, which are supposed to detect intoxication, could obviously not identify alcohol involvement in patients whose BAC was low and who were not intoxicated or at a level barely detectable by observation. This low BAC could be attributed to factors such as the time that lapsed between drinking and arrival at the ER, and/or too low consumption prior to the event.

Self-reports provided the highest estimate of alcohol involvement reaching 10%, which was twice as high as other measurements. Also, self-reported confirmed sobriety/intoxication status prior to the event in a majority of patients, including those drinking in amounts which were not possible to be detected by either of the other methods applied. On the other hand, about every third patient who was identified by either the breathalyser or clinical/interviewers’ assessment did not report drinking. Adding those to the total number of self-reports increased the proportion of those alcohol-involved by about two percentage points to almost 12%.

While it may be argued that breathalysing patients before obtaining self-reports of drinking could have increased the tendency to report drinking prior to the event, an earlier study suggests that the concordance of negative self-reports with breathalyser
readings remains high in ER populations regardless of whether breathalysing was conducted prior to or after obtaining the self-report data [24].

This paper has some limitations, including non-consideration of the BAC level or the amount of alcohol consumed prior to the event and not controlling for drinking after the event, both of which could have affected concordance between the different measurements of alcohol involvement. Nevertheless, our aim was not to find which method is superior but to compare their usefulness and possible limitations.

A lesson learned from this study is that considering the scarcity of resources in many countries, including the short supply of breathalysers and lack of time to apply more elaborated instruments, self-reports appear to be sufficient to approximate alcohol involvement and its impact on injuries and medical conditions among ER patients. For epidemiological accuracy, however, and to measure intoxication level and the related risk of injury/medical condition, it may be worthwhile to supplement self-reports with breathalysing patients, and/or by clinical assessment or lay observation if available. Self-reports should also be recommended as an inexpensive way of screening for problem drinkers in the ER, identifying those who might benefit from brief intervention, in contrast to those who deny alcohol involvement and may be more likely not to accept a brief intervention. In this context, introduction of Screening, Brief Intervention, Referral to Treatment (SBIRT) in the Polish ER system should be considered.

REFERENCES

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