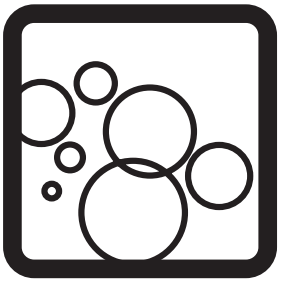
A trip to the Emergency Room

Salvatore Vitale



Substance use among emergency room patients in the Netherlands: prevalence rates and methodological considerations

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A Trip to the Emergency Room

Substance use among emergency room patients in the Netherlands: prevalence rates and methodological considerations

Een trip naar de Spoedeisende Hulp

Middelengebruik onder spoedeisende hulp patiënten in Nederland: prevalentie cijfers en methodologische overwegingen

Proefschrift

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Contents

List of publications

The chapters of this thesis are based on the following publications:

Vitale, S.G., Van de Mheen, H. (2006). Illicit drug use and injuries: a review of emergency room studies. Drug and Alcohol Dependence 82(1), 1-9. Chapter 2

Vitale, S.G., Van de Mheen, H., Van de Wiel, A., Garretsen, H.F.L. (2006). Substance use among emergency room patients: is self-report preferable to biochemical markers? Addictive Behaviors. 31(9), 1661-1669. Chapter 3

Vitale, S.G., Van de Mheen, H., Garretsen, H.F.L., Van de Wiel, A. (2005). Self-reported alcohol use among Dutch emergency room patients: variations in prevalence rates owing to methodological differences. Alcohol & Alcoholism. 40(6), 524-530. Chapter 4

Vitale, S.G., Van de Mheen, H., Van de Wiel, A., Garretsen, H.F.L. (2006). Alcohol and illicit drug use among emergency room patients in the Netherlands. Alcohol and Alcoholism. 41(5), 553-9. Chapter 5

Vitale, S.G., Van de Mheen, H., Van de Wiel, A., Garretsen, H.F.L. Substance use among emergency room patients: identifying predictive factors for the visit. (Submitted for publication) Chapter 6

Part I

Introduction

Introduction

Chapter 1

General introduction

1.1. Introduction

Both alcohol use and illicit drug use are associated with many health problems. In the Netherlands alcohol is still the most used substance, with about 85% of the population aged 16 years and over reporting alcohol use on occasion (Van Laar et al., 2004). Although a large percentage of this latter group will never experience any problem caused by their alcohol use, many of them will. In the Netherlands, approximately 8% of the population aged 18 to 65 years (750,000 persons) experience some problems caused by alcohol (Verdurmen et al., 2003). In about 400,000 of these people it concerns alcohol abuse and around 350,000 people can be diagnosed as alcohol dependent. Similar findings were reported in a recent study among the general population in the Netherlands aged 16 to 69 years where an estimated 10.3% of the Dutch population can be classified as a problem drinker (Van Dijck & Knibbe, 2005). Variations in prevalence rates occur depending on age and gender, with a higher prevalence rate of problem drinking found for men (16.8%) compared to women (4.2%), and with a decreasing prevalence rate with an increase of age for both genders.
In comparison, illicit drug use is far less common. Data from the National Drug Monitor (Van Laar et al., 2004) show that cannabis is the most frequently used illicit drug in the Netherlands. Current use of cannabis (as measured in the previous month) has been reported by 3% of the Dutch population aged 12 years and older, with 1 out of 5 of the cannabis users doing so on a daily basis. There are large variations in cannabis use depending on the category, with young people aged 20-24 years showing the highest prevalence rates for actual use (11.2%). Hard drugs, such as cocaine, ecstasy and heroin, are even less prevalent, with less than 1% reporting actual use (Verdurmen et al., 2005).
Annually in the Netherlands, problematic alcohol use and illicit drug use results in approximately 60,000 people being treated by the addiction care services (Ouwehand et al., 2005).

Higher prevalence rates for various medical conditions (including the more costly conditions such as hypertension and psychiatric disorders) were found for hazardous drinkers and drug users (Mertens et al., 2005). Drug use and drug use disorders are also associated with related conditions such as HIV (Compton et al., 2005). There is considerable evidence that alcohol is causally related to more than 60 different medical conditions (Room et al., 2005) and to many major disease outcomes, such as various forms of cancer, major depression, epilepsy, and cirrhosis of the liver (Rehm et al., 2003). These alcohol-related health problems not only concern frequent excessive drinking, but also socially accepted excessive drinking (daily intake of 3-8 glasses) and binge drinking which also lead to various health problems (Poppelier et al., 2002). Associations were also found with cancer, cardiovascular diseases, neurological defects and accidents. Despite all these negative associations between substance use and health, especially alcohol at low levels of consumption is reported to have cardioprotective effects (Gronbaek, 2004; San José, 2000). For illicit drugs no positive health effects, even in low levels, have been found.

Besides long-term adverse health effects, alcohol and illicit drug use directly influence health through injuries occurring as a result of all types of intentional and unintentional accidents, e.g. traffic accidents, workplace accidents, and falls (EMCCDA, 1999; Kurzthaler et al., 2005a; Kurzthaler et al., 2005b; Mitchell et al., 2004). In the past 15 years the relationship between substance use and injuries has been studied more intensively. Moreover, injuries due to substance use affect not only the individual's physical health, but also society in general. For example, the costs to Dutch society as a result of traffic accidents involving alcohol use are estimated at 400 million euro per year (KPMG, 2001). Numerous international studies reported on the association between alcohol use and injuries (Cherpitel, 1993a; Cherpitel et al., 2003; El-Guebaly et al., 1998). It is reported that those patients visiting an emergency room after an injury positive for blood alcohol are more likely to be male, aged 25 to 45 years, and admitted to the emergency room during the weekend evening or early morning hours (Cherpitel, 1993a). Consistent findings were also reported across different countries concerning alcohol use before an injury treatment in an emergency room; positive blood alcohol concentrations were related to violence (Macdonald et al., 2005) showing that young, single, lower-earning males are more likely to be involved in violence. Compared to alcohol and injuries, the role of illicit drugs in injuries is less well documented, but a relationship between illicit drug use and injuries is assumed (Blondell et al., 2005; Macdonald et al., 2003). Similar to alcohol use, these studies show that illicit drug use is strongly associated with injury treatment as a result of violence.

Until now, the Netherlands lacks complete data on alcohol and illicit drug use among emergency room patients. Data for individual countries are needed, because previous studies have reported that

associations between substance use and injuries can differ between countries (Cherpitel, 1993a), and between cities or regions in the same country (Buss et al., 1995; Cherpitel, 1993b; Cherpitel, 1997). So far, studies in the Netherlands are limited, reporting only on car or traffic accidents (Kingma et al., 1994; Mathijssen et al., 2002; Mathijssen & Houwing, 2005), young people with alcohol intoxication (Wilsterman et al., 2004), and drug-related problems (Elshove-Bolk et al., 2002). Results show that 8% of all persons involved in a traffic accident and attending an emergency room had consumed alcohol (Kingma et al., 1994), and that 1% of the patients presenting at the emergency room had health problems related to illicit drug use (Elshove-Bolk et al., 2002). Drug-related health complaints of 75% of the patients who used illicit drugs use were mainly minor ones because soft drugs (such as joints, spacecake and mushrooms) had been used. A recent study showed that driving under the influence of alcohol or drugs has an impact on the driving performance and accident risk (Mathijssen & Houwing, 2005). This latter study was conducted in the Tilburg police district and showed that 4.5% of the studied driving population was positive for cannabis (most prevalent illicit drugs) and 2.1% was positive for alcohol, with the prevalence of abuse of drugs strongly related to male drivers aged 18-24 years. The above-mentioned studies on alcohol and illicit drug use concern specific subgroups of patients with different types of injuries. All these studies conducted in the previous 10 years in the Netherlands show that alcohol and illicit drug users are involved in accidents and lead to medical treatment in an emergency room of a hospital. Despite this, these studies are scarce and have mainly focused on specific patient populations (e.g. traffic accidents, young people).

Data on substance use among Dutch emergency room patients are needed to assess the situation in the Netherlands, because identifying patients under the influence of alcohol and illicit drugs provides an opportunity for preventive activities and treatment. However, before assessing substance use among emergency room patients it is important to first explore which measures used to do this are reliable and which study methods should be used.

1.2. Aims

The aims of this thesis are twofold. The first part of the thesis concerns the methodological aspects of assessing substance use among emergency room patients with respect to measures and methods of data collection used. Secondly, the thesis presents data on substance use among emergency room patients in the Netherlands, including the prevalence rates of alcohol and illicit drug use, as well as the characteristics of the patients who have used either alcohol or illicit drugs. The following research questions are thus addressed:

(1) What are the main methodological considerations when assessing alcohol and illicit drugs among emergency room patients?
(2) What are the prevalence rates of alcohol and illicit drugs among emergency room patients in the Netherlands?
(3) What are the characteristics of emergency room patients using alcohol and illicit drugs?

As previously mentioned, numerous studies have been conducted on alcohol use and injuries, but the relationship between illicit drug use and injuries has been less well documented. Therefore, this thesis will first focus on a review of international emergency room studies that investigated illicit drug use and injuries. Studies on alcohol are presented in this introductory chapter (see previous paragraph) and in the introductions of the following chapters. Besides this, the methodological aspects of investigating alcohol and illicit drug use among emergency room populations have been studied less compared to studies focusing on prevalence rates and patient characteristics. This thesis will therefore explore the methodological issues more closely, focusing on variations in measures and methods of data collection. Finally, we provide prevalence rates and patient characteristics related to alcohol and illicit drug use in the Netherlands, because comprehensive data on this subject are lacking.

1.3. Study design

Information on alcohol and illicit drug use among emergency room patients was obtained from four different hospitals in four different regions in the Netherlands using a self-report questionnaire among the patients. Two university hospitals [Erasmus MC Rotterdam (EMC) and the University hospital Maastricht (AZM)] and two general hospitals [Meander MC Amersfoort (MMC) and Scheper Ziekenhuis Emmen (SZE)] participated in this study. The medical review board of each hospital approved the research protocol.

Measurements

Patient self-report, judgement of emergency room staff on the patient's alcohol and illicit drug use, and emergency room data were used to collect data for this study (more detailed information than described below can be found in the subsequent chapters of this thesis). For all patients visiting the emergency rooms of the four participating hospitals during the study period, basic demographic data (gender and age) and emergency room data (date and time of emergency room visit, type of referral to the emergency room, and type of injury/illness) were available and abstracted from the hospital's patient database. In the EMC, referral to and time of emergency room visit were not available because these data were not registered.

Additional information was obtained using a patient questionnaire (see Appendix 1) which addressed: demographic data (cultural background, work and living situation), reason for emergency

room visit (traffic accident, accident, injury/illness, aggression/violence, suicide attempt or self-mutilation), location of accident or illness (home, other people's home, public place, catering establishment, work, school or street), alcohol use (24 hours and 6 hours prior to the visit, and general alcohol consumption pattern; number of drinking days in the weekend and during the week, average number of consumptions on a drinking day in the weekend and during the week), location of alcohol consumption, licit drug use [sleep-inducing drugs (sedative), tranquillizers (sedative), antidepressants, antipsychotic drugs and palliative drugs (analgesic)], illicit drug use [24 hours prior to the visit, consumption of illicit drugs during the past 4 weeks and during the past year for the following substances: marijuana, cocaine, amphetamines, ecstasy, heroin, hallucinogenics, -hydroxy butiric acid (GHB) and methadone], and location of illicit drug use.

Staff judgement was used for those patients that were not able to fill in the questionnaire due to their medical condition. The staff indicated on the questionnaire whether they considered it was probable that these patients had used alcohol and/or illicit drug prior to the injury/illness.

Inclusion/exclusion criteria

All four research sites used the same inclusion/exclusion criteria and an identical patient questionnaire. Patients visiting the emergency room of the participating hospitals were included if they were aged 12 years and over. Patients treated in the emergency room for injuries or illness were included; excluded were those attending for a control visit and those without sufficient command of the Dutch language. The main researcher gave instruction on the study procedures to the emergency room staff and research staff in each hospital. During the period of data collection the researchers made site visits to check these procedures. Data collection in the MMC took place from July 2003 to May 2004; in the SZE from August 2003 to April 2004; in the AZM during 2 consecutive weeks in November 2004; and in the EMC during 7 consecutive weeks in November and December 2004.

Procedures

Some variation in research procedures existed due to organisational differences between the four hospitals. In the SZE and EMC administrative staff were present at the emergency room entrance. In these two hospitals patients with minor injuries/illnesses were approached by the administrative staff shortly after entering the emergency room; the patient then completed the questionnaire in the waiting room. Patients with more serious/severe injuries/illness, were approached in the treatment room by the staff before or shortly after treatment; the patient then filled in the questionnaire. Because in the MMC and AZM administrative staff were not available 24 hours a day at the entrance of the emergency room, research staff were present (24 hours a day) to approach patients for this study. In this procedure, research staff handed out the questionnaire. Patients with minor injuries/illness were approached to participate whilst waiting for treatment (i.e. shortly after entering the emergency room). Patients with more severe injuries/illness were approached (after having been seen by the emergency room personnel) by the research staff before or shortly after treatment; the patient then filled in the questionnaire.

In one of the hospitals (MMC) three different methods of data collection were used to determine the influence of methodological differences on self-reported alcohol use prevalence rates. In the first method emergency room staff were responsible for data collection that took place from July 2003 to January 2004. The second method consisted of research staff handing out the questionnaire during two weeks in May 2004. The third method collected data retrospectively via a postal questionnaire. The latter method was not studied in relation to illicit drug use, because the low prevalence rates of illicit drug use makes it difficult to conduct reliable analyses; therefore, Chapter 4 focuses on alcohol only. In two hospitals (MMC and the AZM) blood alcohol concentrations were measured using an alcohol breath analyser. In the MMC data collection on blood alcohol concentrations took place during two weeks in May 2004 and in the AZM data collection took place during two weeks in November 2004. Then data of both hospitals on blood alcohol concentrations were merged. In the EMC urine toxicology was conducted during seven weeks in November and December 2004 to assess illicit drug use among a sample of emergency room patients.

Eventually, data collected in the AZM were not included in all analyses. Due to the small sample size, data from the AZM were not compared separately with data from the other three hospitals (Chapter 5). When data from all hospitals were merged for analyses, data from the AZM were included (Chapter 6); the data from this hospital were also included in Chapter 3.

1.4. Outline of the thesis

Chapter 2 presents a review of emergency room studies on illicit drug use. Prevalence rates, patient characteristics and methodological aspects are discussed. Among the reviewed studies a distinction was made between those studies using self-report and those using blood and urine toxicology.
Chapter 3 investigates the validity of self-reported substance use among emergency room populations and the processes of sample selection bias, to establish their influence on the prevalence rates found. Self-reported alcohol and illicit drug use of patients in the emergency room are compared with results derived from an alcohol breath analyser and urine toxicology.
Chapter 4 discusses variations in self-reported alcohol use prevalence rates among Dutch emergency room patients owing to methodological differences. Alcohol use prior to the injury/illness event

leading to the emergency room visit was measured by a self-report questionnaire in one hospital using different methods of data collection. Patients were approached in three different ways. The patient questionnaire was either administered by (1) emergency room staff, or (2) research staff, or (3) sent to the patient's home after the emergency room treatment. Alcohol prevalence rates are reported per method of data collection. For each method used patient characteristics are compared, and the use of staff judgement on the patient's alcohol use are included and compared.

Chapter 5 explores the situation regarding alcohol and illicit drug use among emergency room patients in the Netherlands. Alcohol and illicit drug use were studied within the emergency room population in three different hospitals. For each hospital substance use was assessed using an identical self-report questionnaire filled in by the patients, and by combining self-report with staff judgement on the patient's alcohol and illicit drug use. For each hospital prevalence rates and the characteristics of patients positive for alcohol and illicit drug use were reported and compared with the other two hospitals. In order to minimise the influence of organisational differences, the risk groups for alcohol and illicit drug use (including men aged 18 to 35 years) were compared between the three hospitals regarding charateristics of alcohol and illicit drug use. The aim is to draw some conclusions about regional differences.

Chapter 6 focuses on identifying emergency room patients who used alcohol or illicit drug use prior to the injury/illness event. The emergency room data and self-reported information on substance use from the four hospitals were merged and analysed on demographic, emergency room, and substance use characteristics. These data were analysed to see whether risk groups for substance abuse could be identified.

Chapter 7 summarises and discusses the results of these studies. Topics addressed include methodological issues related to emergency room studies, prevalence rates for the Netherlands, our study limitations, recommendations for future research, and recommendations for possible prevention and treatment activities.

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Chapter 2

Illicit drug use and injuries: a review of emergency room studies

Abstract

The reviewed emergency room studies (n =11) show overall prevalence rates of illicit drug use of 35 to 40% in studies using blood and urine toxicology and 1 to 5% in self-report studies. Cannabis and cocaine are the substances most prevalent in these studies, with a higher prevalence of cocaine in emergency rooms in the USA than in other countries where cannabis is the most common substance. Illicit drugs and alcohol are often used in combination. No relationship was found between injury severity and illicit drug use. Less clear associations emerged concerning patient and injury characteristics and illicit drug use. However, illicit drug use seems to be more common in men aged 20-40 years and is strongly associated with violence-related injuries. Variations in the prevalence rates and patient characteristics can partly be explained by locale and/or country of research. Moreover, because methodological differences influence the study outcomes, methodological aspects of emergency room studies should be taken into consideration when interpreting the results.

2.1. Introduction

Illicit drug use and injuries seem to be related. In their review of studies on injury risk associated with cannabis and cocaine use, Macdonald et al. (2003), concluded that cannabis and cocaine are related to intentional injuries and injuries in general among non-clinical samples. Different associations between monthly and lifetime drug use and emergency room visits have been established. Drug use more frequently than once a month was associated with emergency room treatment for illness (Cherpitel, 1999) and "life time" illicit drug use was also associated with injury (Chipman, 1995). Persons who experienced multiple injuries appear to be more likely to use and

abuse a wide range of licit and illicit substances compared with those without injuries (Macdonald et al., 1998). Identifying these patients offers a window of opportunity for injury prevention and substance abuse treatment. Most emergency room studies emphasize the role of alcohol and have established the relationship between alcohol use and injuries, concluding that alcohol consumption increases the risk of injuries (Cherpitel, 1993; El-Guebaly et al., 1998; Cherpitel et al., 2003). However, most emergency room studies conclude that illicit drug use and injuries deserves further attention and more detailed information is required (Cherpitel and Borges, 2001; 2002). Studies conducted outside the emergency room (e.g. household surveys, fatally injured drivers) also claim an influence of illicit drug use on injuries. Most studies on illicit drug use and injuries have studied the relationship with victims from car accidents. Studies on illicit drug use and fatal road accidents (Del Rio and Alvarez, 1995; Hansen et al., 1996; Del Rio and Alvarez, 2000; Del Rio et al., 2002; Skurtveit et al., 2002) conclude that illicit drug use is associated with traffic accidents and estimations show that some type of illicit (and medicinal) substance is involved with at least 10% of all those killed or injured in traffic accidents (De Gier, 1993). The European Monitoring Centre for Drugs and Drug Abuse (EMCDDA, 1999) concluded in their review study on illicit drugs and driving that alcohol remains the major problem in traffic accidents, but the problem of illicit and licit drug use in traffic accidents should not be underestimated. This is because the use of illicit and licit drugs (e.g. cannabis, ecstasy, amphetamines, cocaine, heroin, barbiturates, methadone, antidepressants, antihistaminines, benzodiazepines), as in the case of alcohol, influences the psychomotor functions and can negatively influence the driver's capabilities (Schmitt et al., 2002). It has been shown that illicit drugs and certain medicinal drugs impair driving skills and can increase crash risk, and that combining alcohol with benzodiazepines results in additive impairing effects on psychomotor performance (EMCDDA, 1999). It is of course impossible to establish a causal relationship between the presence of illegal drugs in biological fluids and road traffic accidents, due in part to the number of confusing factors which play their part (e.g. speed, age, combined use of other substances etc.) (Del Rio and Alvarez, 2000).

Despite all these findings, only the causal effects of alcohol on injuries and impaired driving are well established. The relationship between injuries (other than car accidents) and drug use is still unclear. Moreover, emergency room studies on the relationship between illicit drug use and injuries are scarce and have not been reviewed until now. Therefore, the present study provides a review of the literature on the relationship between illicit drug use and injuries in patients presenting at the emergency room and trauma centers. Our aim is to summarize the prevalence rates of illicit drug use and patient characteristics by making a distinction between studies using blood and urine toxicology and studies using self-report to assess illicit drug use. Methodological characteristics of the reviewed

studies are described and discussed. Suggestions for injury prevention and further studies on illicit drug use among emergency room populations are made, because the identification of patients under the influence of drugs in the emergency room is necessary for appropriate substance use treatment and to develop intervention programmes. For example, brief counselling interventions for alcohol have proven to be effective (Longabagaugh et al., 2001; Crawford et al., 2004) and there is good evidence that the use of motivational interviewing as a brief intervention method works for substance abuse (Dunn et al., 2001). Before developing interventions on illicit drug use, more has to be known about the prevalence and characteristics of the emergency room patients using illicit drugs.

2.2. Methods

English-language articles in MEDLINE (from 1966 to December 2003) were found by combining the keywords: illicit drugs, drugs, substance use, injuries, trauma, emergency room and trauma center. In addition, reference lists of all selected articles were screened. In the present review "illegal drugs" will refer to substances other than alcohol and nicotine. Illicit drugs are considered to be: cannabis, ecstasy, amphetamines, cocaine, heroin, barbiturates, methadone. Licit drugs are considered to be: antidepressants, antihistaminines and benzodiazepines. Any studies focusing solely on licit drugs were excluded. Studies with the combined use of illicit drugs and alcohol were also included.

Studies were included that focused on the relationship between recent illicit drug use and injuries treated in the emergency room or in a trauma center. Recent drug use is defined here as drug use in the 6 hours prior to the visit. In order to compare results and measures, only studies were included that used total emergency room samples. Studies that focus on emergency room sub-samples (e.g. injured road users, victims of violence, patients with mental status alterations) were excluded.

Also excluded were studies which investigated only non-recent drug use, such as during the past week, month, or past three months (Verhaeghe et al., 1996; Cunningham et al., 2003; Woolard et al., 2003). Very few studies focus only on illicit drug use. Studies that focus on alcohol and illicit drug use were also included; however, only those parts related to drug use other than alcohol are discussed. If alcohol was included in the reviewed study, it was only included in the present study when the combination of alcohol and drug use was mentioned. Besides illicit drugs, most studies also include the most frequently used licit drugs; these licit drugs investigated in the selected studies are included in this review. Only studies in the English language were included in our review.

In order to make the studies comparable, in the results a distinction is made between those focusing on the emergency room population using blood and urine toxicology, and studies relying on patient self-report to determine illicit drug use.

2.3. Results

Table 2.1 presents an overview of the reviewed studies, together with their main methodological characteristics. The main findings are discussed below under appropriate headings.

2.3.1 Methodological characteristics of emergency room studies

Table 2.1 shows that most studies on emergency room populations have been conducted in urban trauma centers and emergency rooms in large cities in the USA in the past ten years, with relatively few studies done in other countries (Canada, Mexico, the UK, South Africa and Australia). Despite only including studies with total emergency room populations a lot of variation exists in methods used, age criteria, duration of data collection, sample size, types of illegal drugs measured, cut-off values for illegal drugs, time lapse between substance use and admission, and sample selection (presented in table 2.1). In this section, only the most influential factors will be discussed. Period of the year and part of the week in which data collection took place can result in seasonal influences regarding substance use (Macdonald et al., 1999), whereby weekday sampling can lead to lower illegal drugs prevalence rates (Soderstrom et al., 2001) due to weekend-associated illicit drug use. Cut-off values for illegal drugs were only reported by Peden et al. (2000); that study used cut-off levels that represent the lower limit of reliable detection for each substance. Otherwise, results were reported qualitatively; i.e. presence or absence of the illegal drugs. Only Rivara et al. (1989) checked if there were any medical indications for the detected substances. Most studies compared patient groups (e.g. violent injuries, intentional injuries) within the emergency room sample, few studies used the non-injured patients presenting at the emergency room with an illness as a control group (Cherpitel and Borges, 2001; 2002). The main disadvantage of this method is that it may not have been representative of the general population (Macdonald et al., 1999). None of the reviewed emergency room studies used a non-emergency room control group.

An important methodological issue for emergency room studies is the representativeness of the selected emergency room sample, because inclusion/exclusion criteria can lead to sample selection bias. For example, studies using available urine and/or blood samples should carefully interpret results with a potentially biased population (Lindenbaum et al., 1989; Macdonald et al., 1999; Carrigan et al., 2000), caused by the selection process of the patients with and without screens available. Buchfuhrer and Radecki (1996) found that screens (toxicology and alcohol) were not performed randomly. This was supported by Rivara et al. (1989). To avoid sample selection bias a probability sample (Cherpitel and Borges, 2001; 2002) or inclusion of all patients (Soderstrom et al., 1988; Zautcke et al., 2002) are used.

Another issue that can lead to sample selection bias and influence prevalence rates is non-response. Despite this, a description of the non-response rates and characteristics was not available in every study. Response rates range from 73% (Cherpitel and Borges, 2002) to 100% (Lindenbaum et al., 1989; Rivara et al., 1989). Concerning response and non-response description, studies can be divided into three categories. The first category regards studies with no non-response (Lindenbaum et al., 1989; Rivara et al., 1989); probably due to sample selection procedures, because only patients with available blood and/or urine samples were included. The second group entails studies that did not provide any information on the non-response (Buchfuhrer and Radecki, 1996; Zautcke et al., 2002), and the third group consists of studies with information on response and non-response (Soderstrom et al., 1988; Macdonald et al., 1999; Carrigan et al., 2000; Peden et al., 2000; Cherpitel and Borges, 2001; Soderstrom et al., 2001; Cherpitel and Borges, 2002). These studies found that refusal, leaving the emergency room before completing the interview, and injury/illness severity were the most reported reasons for non-response. Some of these studies found no differences between consent and non-consent patients regarding demographic characteristics (Soderstrom et al., 1988; 2001), whereas other studies (Cherpitel and Borges, 2001; 2002) did find differences in demographic characteristics (gender, age and cultural background).

2.3.2 Prevalence of illicit drug use measured by blood and urine toxicology

Studies conducted with emergency room samples using urine toxicology screens report an overall incidence of illicit drugs of 35% (Carrigan et al., 2000), 42.6% (Zautcke et al., 2002) and 74.5% (Lindenbaum et al., 1989). These large variations can partly be explained by locale and/ or country of research. Excluding the exceptionally high prevalence rate of 74.5% (Lindenbaum et al., 1989), the overall prevalence (when reported) of illicit drug use among patients at the emergency room then becomes 35 to 40%. One explanation for the high prevalence in the study by (Lindenbaum et al., 1989) is that prescription drugs (with abuse potential) were included. Another explanation is the high percentage (almost 50%) of trauma patients in this study resulting from violent crime: illicit drug use is known to be associated with injuries resulting from violence (Buss et al., 1995). Therefore, the results of the Lindenbaum study (1989) study are excluded in the discussion below. The most prevalent illicit drugs in the reviewed studies are cannabis and cocaine. The incidence of cannabis found in studies using blood and urine toxicology ranges from 9.2% (Zautcke et al., 2002) to 34.2% (Peden et al., 2000). In the reviewed studies, use of cocaine ranged from 2.7% (Peden et al., 2000) to 18.7% (Soderstrom et al., 2001), use of opiates from 2.7% (Zautcke et al., 2002) to 23.7% (Soderstrom et al., 2001), and the use of amphetamines ranged from 0% (Soderstrom et al., 2001) to 12.3% (Buchfuhrer and Radecki, 1996). The prevalence of other types of illegal drugs is lower. The combination of a positive drug screen and a positive alcohol screen ranged from 16.5% (Soderstrom et al., 1988) to 49.3% (Buchfuhrer and Radecki, 1996). The likelihood of drug use in combination with alcohol has been shown in several studies (Soderstrom et al., 1988; Rivara et al., 1989; Buchfuhrer and Radecki, 1996).

Despite these differences in prevalence estimates, cannabis and cocaine are the illegal drugs most commonly found, mostly in this particular order. Variations regarding drug type also seem to be related to the country or locale of study. For example, the use of Mandrax (methaqualone) mixed with cannabis (locally known as “white pipe”) was reported only in South Africa; the authors conclude that other illegal drugs are not a major problem, probably because they are very expensive (Peden et al., 2000). The prevalence and pattern of illicit drug use between emergency room studies within and outside the USA also differ: e.g. the prevalence of cocaine seems to be higher in the USA (range 10.4% to 18.7%) than in other countries (range 2.7% to 3%). Studies conducted in the USA reported cocaine to be the most prevalent illicit drug, followed by cannabinoids. In contrast, studies in countries other than the USA report cannabinoids to be the most prevalent drug with cocaine being far less prevalent and not even the second most prevalent illicit drug. These differences can not be attributed to different prevalence rates of illicit drug use in the general population, because both in the USA and in other countries marijuana is the most used illicit drug use (NSDUH, 2002; EMCDDA, 2003).

2.3.3 Blood and urine toxicology related to patient and injury characteristics

The results of the reviewed studies indicate that although specific types of illegal drugs are associated with specific patient characteristics and injury groups, not all study results are uniform.

Some studies show a relationship between demographic characteristics of emergency room patients and a positive screen for illicit drug use. For example, Lindenbaum et al. (1989) found that drug use (and alcohol) was more common in males, and in persons aged 21-30 years. Similarly, marijuana use was more common in patients aged 30 years or younger, and more common among men (Soderstrom et al., 1988). (Rivara et al., 1989) found that drug tests were most likely to be positive for persons aged 20-40 years. Also, a comparison less than and older than 65 years shows that drug use (e.g. cocaine, marijuana, and mixed ingestions) was more common in patients under 65 years of age. Drugs found in patients aged 65 years and older were more likely be accounted for by prescription medications (Zautcke et al., 2002). Not all studies found correlations between demographics and illicit drug use. Buchfuhrer and Radecki (1996) and Macdonald et al. (1999) found no differences in positive findings for illicit drugs based on age or gender. Also, the only available study from the UK found no differences between gender groups or mechanism of injury groups between different licit and illicit drugs (Carrigan et al., 2000).

Table 2.1. Studies on illicit drugs and injuries among emergency room studies

Reference	Locale	Population size	Response/ non-response	Measure and period of data collection	Age range (Years)	Control group yes/ no	Types of drugs	% drugs	Types of injury and injury mechanism
Blood and urine toxicology									
Buchfuhrer & Radecki, 1996	Long Beach Los Angeles (USA)	n = 2246	n = 284 randomly selected n = 246 (87%) retrievable results n = 231 (alcohol) n = 171 (toxicology)	Trauma registry and toxicology screens July 1989 to December 1991 (2.5 years)	12 years and older	Results compared with non-tested patients	All drugs Cocaine THC Amphetamines Opiates Benzodiazepines Barbiturates PCP Methadone	40.9% 16.4% 15.8% 12.3% 6.4% 3.5% 1.2% 1.2% 0.0%	*Positive screens for drugs (other than alcohol) are highest for patients who are completely orientated*
Carrigan et al. 2000	Leeds (UK)	n = 116	n = 93 (80% response) n = 79 (toxicology screens)	Blood and urine samples July to December (6 months) Prospective	12 years and older	No control group	All drugs Cannabinoids Codeine Morphine Amphetamine Benzodiazepines Cocaine Dihydrocodeine Methadone	35% 13% 11% 8% 6% 6% 3% 1% 1%	*Although no individual causal link to trauma can be assumed, there appears to be an association.*
Lindenbaum et al. 1989	Philadelphia (USA)	N = 373	n = 169 samples submitted	Blood and urinesamples 9-month prospective	14-85 years	Compared violent crime and accidental injury	All drugs Cocaine Cannabinoids Benzodiazepines Opiates Barbiturates Amphetamines Codeine Alcohol and drugs	74.5% 54.4% 37.2% 10.1% 8.9% 7.1% 4.7% 1.7% 28.4%	*A greater proportion of the violent crime group had been using cocaine*
Macdonald et al. 1999	Alberta & Quebec (Canada)	n = 3173	77.9% approached n = 1855 response 75.5% n = 1701	Interviews and urine samples 2 weeks (1 winter, 1 summer, 1989) prospective	18 years and older	Compared accidental injury (AI), violent injury (VI), non-injury/ illness (NI)	THC Benzodiazepines Barbiturates Morphine Codeine	AI-VI-NI 6.3-13.2-4.6% 6.3-21.1-8.8% 2.5-5.4-4.5% 0.7-0.0-1.3% 5.9-7.9-8.7%	*The violent injury group was more likely than the accidental injury group to test positive for benzodiazepines*
Peden et al. 2000	Cape Town (South Africa)	N = 278	N = 254 (8.6% refused) 196 urine samples (77.2%)	Self-report & urine samples 4 weeks prospective	18 years and older	No control group	At least one drug Cannabis Mandrax[1] "White pipe"[2] Cocaine	41.8% 34.2% 20.0% 19.1% 2.7%	*Compared self-report with urine analysis very poor*

Reference	Locale	Population size	Response/ non-response	Measure and period of data collection	Age range (Years)	Control group yes/ no	Types of drugs	% drugs	Types of injury and injury mechanism
Rivara et al. 1989	Seattle (USA)	n = 1314	N = 525 (40%) n = 452 urine samples available emergency room; 160 medical examiner office screens available	Urine samples and emergency room data 5 months	10 years and older	ER patients and patients died from trauma (MEO)	ER (non fatal): At least one drug THC Cocaine Opiates Benzodiazepines Alcohol & drugs MEO (Fatally)	 40.3% 27% 10.4% 11.9% 3.8% 44% 18.7%	*A positive drug test was not associated with injury severity. Also no association found for any specific drug*
Soderstrom et al. 1988	Maryland, Baltimore (USA)	n = 1109	n = 1023 (92.2% response)	Serum sample, blood samples (alcohol) Levels from 2 ng/mL positive July 1985 to May 1986 (11 months) Prospective	Not clarified; distinction aged 30 years and older and younger than 30 years	No control group	Marijuana Only marijuana Marijuana and alcohol	34.7% 18.3% 16.5%	*No association between marijuana use and injury severity*
Soderstrom et al. 2001	Maryland, Baltimore (USA)	n = 1338	n = 1216 (90.6%) consented; n = 778 included	Blood samples and trauma registry; linking a number of databases from trauma center May 1994 to November 1996 (2 years and 5 months)	18 years and older	No control group	Opiates cocaine cannabinoids phencyclidine amphetamines	23.7% 18.7% 9.6% 1.6% 0%	
Zautcke et al. 2002	Illinois (USA)	n =134,846	n = 24,458 urine toxicology screens performed (no information on selection of patients for urine samples)	Retrospective Trauma registry, blood and urine samples January 1994 to December 1996 (24 months) No cut-off value for drugs Retrospective	Not specified	Compared patients aged over 64 and patients under 65 years	>64 - < 65 years At least one drug Cocaine PCP Benzodiazepines Barbiturates Opiates Amphetamines Marijuana Mixed	>64 - < 65 10.6-42.6% 0.45-13.7% 0.06-0.53% 3.6-3.0% 1.1-0.69% 2.7-3.5% 0.5-0.41% 0.1-9.2% 2.1-11.6%	*In the elderly trauma population illicit drug use is much less prevalent than alcohol use. Many of the drug-positive test results could likely be accounted for by prescription medications*
Self-reported illicit drug use									
Cherpitel & Borges, 2002	Santa Clara (USA)	n = 1952	N = 1429 (73% completed interviews)	Self-reported drug use 12 weeks	18 years and older	Injured and non-injured;	Substance use Tranquilizers / opium / heroin / methadone Marijuana Cocaine / amphetamines Hallucinogens / others	Ni – Injured 5.2 - 3.7% 3.4 – 1.7% 1.3 – 1.7% 1.2 - 1.0% 0.6 – 0%	*The prevalence rates of substance use among ER patients suggest that not all findings regarding alcohol use among ER patients are readily translated to other substances*
Cherpitel & Borges, 2001	San Jose (California, USA) & Pachuca (Hidalgo, Mexico)	n = 733 & n = 1624	n = 550 (80%) & n = 1417 (87%)	Face-to-face questionnaires and breathalyzers 14 weeks & 4 months prospective	18 years and older	Compared injured and non-injured	Not specified	4% injured and 3% non-injured in Santa Clara and 0.6% (injured) and 1.7% (non-injured) in Pachuca	

The association between illicit drug use and specific types of injuries has been reported, but none of the studies reviewed here reported a correlation between injury severity and illicit drug use (Soderstrom et al., 1988; Rivara et al., 1989; Macdonald et al., 1999). One of the most frequently reported correlations is that of violence-related injuries and illicit drug use (usually in combination with alcohol) (Rivara et al., 1989; Macdonald et al., 1999; Peden et al., 2000). In the South African study "white pipe" smoking was almost exclusively confined to the interpersonal violence group. Rivara et al. (1989) reported that assault victims had the highest proportions of positive urine drug tests. (Lindenbaum et al., 1989) showed that a greater proportion of the violent crime group compared to the accidental injury group had been using cocaine, and that illicit drugs were related to accidental and crime-related trauma.

A comparison between Canadian accidental injury and non-injured emergency room patients showed more prescription drugs use in the non-injury group and more illicit drug use (of any type) in the injury group in the previous year (Macdonald et al., 1999). Persons with traffic-related injuries, particularly from motorcycle crashes, had a high proportion of samples testing positive for at least one illicit drug (Rivara et al., 1989): in that study motorcyclists accounted for the highest proportion of specimens positive for THC among the emergency room patients. Marijuana use was also reported to be greater among victims of both vehicular and non-vehicular trauma (Soderstrom et al., 1988).

2.3.4 Prevalence of illicit drug use measured by self-report

An alternative for blood and urine toxicology in the assessment of illicit drug use is the use of self-report; this was, however used in only a minority of studies (Cherpitel and Borges, 2001; 2002). Compared to blood and urine toxicology the prevalence of self-reported illicit drug use prior to the injury is lower. Emergency room data from Mexico show an overall prevalence rate of self-reported drug use in the 6 hours before the event of 0.6% for injured patients and 1.7% for non-injured patients (Cherpitel and Borges, 2001). In that study the American sample showed prevalence rates of 4% for injured patients and 3% for non-injured patients. In another study, Cherpitel and Borges (2002) reported a prevalence of 5.2% for the non-injured and 3.7% for the injured. Only one study (Cherpitel and Borges, 2002) made a distinction between various types of illicit drugs. The incidence of self-reported marijuana use is 1.3% for non-injured emergency room patients and 1.7% for injured patients; in that study the prevalence of cocaine/amphetamines in both groups is 1.2% and 1.0%, respectively.

2.3.5 Self-report of illicit drug use related to patient and injury characteristics

The self-report studies revealed the following patient characteristics related to illicit drug use and injuries. The two studies conducted in the USA found no differences between injured and non-injured concerning illicit drug use in the 6 hours prior to the emergency room visit (Cherpitel and Borges, 2001; 2002). Some findings are consistent with the results from studies using blood and urine toxicology. Non-injured were more likely to report use of medicines in the 6 hours prior to the event than injured patients (Cherpitel and Borges, 2002), and injured patients were more likely than the non-injured to report usual drug use during the last year. Similar findings were also reported concerning the relationship between injuries resulting from violence and illicit drug use. Patients with violence-related injuries were more likely to report substance use (primarily cocaine/amphetamines and marijuana) in the 6 hours prior to the injury (as well as in the last 12 months) compared to those with injuries from other causes (Cherpitel and Borges, 2002).

The different prevalence rates reported in the blood and urine studies due to variations in locale and/or country of study are also present in self-report studies. A comparative emergency room study of Mexicans living in the USA and Mexicans living in Mexico shows that both injured and non-injured patients in Mexico were less likely to report drug use during the last year compared with those living in the USA (Cherpitel and Borges, 2001). In Santa Clara (USA), injured patients were more likely to report drug use during the last year compared with the uninjured (Cherpitel and Borges, 2001). This association was not found in the emergency room in Mexico. In these self-report studies no association was found between illicit drug use and demographics.

2.4. Discussion

Emergency room studies on illicit drug use and injuries rarely focus solely on illicit drug use. Alcohol use and its relationship with injuries is frequently the main focus, leaving illicit drug use less well investigated. The studies included in this review on illicit drug use and injuries showed variation in methodology. Decisions concerning the locale of study, measures used, period of data collection, time lapse between accident and emergency room visit, day of the week, age range and types of illegal drugs screened for can all lead to variations in prevalence rates, which did indeed vary between studies.

The overall prevalence rates range from 35 to 40% in studies using blood and urine toxicology (excluding one outlier), and from 1 to 5% in self-report studies. These large differences should be explored in future studies to identify the possible under-reporting of self-reported illicit drug use and that blood and urine toxicology are invalid indicators of recent use, because metabolites can persist even long after a pharmacological effect has vanished. This makes it difficult to identify the exact relationship between illicit drug use and injuries using blood and urine toxicology. Despite these differences in prevalence, reasonable agreement among studies is found for the type of illegal drugs most often used, i.e. cannabis and cocaine. Cocaine is the drug of main concern among emergency room patients in the USA, whereas in other countries cocaine is far less frequently used and

marijuana is the most prevalent. Differences in the characteristics of the emergency room population as a result of the organisation of the medical care leading to variations in admittance policy between the USA and other countries may explain these findings. Not only the area of the city where the emergency room is located, but also type of center (e.g. emergency room, trauma center, private clinic, walk-in clinic) can influence patient and injury characteristics of those seeking treatment.

Comparative findings have been reported on the association of alcohol and casualties between countries and cultures (Cherpitel, 1993): prevalence rates appear to reflect usual drinking patterns within the countries concerned. Cross-national comparative emergency room studies have generally not analysed drug use, and it is not known how substance use other than alcohol may vary in emergency room populations across cultures (Cherpitel and Borges, 2001). Marijuana is also the most prevalent type of drug in persons involved in traffic accidents. The pure effect of cannabis is clouded due to its use in combination with alcohol (EMCDDA, 1999).
Associations between characteristics of the emergency room patients and illicit drug use show some similarities, but general conclusions are difficult to draw because of methodological differences: including inclusion/exclusion criteria, non-response, sample selection, and measures to assess substance use. Another point of discussion is using the non-injured/illness patients as a control group. As stated earlier, these patients do not represent the general population, because injured people use generally more licit drugs, and less illicit drugs and alcohol. Therefore, future research should assess the reported associations more systematically.

In summary, none of the studies found an explicit relationship between injury severity and illicit drug use. One of the most reported correlations is that of violence-related injuries and illicit drug use (usually in combination with alcohol) (Rivara et al., 1989; Macdonald et al., 1999; Peden et al., 2000; Macdonald et al., 2003; Blondell et al., 2005). Cocaine and marijuana (in combination with alcohol) is associated with violence-related injuries.

The prevalence of illicit drug use in the general population of the various countries may partly explain the different prevalence rates reported. On the other hand, variations also occur due to methodological factors. Within assessment procedures a distinction can be made between studies using blood and urine toxicology and studies using self-report. Both measures have advantages and disadvantages. Blood and urine toxicology seem to result in higher prevalence rates of illicit drug use, because the metabolites remain long after the pharmacological effect has vanished. Therefore, recently Cherpitel and Borges (2002) state that self-report offers better information on the recent and actual drug use, whereas others (McNagny and Parker, 1992; Brookoff et al., 1993; Buss et al., 1995; Peden et al., 2000) state that it tends to under-report drug use. A possible solution may be to use a combination of both measures and assess more specifically (e.g. by means of a personal interview or questionnaire) the drug use history in the previous week. Another methodological consideration of studies including patients with available urine or blood samples is that they should test for sample bias, because screens are generally done on an elective basis as determined by emergency department personnel (Buchfuhrer and Radecki, 1996). Sample selection bias in the emergency room can lead to difficulties in that the emergency room sample can not truly represent the population of injured (Treno et al., 1998).

Compared to the relationship between alcohol and injuries, both similarities and differences are found. An earlier review on alcohol and injuries among emergency room patients concludes that alcohol plays an important role in the events leading to an injury treatment in the emergency room. That role differs from place to place and also differs according to the socio-demographic characteristics of the study population (Cherpitel, 1993). Patients frequenting the emergency room with casualties are more likely to be positive for blood alcohol at the time of the visit and to have reported drinking prior to the event compared to the non-injured. Illicit drug use and injuries are not that strongly related. Specific types of injuries (e.g. violence related) and specific types of accidents (motor vehicle) are related to specific types of illegal drugs (marijuana and cocaine). Illicit drug use in general, in contrast to alcohol, is not associated with injuries. The injured admitted to the emergency room who are positive for blood alcohol concentrations are more likely to be male, aged 25 to 45 years, and arrive at the emergency room during a weekend evening or early morning hours (Cherpitel, 1993). Emergency room patients with a positive screen for illicit drug use are more likely to be male and aged 20 to 40 years. No association with day and time of emergency room visit has been found. The comparative findings of the association between alcohol and casualties between countries and cultures appear to reflect usual drinking patterns within the countries concerned (Cherpitel, 1993). The results of the present review of emergency room samples indicate that the same might apply to illicit drug use.

In the USA, the high costs of screening for illegal drugs and alcohol, coupled with the problem of unreimbursed health care, make it impossible to perform these tests on each trauma patient (Buchfuhrer and Radecki, 1996). In other countries such as in Europe, where for example in the Netherlands illicit drug use has been measured in 1% of an emergency room population (Elshove-Bolk, et al., 2002), such screening would be even less cost-effective. This also applies to studies carried out in the UK, South Africa and Canada. Moreover, especially the most frequently detected illicit drugs, cocaine and marijuana, seem to be less prevalent outside the USA.

It is recommended that future studies focus more on the methodological aspects of emergency room studies and their influence on prevalence rates and patient characteristics. In addition, future studies should aim to identify specific risk groups within the emergency room population in order to develop appropriate interventions for them. This would provide knowledge on risk groups for illicit drug use and provide emergency room personnel with tools to identify those with possible illicit drug use. A future study on this subject could obtain data from different studies and make a meta-analysis of them. This current review only included studies using total emergency room populations, because subpopulations of patients differ regarding characteristics and are therefore difficult to compare. Interventions to decrease illicit drug use among emergency room patients can then focus on specific groups. Our review of emergency room studies shows that illicit drugs are seldom used alone, but are generally combined with alcohol use. This makes it difficult to clarify the role of illicit drugs in the injury event. The use of urine toxicology to establish illicit drug involvement in injuries remains debatable: a positive screen does not necessarily mean recent use. Interventions could focus on alcohol patients (easier to measure/identify) but also address illicit drug use. Studies on interventions for substance use have shown promising results (Longabagaugh et al., 2001; Woolard et al., 2003) and a recent study (Rockett et al., 2005) has suggested that among emergency room patients screening, intervention and treatment for substance abuse can be highly cost effective. Therefore, interventions for illicit drug use, in combination with alcohol, should be further developed and evaluated.

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Part II

Methodological issues concerning substance use among emergency room patients

Chapter 3

Substance use among emergency room patients: is self-report preferable to biochemical markers?

Abstract

Aim of study: To explore the validity of self-reported substance use among emergency room populations and the processes of sample selection bias, to establish their influence on the prevalence rates found.

Methods: Self-reported alcohol and illicit drug use of patients in the emergency room is compared with results from an alcohol breath analyser and urine toxicology.

Results: Variations in reported substance use occur when comparing self-report measures with alcohol breath analyser results and urine toxicology. Self-reported alcohol use was found among 7.5% of the patients compared with 4.7% based on alcohol breath analysers. Illicit drug use was reported by 9.0% of the patients whereas urine toxicology resulted in 30% patients positive for illicit drug use. Patients that voluntarily participate in the study differ from those that do not participate. Patients who refuse an alcohol breath analyser report slightly more alcohol use prior to the injury (difference not significant), and patients who provide a urine sample report more illicit drug use prior to the injury compared to those that refuse.

Discussion: Differences in prevalence rates can be explained partly by the measurements used and partly by sample selection bias. Self-reported alcohol use and self-reported illicit drug use is preferable to the "gold standard" when used among emergency room patients, because both measures provide more accurate information on the actual use. Sample selection bias also influences the prevalence rates.

3.1. Introduction

Substance use among emergency room patients has been studied intensively, providing data on the relationship between use and injuries (Blondell, Dodds, Looney, Lewis, Hagan, Lukan, & Servoss, 2005; Cherpitel, 1993; Cherpitel, Bond, Ye, Borges, Macdonald, & Giesbrecht, 2003; Macdonald, Anglin-Bodrug, Mann, Erickson, Hathaway, Chipman, & Rylett, 2003). Among these studies, however, the methods used to measure substance use vary. Most studies use alcohol breath analysers and blood and urine toxicology, whereas self-reported substance is used less frequently (Cherpitel, 1993; El-Guebaly, Armstrong, & Hodgins, 1998; Vitale & Van de Mheen, submitted for publication). Although self-report is a reliable and valid method to measure alcohol use prior to the injury event (Cherpitel, 1989; Cherpitel, 1993; Del Boca & Darkes, 2003; El-Guebaly et al., 1998; Treno, Gruenewald, & Johnson, 1998), in practice the use of an alcohol breath analyser and urine toxicology prevail. Cherpitel & Borges (2002) even concluded that self-reported alcohol use prior to the event has been found to be a more accurate indicator of use than biological specimens obtained at the time of the emergency room visit. In the present study some data indicate that this may also be true of drug use. Del Boca & Darkes (2003) concluded that there is no single measure of alcohol use suitable for all research purposes and populations, and that response accuracy is influenced by the interaction of social context factors, respondent characteristics and task attributes; these authors state that research should be directed at understanding the process involved in response behavior. Independent of the measures used, due to medico-ethical considerations research among emergency room populations will always depend on the voluntary participation of patients, or on patients with urine or blood samples available as part of their emergency room treatment. However, it is known that screens are done on an elective basis as determined by emergency department personnel (Buchfuhrer & Radecki, 1996; Rivara, Meuller, Fligner, Luna, Raisys, Copass, & Reay, 1989). These results stress the importance to include tests for sample selection bias and to carefully interpret results from studies with a potentially biased population (Carrigan, Field, Illingworth, Gaffney, & Hamer, 2000; Lindenbaum, Weissberg, & Terry, 1989; Macdonald, Wells, Giesbrecht, & Cherpitel, 1999). Therefore, sample selection bias in the emergency room should not be underestimated, as it can lead to difficulties in the true representation of the injured population (Treno et al., 1998). Although self-reported alcohol use is a valid method to measure substance use, data on the influence of sample selection among emergency room patients reporting alcohol and illicit drug use are scarce. Therefore, this study aims to determine the validity of self-reported alcohol and illicit drug use among emergency room patients. Self-reported alcohol and illicit drug use of patients in the emergency room is compared with alcohol breath analyser and urine toxicology results of the same patients by posing the following research questions:

(1) Do patients who provide self-report on substance use differ from patients who do not?
(2) Do patients who voluntarily provide a breath analyser/urine sample differ from patients who refuse?
(3) What is the validity of self-reported substance use among emergency room patients compared to alcohol breath analyser/urine toxicology?

3.2. Materials and methods

3.2.1 Sample selection

Data were collected at three emergency rooms in the Netherlands, and involved the participation of two university hospitals: Academic Hospital Maastricht (AZM), Erasmus Medical Center (EMC), and one general hospital: Meander Medical Center (MMC). All research sites used the same inclusion/exclusion criteria and self-report questionnaire. Included were patients treated in the emergency room for injuries or illness; excluded were those attending for a control visit and those without sufficient command of the Dutch language. In two hospitals (MMC and the AZM) blood alcohol concentrations were measured using an alcohol breath analyser; data of both these hospitals were merged. In the third hospital (EMC) urine toxicology was conducted to assess illicit drug use.

In the MMC and the AZM research staff was available 24 hours a day, 7 days a week, to approach patients for this study. In this procedure, research staff handed out the questionnaire and administered the breath analyser on admittance. Patients with minor injuries/illness were approached to participate whilst waiting for treatment (i.e. shortly after entering the emergency room). Patients with more severe injuries/illness were approached after consultation of the emergency room personnel by the research staff before or shortly after treatment; the patient then filled in the questionnaire and performed a breath analyser. In the EMC research staff was available 24 hours a day only during the weekends (Friday-Sunday), because relatively more patients positive for illicit drug use visit the emergency room during weekends (Vitale et al., submitted). Apart from this, there were no other differences in research procedures. Data collection took place during 2 weeks in May 2004 (MMC); 2 weeks in November 2004 (AZM); and during 7 weeks in November and December 2004 (EMC). The study period in the EMC was extended because patients were less likely to provide a urine sample voluntarily. The medical review boards of the three hospitals involved independently reviewed the study procedures and approved the study protocol.

3.2.2 Measurements

Data were collected using a standard questionnaire that addressed the following topics: reason for emergency room visit, location of accident or illness, demographic data, alcohol use, location of alcohol consumption, licit drug use, illicit drug use, and location of illicit drug use. Basic demographic variables (gender, age) and emergency room data (date and time of emergency room visit, type of referral to the emergency room, and type of injury/illness) were abstracted from the hospital patient database. These demographic and emergency room data were available for all patients visiting the emergency room in the study period, with the exception of the EMC where data on referral to and time of emergency room visit were not available. Alcohol use (self-report) in the 6 hours prior to the visit was asked. Illicit drug use (self-report) included questions about the use of marijuana, cocaine, amphetamines, ecstasy, heroin, hallucinogenics, GHB and methadone 24 hours prior to the visit. Breath alcohol concentrations were measured using a digital alcohol breath analyser (CA2000 AlcoScan; U.S. DOT/NHTSA approved). Urine toxicology was used to assess the use of the most prevalent illicit drugs (cannabis (THC), cocaine, and opiates) that were found among emergency room patients (Macdonald et al., 2003). SAMHSA (Substance Abuse and Mental Health Security Agency) cut-off points were used. A patient is considered positive for a drug when their level exceeds 50 µg/l for cannabis, 300 µg/l for cocaine, and 300 µg/l for opiates.

3.2.3 Statistical analysis

For statistical analyses two data files were used. The first consisted of data merged from two hospitals (MMC and AZM) on alcohol use (self-report and breath analyser). The second data file consisted of data from one hospital (EMC) on illicit drug use (self-report and urine toxicology). First (research question 1), the response and non-response populations on the self-report questionnaire for both data files were compared regarding demographics (gender, age) and emergency room characteristics (day and time of emergency room visit, type of referral to the emergency room), using bivariate cross-tabulation. Chi-square tests were conducted to determine whether there was a significant difference between response and non-response patients. The categories of the various variables were tested separately. A Bonferroni correction was used to decrease the possibility of false-positives. Mean age was compared using a t-test. Second (research question 2), patients who consented to provide a breath analyser or a urine sample were compared with those who refused, using bivariate cross-tabulation. Chi-square tests were conducted to determine whether there was a significant difference between patients who consented and patients who refused. All results were regarded significant at $P < 0.05$, except for those variables with more than two categories where the Bonferroni correction was applied in which case results were significant at $P < 0.05/n$ (= number of variable categories).
Third (research question 3), self-reported alcohol and illicit drug use was compared with results from alcohol breath analysers and urine toxicology.

3.3. Results

3.3.1 Sample characteristics self-report

In the MMC and the AZM 1306 patients were approached to participate in the study and 694 (53.1%) consented to fill in the questionnaire. Reasons for non-response were: refusal (40.5%), severity of

the patient's medical condition (56.1%) and insufficient command of the Dutch language (3.4%). Compared with the non-response group, the response group were more likely males (60.3% vs. 49.0%), younger (41.7 vs. 53.9 years), more likely referred on their own initiative (43.6% vs. 31.0%) and less likely referred by ambulance (8.3% vs. 20.1%). No differences were found regarding time and part of the week of emergency room visit.
In the EMC 879 patients were approached to participate during the study period and 704 (80.1%) patients consented to fill in the questionnaire. Reasons for non-response were similar: severity of patient's medical condition (46.3%), refusal (23.4%) and insufficient command of the Dutch language (30.3%). Compared with non-response patients, response patients were younger (36.1 vs. 43.9 years). No differences were found regarding gender and part of the week of the emergency room visit.

3.3.2 Sample characteristics breath analyser or urine sample

Table 3.1 shows the characteristics of the patients that consented to a breath analyser or provided a urine sample in the present study. Patients consenting to a breath analyser (n = 283) are mostly males (68%) with a mean age of 41 years, visiting the emergency room on weekdays between 8:00 and 16:00 hours on their own initiative.
Patients providing a urine sample (n = 98) are mostly male (70%) with a mean age of 36 years. More than 50% of these patients were aged 18-35 years and also approximately 50% visited the emergency room during weekends. In comparison, patients refusing an alcohol breath analyser were more likely female, are older (46.1 years vs. 40.6), less likely visit the emergency room between 8:00 and 16:00 hours and more likely between 16:00 and 24:00 hours. Patients who refused to provide a urine sample differed from those who did regarding gender only, with relatively more females refusing a urine sample. No differences were found regarding age and part of the week of visit.

3.3.3 Validity of self-reported alcohol use

Of all patients who filled in the questionnaire (n = 694) 7.5% reported alcohol use 6 hours prior to the injury/illness event (Table 3.2). In total 294 of these patients agreed to both an alcohol breath analyser and a questionnaire. Within this population of patients, self-reported alcohol use 6 hours prior to the injury/illness event is 6.8%. Breath analyser results show that alcohol use (positive breath analyser: any level above 0) is prevalent among 4.7% (n = 14) of the patients; the mean alcohol level for these patients positive is 1.81 g/100 ml. Of the patients who refuse an alcohol breath analyser a higher percentage of the patients admit alcohol use 6 hours prior to the injury compared to those consenting to a breath analyser (8.6% vs. 6.8%; P = 0.46), but the difference is not significant. The validity of self-reported alcohol use is good (sensitivity = 92.9%, specificity = 97.5%) compared to the alcohol breath analyser.

Table 3.1 Characteristics of patients consenting to testing (breath analyser or urine screening)

	MMC & AZM		EMC	
Gender	Breath analyser (n = 283)	Refused (n = 387)	Urine screening (n = 98)	Refused (n = 150)
Men	68.2% (193)	51.7%* (200)	70.4% (69)	52.0%* (78)
Women	31.8% (90)	48.3% (187)	29.6% (29)	48.0% (72)
Mean age (years)	40.6	46.1*	35.7	36.1
Age category	**MMC & AZM**		**EMC**	
12-17 years	10.2% (29)	9.0% (35)	5.1% (5)	4.0% (6)
18-35 years	37.5% (106)	27.1%* (105)	56.1% (55)	55.3% (83)
36-60 years	31.4% (89)	37.5% (145)	28.6% (28)	30.7% (46)
61 years and older	20.8% (59)	26.4% (102)	10.2% (10)	10.0% (15)
Part of the week of ER visit	**MMC & AZM**		**EMC**	
Weekdays	79.5% (225)	73.4% (284)	46.9% (46)	40.7% (61)
Weekend	20.5% (58)	26.6% (103)	53.1% (52)	59.3% (89)
Time of emergency room visit	**MMC & AZM**			
0:00-8:00 h	8.1% (23)	7.2% (28)		
8:00-16:00 h	66.1% (187)	47.5%* (184)		
16:00-24:00 h	25.8% (73)	45.2%* (175)		
Referral to emergency room	**MMC & AZM**			
Ambulance	8.8% (24)	7.9% (30)		
Own initiative	42.3% (115)	44.7% (170)		
GP	37.9% (103)	42.4% (161)		
Other	11.0% (30)	5.0%* (19)		

Table 3.2 Data on alcohol use

	MMC & AZM
Self-reported alcohol use (6h) (n = 694) (all patients with questionnaire)	7.5% (52)
Self-reported alcohol use (6h) (n = 294) (all patients with questionnaire and breath analyser)	6.8%** (20)
Self-reported alcohol use (6h) (n = 185) (all patients with questionnaire who refused a breath analyser)	8.6%** (16)
Breath alcohol concentration (positive any value) (n = 301)	4.7% (14)

** Difference not significant; P = 0.46

Table 3.3 Data on illicit drug use

	EMC
Self-report illicit drug use (24h) based on all complete questionnaires (n = 641)	
All illicit drugs (cannabis, cocaine and opiates)	9.0% (58)
Cannabis	6.9% (44)
Cocaine	1.9% (12)
Opiates	1.7% (11)
Self-reported illicit drug use (24h) (n = 87) (all patients with questionnaire and urine sample)	18.4%** (16)
Self-reported illicit drug use (24h) (n = 177) (all patients with questionnaire who refused an urine sample)	5.1%** (9)
Urine toxicology (exceeds SAMHSA cut-off) based on all urine samples (n = 100)	
All illicit drugs (cannabis, cocaine and opiates)	30.0% (30)
Cannabis	20.0% (20)
Cocaine	6.0% (6)
Opiates	10.0% (10)

** Difference significant; P< 0.001

3.3.4 Validity of self-reported illicit drug use

Table 3.3 shows that self-reported illicit drug use (cannabis, cocaine and opiates) 24 hours prior to the injury/illness event in the EMC is 9.0%. Cannabis is reported by 6.9% of the sample, cocaine by 1.9% and opiates by 1.7%. Of the patients who refused to provide a urine sample, 5.1% reported illicit drug use prior to the injury. Urine toxicology shows that 30% used at least one of these illicit drugs: 20 patients (20%) tested positive for cannabis, 6 (6%) had a positive urine screen for cocaine, and 10 patients (10%) tested positive for opiates. In total 87 patients provided both a urine sample and a questionnaire. Of these patients, compared to those refusing a urine sample, a higher percentage reported illicit drug use 24 hours prior to the injury (18.4% vs. 5.1%; P< 0.001). The validity of self-reported illicit drug use is moderate (sensitivity = 59.3%, specificity = 100%) compared to urine toxicology.

3.4. Discussion

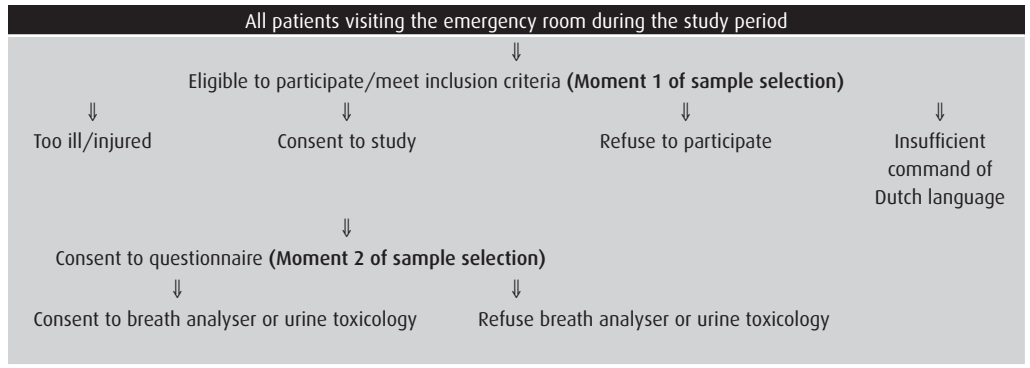
In the present study, when using self-reported alcohol use among an emergency room population 7.5% of the patients report alcohol use 6 hours prior to the injury/illness event. However when using an alcohol breath analyser on a voluntarily basis among the same population a lower prevalence rate of 4.7% alcohol positive patients emerges. The opposite was found for self-reported illicit drug use compared to urine toxicology. Self-report of illicit drug use was found among 9% of the emergency room population and higher prevalence rates were found when urine samples were screened for illicit drugs, with 30% of the patients found positive for one or more illicit drugs. These differences can be explained by two factors: (1) selection bias (Treno et al., 1998), and (2) the validity of self-reported substance use. Sample selection bias can occur at two moments during the study (Figure 1). The first moment is when all patients who meet the inclusion criteria are approached to participate (moment 1); sample selection bias occurred mainly as a result of refusal and the patient's medical condition. The second moment is when patients consented to fill in the questionnaire but refused to use a breath analyser or provide a urine sample (moment 2). More patients refuse to participate during evening and night hours; a period when patients suspected to use alcohol and illicit drugs are expected. Partly as a result of this, higher prevalence rates were found for illicit drug use, when using urine toxicology, because patients who have used illicit drugs are more likely to voluntarily provide a urine sample. For alcohol use an opposite trend was found, whereby a higher percentage of patients who refused a breath analyser did report alcohol use. When information on the patient's substance use is required at both moments, staff judgement can be used in addition. However, previous studies have shown variable results regarding the detection of substance use by emergency room staff (El-Guebaly et al., 1998; Gentilello, Villaveces, Ries, Nason, Daranciang, Donovan, Copass, Jurkovich, & Rivara, 1999). Apart from sample selection bias, the validity of self-reported substance use is another

factor influencing prevalence rates. At this point, another difference occurs between alcohol and illicit drugs. The present study confirms the fact that self-report is a reliable measure to assess alcohol use among emergency room patients (Cherpitel, 1993; El-Guebaly et al., 1998; Peden, Van der Spuy, Smith, & Bautz, 2000; Treno et al., 1998). The higher prevalence rate of self-reported alcohol use compared to breath analyser results can be explained by the time lapse between the injury/illness event and emergency room visit. In contrast to alcohol use, the validity of self-reported illicit drug use in our study is moderate; this finding is similar to the results of previous studies (McNagny & Parker, 1992; Peden et al., 2000). This is most probably not caused by inaccurate reporting of illicit drug use, but a result of the detection time of illicit drugs in urine. This factor, largely explains the fact that when relying on the use of urine toxicology only, the prevalence rates are higher compared to self-reported prevalence rates. A positive urine screen does not imply that the illicit drug was used 24-hours prior to the injury, whereas a self-report can measure the illicit drug use 24-hours prior to the injury/illness event more accurately. An important consideration in the use of urine toxicology is that metabolites can persist long after a pharmacological effect has cleared. An advantage of urine over blood (apart from non-invasiveness and ethical considerations) is a longer persistence and generally higher concentrations of drugs and metabolites. However, this is also its major drawback because persistence ranges from one to several days, depending on the pharmacological class. Because this makes it difficult to identify the exact relationship between illicit drug use and injuries using urine toxicology, self-reported illicit drug use could be a solution. A disadvantage of self-report, however, is possible sample selection bias when patients are unable to undertake or complete the interview because of their medical condition. This makes a non-response analysis and check for sample selection bias necessary.

In the present study the following methodological considerations need addressing. Despite identical research procedures, response rates vary between both study samples. The lower response rates in the MMC and AZM sample may be explained by the age of the emergency room populations, with a relatively older population in the MMC and AZM; however this needs further exploration. In the EMC sample more non-response was due to patients without sufficient command of the Dutch language; this is because a higher percentage of that population has a non-Dutch background. The validity of self-reported illicit drug use was studied by combining data on cannabis, cocaine and opiates; by doing so differences between these drugs in the validity of self-report are not assessed. Future studies could focus on possible individual differences between these drugs, but then a larger research sample is needed.

Self-report of alcohol shows good validity whereas that of self-reported illicit drug use is only moderate. Alcohol breath analysis may lead to an underestimation of the actual use, and urine toxicology may lead to an overestimation of the actual use. When using either self-report or alcohol breath analyser/urine toxicology on a voluntarily basis to assess substance use among emergency room populations, sample selection bias also influences study results. This study shows that despite alcohol being more socially accepted, patients who reported alcohol use were less likely to agree to an alcohol breath analyser test. The opposite was found for illicit drugs, with a social taboo on illicit drug use patients were less ashamed to admit their recent use. Using self-report among emergency room patients would therefore lead to more accurate information on the substance use prior to the injury compared to the more labour-intensive and expensive "gold standard" of biochemical markers.

Figure 3.1 Ways of obtaining data on patient's substance use among Dutch emergency room patients



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Chapter 4

Self-reported alcohol use among emergency room patients in the Netherlands: variations in prevalence rates owing to methodological differences

Abstract

Aims: This study compared different methods of assessing self-reported alcohol use among emergency room patients in order to explain the variations in reported prevalence rates.

Methods: Alcohol use prior to patient's injury or illness was assessed in one hospital by a self-report questionnaire in three different ways: (1) administered by emergency room staff, or (2) administered by research staff, or (3) sent to the patient's home by post.

Results: Results show variations in self-reported alcohol use 6 hours prior to the injury or illness ranging from 4.6% to 9.1%; these variations may be explained by sample selection bias and characteristics of the included study populations. When self-report is combined with staff judgement the corresponding prevalence rates are 6.8% for research staff and 16.2% for emergency room staff. This shows that the latter more efficiently judge patient's alcohol use than research staff. Using research staff 24 hours a day resulted in almost no sample bias. Data collection via emergency room staff leads to the highest alcohol use prevalence rates, and to the highest sample bias; this was influenced by the emergency room characteristics. A retrospective mail survey results in an older sample with age-related (lower) alcohol use and emergency room characteristics related to this age group.

Conclusions: Future studies using patient self-report among emergency room samples should consider carefully the influence of sample selection bias. The use of a combination of research staff handing out the questionnaire and emergency room staff giving their judgement on the patient's alcohol use seems to be a useful method.

4.1. Introduction

The relationship between alcohol use and injuries has been established in many studies, with most studies being conducted in emergency room settings. Estimated prevalence rates of emergency room patients positive for alcohol range from 9% to 24.4% (El-Guebaly et al., 1998). Alcohol use increases the risk of injury. Cherpitel (1993) reviewed these studies and reports that patients with injuries and positive for blood alcohol are more likely to be male, aged 25 to 45 years, and to visit the emergency room during the weekend evening or early morning hours. Prevalence rates vary from country to country and from place to place, partly due to alcohol consumption patterns in a culture or in a region (Cherpitel, 1993; Cherpitel, 1999; Cherpitel, et al., 2002). Most of these studies have been conducted in the United States; data from European countries are scarce. Studies from individual countries (like the Netherlands) are needed to identify the global problems that result from alcohol use and misuse. Additionally, they will provide information on prevalence rates of alcohol use among emergency room patients in various countries. Such data are crucial, because alcohol use is rising among certain groups in the general population. A recent Dutch study shows an increase of young people aged 12-17 years frequenting the emergency room as a result of alcohol intoxication (Wilsterman et al., 2004). More detailed studies and figures on alcohol use among emergency rooms in the Netherlands are very limited. The only available study reported that 8% of all victims of traffic accidents had consumed alcohol (Kingma et al., 1994). Recent figures on problem drinking in the Netherlands show that 8% of the total population between 18-65 years has problems with alcohol (Verdurmen et al., 2003). This means that alcohol abuse is present among approximately 400,000 people and that around 350,000 people are addicted to alcohol in the Netherlands.

Studies outside the emergency room focusing on alcohol use and injuries are conducted by surveys among the general population (Cherpitel, 1999) or within specific groups, especially among people involved in car or motor accidents (Del Rio et al., 2002; Kurzthaler et al., 2003; Weber et al., 2002). Results from a household survey among the general population show that alcohol consumption was predictive for emergency treatment, and that heavier drinking was associated with treatment for an injury and lighter drinking with treatment for an illness (Cherpitel, 1999). However, because household surveys make it difficult to assess a causal relationship between alcohol use and the injury, the emergency room is the most obvious place to study a possible causality. Such emergency room studies mostly employ patient self-reported alcohol use, blood alcohol concentrations, or breathalysers. Another, less frequently employed measure of assessing alcohol use by patients is to use clinical or staff assessment/ recognition. Self-report and tested blood alcohol concentration both have advantages and disadvantages, and it remains debatable whether to use self-reported drinking or to test for blood alcohol concentration (Treno et al., 1998). No single instrument or method

stands out as the "gold standard"; a combination of clinical, self-report and biochemical markers is considered optimal, but will vary according to the purpose of the measurement (El-Guebaly et al., 1998).

Numerous studies have compared self-reported alcohol use with blood alcohol concentration measures. In contrast, studies comparing differences in self-reported alcohol use among emergency room samples are scarce. Therefore, this study focuses on this topic in order to identify factors that influence found prevalence rates of self-reported alcohol use among emergency room patients. The two main issues explored in this study are factors related to differences resulting from study procedure and resulting from sample selection bias. Several studies conclude that self-report is sufficiently valid to measure alcohol use prior to the injury event (Cherpitel, 1993; Treno et al., 1998). Although self-report of alcohol consumption shows adequate reliability and validity social context factors, respondent characteristics and task attributes can influence response validity (Del Roca et al., 2003). Besides differences resulting from alcohol measures and cultural drinking patterns, sample selection bias in the emergency room should not be underestimated and can lead to difficulties in that the emergency room sample can not truly represent the general population of injured (Treno et al., 1998).

In this study the aspects of sample selection bias and study procedure related to alcohol prevalence rates are examined more closely by studying different methods of self-report in an emergency room population of one hospital. The aim is to compare three different methods of data collection using patient self-report among an emergency room population in order to identify variations in study results. The main questions to be addressed are:

(1) Do different self-report methods result in different alcohol prevalence rates?
(2) Are the differences in prevalence rates the result of sample selection bias?
(3) Are there other explanations for these differences in alcohol prevalence rates?

In addition, the potential value of staff information on the patient's alcohol use was explored. In order to answer these questions, results concerning response rates, sample selection bias, characteristics of the research population and alcohol prevalence rates are reported.

4.2. Methods

4.2.1 Procedure and sample

This study was conducted at the Meander Medical Center in Amersfoort (about 130,000 inhabitants); the emergency room of this hospital has about 35,000 patients per year. The medical review board of the Meander Medical Center approved the study protocol. All patients presenting at the emergency room in three different time periods between July 2003 and May 2004 were included in this study. Because alcohol use among youngsters in the Netherlands has increased (Monshouwer et al., 2004) and more alcohol intoxicated patients aged 12 to 17 years attend emergency rooms in the Netherlands (Wilsterman et al., 2004), the minimum age for inclusion in this study was 12 years. Patients treated in the emergency room for injuries or illness were included; excluded were those attending for a control visit and those without sufficient command of the Dutch language. Instruction on the study procedures was given to the emergency room and research staff by the main researcher. Three different methods of data collection were consecutively administered using an identical questionnaire.

4.2.1.1 Method 1 (M1)

In the first method emergency room personnel (nurses and administrative personnel) were responsible for data collection (M1). The period of data collection was from July 2003 to January 2004. In this method patients were approached in two ways. In the first way, patients with minor injuries/illness meeting the inclusion criteria were handed a questionnaire by the administrative staff shortly after entering the emergency room; the questionnaire was then completed in the waiting room. In the second way, patients with more serious/severe injuries/illness were approached in the treatment room by the nurses before or shortly after treatment; the patients then filled in the questionnaire.

4.2.1.2 Method 2 (M2)

The second method consisted of research staff handing out the questionnaire (M2). This method was used for 2 weeks in May 2004. Patients with minor injuries/illness were invited to participate by the research staff whilst patients were waiting for treatment (i.e. shortly after entering the emergency room). Patients with more severe injuries/illness were approached after their consultation with the emergency room personnel, by the research staff before or shortly after treatment; the patient then filled in the questionnaire.

4.2.1.3 Method 3 (M3)

The third method collected data retrospectively via a postal questionnaire (M3). All patients aged 12 years and older visiting the emergency room in April 2004 were approached. At the end of the emergency room visit each eligible patient was given a letter to take home with information about the study and the questionnaire. After this (approximately 7 to 10 days after the visit) all patients received a mailed questionnaire at home, accompanied by a second letter with information about the study.

4.2.2 Measures

Data were collected using a combination of self-report and emergency room data. In the first two studies (M1 & M2) emergency room and research personnel were able to score reasons for non-response (physical status and/or mental status, refusal, without sufficient command of the Dutch language) and give their judgement on the patient's alcohol consumption at the time of the emergency room visit. This was done for patients not able to fill in the questionnaire due to their medical condition.

All three methods used an identical questionnaire which addressed the following topics: reason for the emergency room visit (traffic accident, accident, injury/illness, aggression/violence, suicide attempt or self-mutilation), location of accident or illness (home, other people's home, public place, catering establishment, work, school or street), demographic data (cultural background, work and living situation), alcohol use, location of alcohol consumption, licit drug use, illicit drug use and location of illicit drug use. Alcohol use in the 24 hours and 6 hours prior to the visit was asked, as was general alcohol consumption pattern (number of drinking days in the weekend and during the week, average number of consumptions on a drinking day in the weekend and during the week). Based on alcohol consumption the patient was classified as abstainer, moderate drinker, occasional excessive drinker and frequent excessive drinker (Table 4.1). This classification has been used by Lahaut et al. (2002), based on the classification of Garretsen (1983). This classification was used among emergency room patients because data on the relationship between injuries and occasional/frequent excessive drinking are valuable from a prevention point of view, i.e. to identify which alcohol consumers are at risk for injuries.

Table 4.1 Classification of alcohol consumption used in the present study

Classification of alcohol consumption	Frequencies based on drinking 6 or more units in one day
Frequent excessive drinker	Every day More than 3 times/week 2 or 3 times/week
Occasional excessive drinker	Once a week 2 or 3 times/month
Moderate drinker	Once a month Less than once a month Never drinking 6 or more units in one day
Abstainer	Never drinking alcohol at all

Data on all patients visiting the emergency room in the study period were abstracted from the hospital patient database. Information consisted of demographic (gender and age) and emergency room data (date and time of emergency room visit, type of referral to the emergency room, and type of injury/illness). Data from the patient questionnaire and emergency room data were combined using a unique patient number. This resulted in two groups of patients: patients included in the present study with information available from the questionnaire, and patients excluded from the study because they did not fill in the questionnaire. Demographic and emergency room data were available for these two groups of patients.

4.2.3 Statistical analysis

The response and non-response populations for each method were compared regarding demographics, emergency room characteristics and alcohol use, using bivariate cross-tabulation. Chi-square tests were conducted to determine whether included and excluded patients per method differed significantly. The categories of the various variables were tested separately. A Bonferroni correction was used to decrease the possibility of false-positives. Only mean age was compared using a t-test. The different response populations in the three methods were compared using bivariate cross-tabulation. Chi-square tests were conducted to determine whether included patients in the three methods differed significantly. All results were regarded significant at $P < 0.05$, except for those variables with more than two categories, where the Bonferroni correction was applied in which case results were significant at $P < 0.05/n$ (= number of variable categories).

4.3. Results

4.3.1 Response and non-response rates

Table 4.2 gives data on response and non-response in the three study methods. A distinction can be made between "Patient plus Staff report" (i.e. questionnaire filled in by the patient and information on the patient given by emergency room staff or research staff) and "Patient Only report" (i.e. patient completed questionnaire). Data collection through emergency room personnel (M1) leads to the lowest "Patient plus Staff report" (14.6%) and "Patient Only report" (12.6%) response. Research staff responsible for the administration of the patient questionnaire (M2) results in the highest "Patient plus Staff report" response (74.3%), but the "Patient Only report" response (40.0%) is equal to the "Patient Only report" response (40%) of the mail survey (M3). It should be noted that the non-response was not always due to the patient, especially when emergency room staff was responsible for the questionnaire: for example, during urgent medical situations the questionnaire had a low priority and as a result was not always handed out by the staff.

Table 4.2 Response and non-response rates in the three study methods

	Administered by emergency room staff		Administered by research staff		Mail survey	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Patient completed questionnaire	1749	12.6	438	40.0	868	40.0
No questionnaire, reason for non-response	287	2.0	375	34.3	-	-
No questionnaire and no reason	11898	85.4	281	25.7	1303	60.0
Total	13934	100.0	1094	100.0	2171	100.0

4.3.2 Alcohol use

Table 4.3 gives alcohol use prevalence rates 24 hours and 6 hours (self-report, and judgement of emergency room and research staff) prior to the event leading to the emergency room visit and alcohol consumption. It can be seen that the prevalence of alcohol use 24 hours prior to the event is lowest for M3 (17.9%) and highest for M2 (34.2%). Differences were found between M1 and M3 (28.8% vs. 17.9%) and between M2 and M3 (34.2% vs. 17.9%). No significant differences in alcohol use 24 hours prior to the injury were found between M1 and M2.

Self-reported alcohol use 6 hours prior to the event leading to the emergency room visit is lowest for M1 (4.6%) and M3 (4.8%) compared to M2 (9.1%). The self-reported alcohol use 6 hours prior to the event for M2 differs compared to both M1 (P = 0.000) and to M3 (P = 0.004). Self-reported alcohol use and the judgement of emergency room and research personnel combined, results in different prevalence rates of alcohol use 6 hours prior to the event, being 16.2% based on the judgement of emergency room staff and 6.8% based on the judgement of research staff. Emergency room staff judged 84.4% (n = 250) of the 278 patients who were not able to fill in the questionnaire, as being alcohol positive. Research staff only judged 4% (n = 15) of the 375 patients not able to fill in the questionnaire, as being alcohol positive. Regarding alcohol consumption, M3 resulted in significantly higher proportions of abstainers (37.8%) and significantly lower proportions of occasional excessive drinkers (2.6%) compared to both M1 and M2. The highest proportions of occasional excessive drinkers and frequent excessive drinkers are reported in M1 and M2. No significant differences in alcohol consumption were found between M1 and M2.

Table 4.3 Alcohol use prevalence rates reported by the patients in the three study methods

	Administered by emergency room staff (M1) N =1749	Administered by research staff (M2) N = 438	Mail survey (M3) N = 868	Level of significance		
	Percent	Percent	Percent	M1 vs M2	M1 vs M3	M2 vs M3
Alcohol use 24 h prior to injury/illness	28.8% (503)	34.2% (150)	17.9% (156)	NS	0.000	0.000
Alcohol use 6 h prior to injury/illness self-report	4.6% (80)	9.1% (40)	4.8% (42)	0.000	NS	0.004
Alcohol use 6 h prior to visit (self-report and report emergency room/research staff)	16.2% (330) N = 2027	6.8% (55) N = 813	-	0.000	-	-
Alcohol consumption						
Abstainer	24.3%	27.6%	37.8%	NS	0.000	0.001
Moderate drinker	62.1%	55.6%	54.2%	NS	0.000	NS
Occasional excessive drinker	5.8%	8.0%	2.6%	NS	0.001	0.000
Frequent excessive drinker	7.8%	8.8%	5.4%	NS	NS	NS

* significant difference p < 0.05 (Bonferroni correction), NS; non significant

4.3.3 Sample selection bias

Table 4.4 presents the characteristics of the included and excluded patients according to the three study methods. Patients included in the study population of M1 differed significantly from those excluded regarding gender, mean age, age category, time of emergency room visit, and referral to emergency room. In M2 the included patients differed significantly from the excluded patients only regarding part of the week. Significant differences were found between included and excluded patients in M3 regarding sex, mean age, age category and referral to the emergency room.

In addition to the comparison between included and excluded patients per method the included populations were compared regarding each method (not presented in the table), which showed that the included emergency room populations differed significantly on the following variables: gender (more males in M1 compared to M2 and M3), mean age (M1 younger compared to M2 and M3), age category (more patients aged 61 years and older in M3 compared to M1 and M2,

Table 4.4 Characteristics of the patients included and excluded in the three study methods

	Administered by emergency room staff (M1)		Administered by research staff (M2)		Mail survey (M3)	
	Included N = 2036	Excluded N =11898	Included N = 816	Excluded N =278	Included N = 868	Excluded N = 1303
Gender						
M	60.1%	54.1%*	54.2%	48.8%	49.2%	56.9%*
F	39.9%	45.9%	45.8%	51.2%	50.8%	43.1%
Mean age (years)	42.70	47.83*	46.7	47.6	49.03	45.38*
Age category						
12 - 17 years	7.1%	10.4%*	8.5%	12.8%	11.9%	10.1%
18 - 35 years	34.6%	25.0%*	26.9%	21.7%	19.7%	29.9%*
35 - 60 years	37.7%	31.7%*	35.9%	31.7%	33.5%	31.9%
61 years and older	20.6%	32.9%*	28.7%	33.8%	34.9%	28.1%*
Part of the week						
Weekdays	72.8%	73.6%	72.3%	79.7%*	73.3%	72.2%
Weekend (from Fri 24:00-Mon 8:00)	27.2%	26.4%	27.7%	20.3%	26.7%	27.8%
Time of ER visit						
0:00 - 8:00 h	3.9%	10.4%*	8.4%	13.2%	8.2%	7.5%
8:00 - 16:00 h	62.6%	51.1%*	47.7%	50.5%	51.6%	49.6%
16:00 - 24:00 h	33.5%	38.5%*	43.9%	36.3%	40.2%	42.9%
Referral to ER						
Ambulance	4.7%	13.8%*	11.0%	11.7%	13.6%	8.8%*
Own initiative	55.5%	40.7%*	42.3%	33.8%	36.0%	45.6%*
General practitioner	33.3%	40.9%*	42.4%	47.0%	45.4%	40.4%
Other	6.5%	4.6%*	4.3%	7.5%	5.0%	5.2%

* significant difference from the excluded emergency room population $p < 0.05$ (Bonferroni correction)

and in M1 more patients aged 18-35 years compared to M2 and M3), time of the emergency room visit (more patients between 8:00-16:00 hours in M1 compared to M2 and M3) and referral to emergency room (less by ambulance in M1 compared to M2 and M3). M2 and M3 showed the least differences concerning included patients; both methods only differed regarding gender (M2 more males compared to M1), age category (M2 more aged 18-35 years and less aged 61 years and older compared to M3) and referral to the emergency room (less own initiative in M3).

To summarize the results, M1 resulted in a study sample (those included) that has relatively more males, is younger, less patients arriving between 0:00-8:00 hours and less patients frequenting the emergency room by ambulance compared to the excluded population in this method. In M2 the included patient sample only resulted in relatively more patients frequenting the emergency room during weekends compared to those patients excluded. M3 results in an older sample with more females and more referrals by ambulance, but with no variation in part of the week and time of emergency room visit compared to the excluded population. The three methods compared showed that least differences occurred concerning included population between M2 and M3.

4.3.4 Sample characteristics

Table 4.5 presents the characteristics of the study samples in the three methods. M2 included significantly less patients with a Dutch cultural background than M1 and M3. Concerning living situation no differences were found between the three methods concerning patients who live alone and those who live with others. The occupational status and reason for emergency room visit did not differ between M1 and M2, with the exception of M2 including more students compared to M1. M3 included more patients that were retired compared to M1 and M2. Also, more patients in M3 seek emergency treatment as a result of an illness compared to M1 and M2. Among injured patients, less injuries were caused by accidents in M3 compared to M1 and M2.

Table 4.5 Characteristics of response patients per method

	Administered by emergency room staff (M1) N = 1749	Administered by research staff (M2) N = 438	Mail survey (M3) N = 868	Level of significance		
	Percentage	Percentage	Percentage	M1 versus M2	M1 versus M3	M2 versus M3
Cultural background						
Dutch	93.4	88.3	93.1	0.001	NS	0.004
Other than Dutch	6.6	11.7	6.9			
Living situation						
Alone	19.8	17.1	21.8	NS	NS	NS
With others	80.2	82.9	78.2			
Occupational situation						
Employed	57.1	51.8	36.9	NS	0.000	0.000
Unemployed	3.3	2.5	2.9	NS	NS	NS
Disabled	5.1	5.9	6.7	NS	NS	NS
Retired	12.7	12.6	26.3	NS	0.000	0.000
Housekeeping	9.0	7.5	10.5	NS	NS	NS
Student	9.5	15.1	12.1	0.001	NS	NS
Other	3.3	4.6	4.6	NS	NS	NS
Type of medical complaint						
Injury	71.4	67.3	49.4	NS	0.000	0.000
Illness	28.6	32.7	50.6			
Reason for emergency room visit						
Traffic accident	12.9	12.0	10.5	NS	NS	NS
Accident	54.9	51.4	36.5	NS	0.000	0.000
Aggression / violence	3.3	3.4	1.7	NS	NS	NS
Illness	28.6	32.7	50.6	NS	0.000	0.000
Suicide/ self-mutilation	0.3	0.5	0.7	NS	NS	NS

NS; non significant

4.4. Discussion

This is the first study to compare three different types of self-report methods (emergency room personnel, research staff and a mail survey) of alcohol use among emergency room populations. We will first describe the conclusions with respect to the study questions, then discuss the study limitations and recommendations for further research.

Do different self-report methods result in different alcohol prevalence rates?

Alcohol prevalence rates vary between the different self-report methods. Despite these differences, some similarities between the methods are also seen. Alcohol use 6 hours prior to the emergency room visit was reported by approximately 5% of the patients in both M1 and M3. Prevalence of self-reported alcohol use in M2 was 9.1%. When additionally using emergency room and research staff judgements on the patient's alcohol use, prevalence rates are 16.2% (M1) and 6.8% (M2). Despite the lower proportion of self-reported alcohol use 6 hours prior to the visit in M1 compared to M2, results show that emergency room staff identifies relatively more patients under the influence of alcohol compared to the research staff, eventually leading to higher prevalence rates. This is probably due to the selection bias resulting from this method. Using emergency room staff leads to a small sample; however, staff seem to have selected a biased sample with a relatively large proportion of alcohol positive patients. This is illustrated by the large differences in alcohol judgement between emergency room staff and research staff. In the present study, using only patient self-report would have resulted in an underestimation of alcohol prevalence. The mail survey leads to almost the same proportion of self-reported alcohol use (4.8%) as M1 and approximately half the proportion of self-reported alcohol use 6 hours prior to the visit compared to M2. However, with M3 no judgement is possible of the patient's alcohol use by emergency room or research staff. The only other Dutch emergency room study on self-reported alcohol use combined with emergency room staff recognition of alcohol use among victims of traffic accidents reported a prevalence rate of 8% (Kingma et al., 1994). In our study self-reported alcohol use combined with staff recognition of alcohol use was almost twice as high (16.2%). This can be explained by the fact that our study also included all emergency room patients and not only victims of traffic accidents. Emergency room staff was able to identify significantly more patients who were positive for alcohol at the time of the emergency room visit compared to research staff. Alcohol consumption rates show no differences between M1 and M2, but the retrospective study reported a higher proportion of abstainers and less frequent excessive drinkers. In our study another explanation for the lower alcohol consumption rates in M3 are the characteristics of the sample population selected in M3, which included relatively old people.

Are the differences in prevalence rates the result of sample selection bias?
Two out of the three methods resulted in sample selection bias on various demographic and emergency room characteristics. Only method 2 (with research staff available 24 hours) resulted in almost no sample selection bias. Comparing sample selection biases, the methods using emergency room staff (M1) and research staff (M2) show more similarities on demographic variables regarding the included emergency room population compared to the retrospective method (M3), with M1 and M2 including relatively more males and more patients aged 18-60 years. Emergency room staff seem to include more alcohol "suspect" patients: males and patients aged 18-35 years identified by previous studies (e.g. Cherpitel, 1993).

Data collection through emergency room staff (M1) also differed regarding patients included in the study population compared to the other two methods (M2 and M3): regarding emergency room variables, more patients visited the emergency room between 8:00-16:00 hours and less patients arrived at the emergency room by ambulance. The first result can be explained by the fact that during the day more emergency room staff is present. For the second finding the explanation lies in the fact that these are more seriously injured patients, who need direct treatment for injury or illness. Therefore there is less time (or it is not possible) to approach these patients to participate in the study, because they are less eligible to be interviewed, as also pointed out by Treno et al. (1998).

Are there other explanations for these differences in alcohol prevalence rates?
Besides sample selection bias, differences in alcohol prevalence rates can be explained by characteristics of the included population. In contrast to the two research methods using emergency room staff and research staff, use of a retrospective mail survey among an emergency room population seems to select a different emergency room population, including significantly more older people with an age-related referral pattern (more ambulance and GP). As a result, the M3 sample population includes more patients who are retired and who visit the emergency room due to an illness compared to the other two methods. Previous research among the general Dutch population via postal questionnaires show that the response among elderly individuals is higher (Van de Mheen, 1998). It can be assumed that older people and people with an illness are less likely to drink (excessive amounts of) alcohol.

Study limitations
This study has some limitations. The lower response rates in this study compared to other emergency room studies are probably because this study also included seriously injured patients whereas other emergency room studies usually do not include this group of patients. Some studies specifically focus on seriously injured patients, but use blood alcohol concentrations to determine alcohol use.
A second limitation of this study is the difference in study period between the three methods. To make a more accurate comparison the study periods should have been identical. Particularly in the collection of data through emergency room staff, the total period of data collection may have influenced the response rate; a shorter study period would have augmented the response rate. Another possible limitation is the exclusion of patients that were unable to speak the Dutch language. Previous emergency room studies have shown that cultural differences are present regarding alcohol consumption (Cherpitel et al., 2002). Although the exclusion of non-Dutch speaking patients in our study may have influenced prevalence rates, because less than 2% of the patients were unable to fill in the questionnaire this seems unlikely.

Recommendations for further research
Directions for further research on self-report of alcohol use among emergency room populations are the following. Research should focus on the possibility to combine different methods in order to limit sample selection bias; for example, data collection through emergency room staff for specific groups of patients (e.g. seriously injured) combined with research staff for other groups (e.g. milder injured patients).

In this study the most influential factor in the variation in alcohol prevalence rates is sample selection bias as a result of the chosen research method; i.e. a retrospective mail survey among emergency room patients leads to a relatively older sample with more abstainers and therefore lower alcohol consumption 6 hours prior to the emergency room visit. Using the judgement of research staff and especially using emergency room staff results in higher alcohol prevalence rates compared to a retrospective mail survey, or to relying only on patient self-report. As a result of this, variations in alcohol prevalence rates among emergency room studies between and within countries not only result from consumption patterns in a culture or region, but can also be influenced by sample selection. Therefore, unless sample selection bias is controlled for, comparing results between studies and countries should be done carefully. The identification of patients positive for alcohol is done more efficiently by emergency room staff, but results in a biased sample; including more alcohol "suspect" patients. In contrast, the method using research staff is less biased, but it is the most expensive method of data collection in this study. Future emergency room studies on patient's self-reported alcohol use should take into account that the selected method can influence the alcohol prevalence rates. Therefore, future studies should confirm if a combination of research staff handing out the questionnaire and emergency room staff judging patient's alcohol use results in the lowest sample bias and more accurate alcohol prevalence rates.

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Part III

Prevalence of alcohol and illicit drugs among emergency room patients in the Netherlands

Chapter 5

Alcohol and illicit drug use among emergency room patients in the Netherlands

Abstract

Aims: To clarify alcohol and illicit drug use within the emergency room population in three different regions in the Netherlands, focusing on whether interventions for these substances should be region specific.

Methods: Alcohol and illicit drug use were assessed using a self-report questionnaire filled in by the patients, and by combining self-report with staff judgement on alcohol and illicit drug use.

Results: Data on alcohol use (self-reported and staff judgement combined) resulted in prevalence rates of 4.9% to 18.2%. Patients positive for alcohol are more likely to be male, aged 48 to 58 years, more likely to be a frequent excessive drinker, and to have injuries as a result of violence. Patients positive for illicit drugs are more likely to be male, aged 28 to 38 years, unemployed, and frequent excessive drinkers. Among men aged 18-35 years with a Dutch cultural background, some differences emerge regarding alcohol consumption between the various hospitals, but most variation exists in the case of illicit drug use.

Conclusions: This paper confirms that the emergency room seems to provide an opportunity to initiate interventions regarding alcohol use and seems to suggest that this is independent of the region concerned. However, in the case of illicit drug use interventions seem to be more region specific.

5.1. Introduction

Both alcohol and illicit drug use are associated with injuries. In particular, the relationship between alcohol and injuries is well documented (Cherpitel, 1993; El-Guebaly et al., 1998; Cherpitel et al., 2003; Cherpitel et al., 2004). Characteristics of the injured population positive for blood alcohol are: more likely to be male, aged 25 to 45 years, being admitted to the emergency room during the weekend evening or early morning hours (Cherpitel, 1993), and a causal role of alcohol in injuries related to violence has been found (Macdonald et al., 2005). In contrast to alcohol, illicit drug use in relationship to injuries is less well studied, but a possible correlation has been shown (Macdonald et al., 2003; Blondell et al., 2005). A recent review on injury risk associated with cannabis and cocaine use (Macdonald et al., 2003) indicates their relationship with intentional injuries and injuries in general among non-clinical samples. Among emergency room patients illicit drug use seems to be more common in men aged 20-40 years and is strongly associated with violence-related injuries (Vitale and Van de Mheen, 2006). Different associations between monthly and lifetime drug use and emergency room visits have been established, whereby monthly drug use was associated with emergency room treatment for illness (Cherpitel, 1999), and 'lifetime' illicit drug use was associated with injury (Chipman, 1995). Alcohol use also plays an important role in traffic accidents, and illicit drugs and certain medicinal drugs are known to impair driving skills and can increase crash risk (EMCDDA, 1999). The combination of illicit drug and alcohol use negatively influences driving behaviour (Del Rio and Alvarez, 1995), and both illicit and licit drugs influence driving skills (Schmitt et al., 2002). Results from emergency room studies differ between studies and between countries (Cherpitel, 1993). Comparative findings on the association between alcohol and casualties across countries and cultures appear to reflect usual drinking patterns within the countries concerned (Cherpitel, 1993); therefore, information from different countries is needed. The Netherlands lacks complete data on alcohol and illicit drug use among emergency room patients. Because the associations between substance use and injuries can differ between countries and between cities in the same country (Buss et al., 1995; Cherpitel et al., 2004), this is the first study to explore emergency room data on substance use from three different hospitals in three different cities in the Netherlands. In addition, because of the expected variations in emergency room populations (Cherpitel et al., 2004), the risk group of men aged 18 to 35 years with a Dutch cultural background was selected based on findings from previous studies (Cherpitel, 1993; Vitale and Van de Mheen, 2006) and was further explored regarding the characteristics of alcohol and illicit drug use characteristics. This contributes to the international emergency room literature by elucidating the influence of demographic differences between hospital samples, and allows more conclusions to be drawn about regional differences. The positive identification of patients under the influence of alcohol and illicit drugs in the emergency room is necessary for appropriate treatment and to develop suitable intervention programmes. Outside the Netherlands, brief counselling interventions for alcohol use have proven effective (Longabagaugh et al., 2001; Woolard et al., 2003; Crawford et al., 2004). However, before developing such intervention programmes in the Netherlands, more data are required on whether these interventions should be region specific. Therefore, the present study also explores this topic by comparing the different regions involved.

5.2. Methods

5.2.1 Data collection

This study was conducted at three emergency rooms in different parts of the Netherlands, and involved the participation of one university hospital (Erasmus Medical Center) and two general hospitals (Meander Medical Center and Scheper Ziekenhuis). The Meander Medical Center (MMC) in Amersfoort (about 130,000 inhabitants) is located in the central part of the Netherlands and its emergency room has about 35,000 patients per year. The Scheper Ziekenhuis Emmen (SZE) is located in a city (about 100,000 inhabitants) to the north and the emergency room sees about 12,000 patients a year. The Erasmus Medical Center (EMC) is located to the west in the city of Rotterdam (about 600,000 inhabitants) and the emergency room sees about 24,000 patients a year.
The medical review boards of the hospitals involved approved the study protocol. Data collection in the MMC took place from July 2003 to May 2004; in the SZE from August 2003 to April 2004; and in the EMC during 7 consecutive weeks in November and December 2004. All research sites used the same inclusion/exclusion criteria and measurements. Patients, aged 12 years and older, treated in the emergency room for injuries or illness were included; excluded were those attending for a control visit and those without sufficient command of the Dutch language.
Instruction on the study procedures was given to the emergency room and research staff by the main researcher. The researchers made site visits to check these procedures. Due to organisational differences between the three hospitals there was some variation in the research procedure. In the SZE and EMC administrative staff were present at the emergency room entrance, so in these two hospitals patients were approached in two ways. Patients with minor injuries/illnesses meeting the inclusion criteria were given a questionnaire by the administrative staff shortly after entering the emergency room; the questionnaire was then completed in the waiting room. Patients with more serious/severe injuries/illness were approached in the treatment room by the staff before or shortly after treatment; the patient then filled in the questionnaire. In the MMC, because administrative staff was not available 24 hours a day at the entrance of the emergency room, research staff was hired (24 hours a day) to approach patients for this study. In this procedure, research staff handed out the questionnaire. Patients with minor injuries/illness were approached to participate whilst waiting for treatment (i.e. shortly after entering the emergency room). Patients with more severe injuries/illness were approached after consultation of the emergency room personnel by the research staff before or shortly after treatment; the patient then filled in the questionnaire.

5.2.2 Questionnaire

A patient questionnaire was used in order to obtain more detailed information about the patient's substance use. Studies have concluded that self-report is a valid method to measure alcohol use prior to the injury event (Cherpitel, 1993; El-Guebaly et al., 1998; Treno et al., 1998; Vitale et al., 2006). The questionnaire contained a number of demographic data including cultural background and occupational situation. Cultural background was defined as being either from native Dutch origin, or other. Occupational situation included: employed, unemployed, disability pension, retirement, housekeeping, student, and other. Age, gender, and the time of entering the ER was registered, as well as the day of the week. Reason for visit was either injury or illness, while type of visit included traffic accident, accident, violence, illness, suicide attempt/self mutilation. Location of accident could be either at home, in public or other, and referral could be: ambulance, own initiative, general practitioner or other.
Alcohol: patients were asked for their use of alcohol within 6 and 24 hours prior to their injury/illness event, as well as the location of consumption. Apart from these questions about the acute use of alcohol, general alcohol consumption pattern was analysed as well (number of drinking days in the weekend and during the week, and average number of consumptions on a drinking day in the weekend and during the week). Frequencies are based on drinking 6 or more units (1 unit is equivalent of 1 glass of beer, wine or spirit, and this is about 8-10 grams of pure ethanol) in one day. Based on this pattern, patients were classified as abstainers (never drinking alcohol at all), moderate drinkers (once a month; less than once a month; never drinking 6 or more units in one day), occasional excessive drinkers (once a week; 2 or 3 times/month) and frequent excessive drinkers (every day; more than 3 times/week; 2 or 3 times/week). This classification was introduced by Garretsen in 1983 and has proven useful in other studies (Lahaut et al., 2002;Van Dijck and Knibbe, 2005).
Illicit drug use: The questionnaire asked about the use of cannabis, amphetamins, ecstacy, heroin, cocaine, hallucinogenics, hydroxybutyric acid (GHB) and methadone 24 hours prior to the injury/illness as well as the use of these drugs during the previous year.
Staff judgement on patients' alcohol and illicit drug use was included to obtain information on alcohol and illicit drug use among those patients that are unable to fill in the questionnaire due to their medical condition. Self-reported substance use and together with staff judgement on substance use is considered to be more accurate than self-report alone (El-Guebaly et al., 1998).

5.2.3 Data analysis

Patients with a questionnaire (Q+) and those without a questionnaire (Q-) available were compared on demographics and emergency room characteristics using bivariate cross-tabulation. Data on the Q+ patients were analysed after distinguishing between injured (intentional and unintentional) and non-injured (illness) patients; between alcohol positive patients (alcohol use less than 6 hours prior to the onset of illness or injury event) and alcohol negative (no alcohol for more than 6 hours prior to the onset of illness or injury event) and between patients using illicit drugs (24 hours prior

to the the onset of illness or injury event) and not using illicit drugs (no illicit drug use for more than 24 hours prior to the onset of illness or injury event). Prevalence rates of alcohol use, alcohol consumption and licit/illicit drug use were estimated using frequency statistics. Data from each hospital were analysed separately when comparing alcohol positive/negative patients, and illicit drug positive/negative patients. Data on patients positive for alcohol and illicit drug use are based on self-report and staff judgement combined. Information obtained from the questionnaire was not available for those patients for whom staff judgement alone was used. This resulted in differing numbers of patients, because for those patients who were judged on their substance use solely by the staff, no information from the questionnaire was available. Data were compared using bivariate cross-tabulation, and chi-squared and Fisher's exact tests (used for cells with less than 5 respondents) were used to determine significance. All results were regarded significant at $P < 0.05$, except for those variables with more than two categories, where the Bonferroni correction was applied in which case results were significant at $P < 0.05/n$ (= number of variable categories).

5.3. Results

5.3.1 Response rates

Although it was the intention to hand out questionnaires to all patients older than 12 years of age (excluding control visits), only a minority of the patients in the three hospitals received the questionnaire: EMC 30.3%, MMC 19% and SZE 36.6% respectively (not shown in table). The main reasons for these low figures were non-availability of secretarial assistance (evenings and nights) understaffing of ER personnel, other priorities and/or reserve of ER personnel to hand out the questionnaire. The highest rate was reached when patients were approached by administrative staff not involved in ER activities (SZE). Of those patients that were approached, about 80% consented to participate in the study and filled in the questionnaire. The main reasons for patients (that were approached) not filling in the questionnaire were: medical condition (46.3-75.1%), refusal (11-32%), and insufficient command of the Dutch language (5.1-30.3%). Comparing patients who filled in the questionnaires (Q+) with those who did not (Q-), Q+ patients were more likely to be male, younger, visiting the ER during the daytime, being referred by a GP, and not brought in by ambulance.

5.3.2 Alcohol

Table 5.1 presents prevalence rates for alcohol and illicit drug use prior to the injury/illness event (< 6 and 24 hours, respectively). Based on self-report the prevalence ranges from 5.5% (MMC) to 11.4% (EMC and SZE). Combined with staff judgement, the prevalence rate increases to 11.3-18.2%. General alcohol consumption patterns among these ER visitors show excessive drinking (occasional and frequent) ranging from 11% in the SZE to 15.8% in the EMC, with only the percentage of occasional excessive drinkers being higher in the EMC compared to the SZE. The percentage of abstainers and moderate drinkers varied between the three hospitals. Characteristics of the patients positive for alcohol use prior to the ER visit are given in Table 5.2. Alcohol positive (A+) patients are likely to be males rather than females with a mean age ranging from 32.7 years (EMC) to 58 years in the SZE. In the northern more rurally situated Scheper Ziekenhuis, unexpectedly, relatively more women and older age were observed than in the other two hospitals; in that hospital alcohol positive patients were more likely to be unemployed (12.4% vs. 3.7%) compared to alcohol negative patients. No differences were found with regard to cultural background and occupational situation in the other hospitals. Compared to alcohol negative (A-) patients, visits of A+ patients to the ER were more often made during evening/night hours and during the weekends. In case of an injury the percentage of A+ patients was significantly higher than that of A- patients in two of the three hospitals, and in all hospitals this was the case for injuries as a result of violence. A+ patients were more likely to be brought in by ambulance (MMC and SZE), while especially in the EMC injuries mostly took place in public locations (67.4% vs. 26.4%) (not shown in table). Alcohol was mostly consumed outdoors. In all hospitals the A+ group scored higher than the A- group with regard to frequent excessive drinking and illicit drug use during the previous year, with the difference in the EMC not being statistically significant.

Table 5.1 Alcohol and illicit drug use prevalence rates reported in the three emergency rooms

	Hospitals			Level of significance		
	MMC N = 2849/ n = 2094	SZE N = 2787/ n = 506	EMC N = 879/ n = 675	MMC Vs SZE	MMC Vs EMC	SZE Vs EMC
Self-reported alcohol use (6h)	5.5% (120)	11.4% (102)	11.4% (77)	0.000	0.000	NS
Alcohol use (self-report 6h and staff)	13.6% (385)	18.2% (506)	11.3% (99)	0.000	NS	0.000
Alcohol consumption						
Abstainer	25.0% (475)	38.6% (744)	30.1% (168)	0.000	0.012	0.000
Moderate drinker	60.8% (1155)	50.4% (970)	54.1% (303)	0.000	0.004	NS
Occasional excessive drinker	6.3% (119)	4.8% (92)	8.6% (48)	NS	NS	0.001
Frequent excessive drinker	8.0% (152)	6.2% (120)	7.2% (40)	NS	NS	NS
Self-reported illicit drugs (24h)	2.8% (55)	1.4% (28)	10.1% (65)	0.002	0.000	0.000
Illicit drug use (self-report 24h and staff)	3.3% (80)	1.8% (50)	8.1% (71)	0.001	0.000	0.000
Illicit drug use past year	6.7% (120)	3.1% (55)	18.7% (116)	0.000	0.000	0.000

* significant difference $p < 0.05$ (Bonferroni correction), NS; difference not significant

Table 5.2 Characteristics of patients positive for alcohol (< 6 hours alcohol prior to visit) (A+) and patients negative for alcohol (A-) (self-report and staff judgement combined)

	MMC		SZE		EMC	
	A+ N = 385	A- N = 2228	A+ N = 500	A- N = 2249	A+ N = 80	A- N = 710
Gender (% Men)	65.5% (252)	57.2* (1404)	52.0% (260)	53.2% (1196)	78.4% (69)	57.0%* (410)
Mean age (years)	48.0	41.2*	58.0	51.8*	32.7	38.3*
Age category						
12 – 17 years	3.6% (14)	8.0%* (197)	3.8% (19)	7.2%* (161)	1.1% (1)	5.1% (37)
18 – 24 years	13.5% (52)	14.3% (351)	6.6% (33)	7.0% (158)	33.0% (29)	21.7% (156)
25 – 35 years	16.9% (65)	18.5% (453)	8.6% (43)	12.3% (276)	29.5% (26)	26.7% (192)
36 – 60 years	35.1% (135)	37.5% (921)	31.0% (155)	34.0% (764)	33.0% (29)	32.8% (236)
61 years and older	30.9% (119)	21.7%* (533)	50.0% (250)	39.6%* (890)	3.4% (3)	13.6%* (98)
Cultural background (% Dutch)	95.7% (111)	92.2% (1888)	95.3% (102)	97.3% (2165)	68.8% (55)	60.0% (366)
Occupational situation						
Employed	67.8% (78)	55.4% (1126)	41.0% (43)	33.6% (743)	50.6% (40)	49.9% (305)
Unemployed	1.7% (2)	3.2% (65)	12.4% (13)	3.7%* (81)	15.2% (12)	9.8% (60)
Part of the week (% Weekdays)	67.8% (261)	73.5%* (1805)	69.0% (345)	73.6%* (1655)	50.0% (44)	70.8%* (509)
Time of ER visit						
0:00-8:00 h	12.5% (48)	4.0%* (98)	20.2% (101)	7.4%* (166)		
8:00-16:00 h	40.8% (157)	61.1%* (1501)	41.2% (206)	60.1%* (1352)	Data not available	
16:00-24:00 h	46.8% (180)	34.9%* (856)	38.6% (193)	32.5%* (731)		

Referral to ER						
Ambulance	17.1% (66)	4.8%* (118)	24.8% (124)	10.1%* (227)		
Own initiative	43.9% (169)	52.9%* (1299)	2.2% (11)	4.6% (103)	Data not available	
GP	35.3% (136)	36.0% (884)	59.6% (298)	68.7%* (1546)		
Other	3.6% (14)	6.3% (154)	13.4% (67)	16.6% (373)		
Reason for visit (% Injury)	85.1% (103)	69.5%* (1425)	46.5% (47)	39.3% (839)	82.5% (66)	57.5%* (341)
Type of visit						
Traffic accident	19.8% (24)	12.2% (251)	13.9% (14)	7.1% (152)	12.5% (10)	13.5% (80)
Accident	49.6% (60)	54.4% (1115)	24.8% (25)	30.3% (647)	38.8% (31)	37.9% (225)
Violence	14.0% (17)	2.6%* (53)	6.9% (7)	1.4% * (29)	31.3% (25)	4.9%* (29)
Illness	14.9% (18)	30.5%* (624)	53.5% (54)	60.7% (1295)	17.5% (14)	42.5%* (252)
Suicide/ self-mutilation	1.7% (2)	0.3% (6)	1.0% (1)	0.5% (11)	0% (0)	1.2% (7)
Illicit drug use 24 h	3.0% (11)	3.3% (69)	1.0% (5)	2.0% (45)	16.2% (16)	7.1%* (55)
Illicit drug use last year	14.3% (14)	6.2%* (104)	10.3% (8)	2.8%* (47)	26.0% (20)	17.6% (96)
Alcohol consumption						
Abstainer	0% (0)	26.3%* (469)	0% (0)	40.7%* (744)	0% (0)	34.9%* (168)
Moderate drinker	62.0% (67)	61.0% (1089)	66.7% (66)	49.5%* (904)	62.8% (49)	52.8% (254)
Occasional excessive drinker	13.9% (15)	5.8%* (104)	6.1% (6)	4.7% (86)	16.7% (13)	7.3% (35)
Frequent excessive drinker	24.1% (26)	6.9%* (123)	27.3% (27)	5.1%* (93)	20.5% (16)	5.0%* (24)

* significant difference between injured and non-injured patients $p < 0.05$

Table 5.3 Characteristics of patients positive for illicit drug use (D+) and patients negative for illicit drug use (D-) (self-report and staff judgement combined)

	MMC		SZE		EMC	
	D+ N = 80	D- N = 2361	D+ N = 49	D- N = 2700	D+ N = 63	D- N = 744
Gender (% Men)	76.3% (61)	59.7* (1410)	63.3% (31)	52.8% (1425)	65.1% (41)	58.9% (438)
Mean age (years)	30.1	42.6*	37.9	53.2*	30.4	38.3*
Age category						
12 – 17 years	6.3% (5)	7.9% (187)	2.0% (1)	6.6% (179)	1.6% (1)	5.0% (37)
18 – 24 years	35.0% (28)	14.9%* (351)	24.5% (12)	6.6%* (179)	30.2% (19)	22.3% (166)
25 – 35 years	35.0% (28)	18.6%* (439)	22.4% (11)	11.4% (308)	41.3% (26)	25.8% (192)
36 – 60 years	21.3% (17)	38.1%* (899)	42.9% (21)	33.3% (898)	27.0% (17)	33.3% (248)
61 years and older	2.5% (2)	20.5%* (485)	8.2% (4)	42.1%* (1136)	0%	13.6%* (101)
Cultural background (% Dutch)	92.6% (50)	92.5% (1926)	90.3% (28)	97.3% (2239)	52.3% (34)	61.9% (387)
Occupational situation						
Employed	55.6% (30)	56.4% (1166)	38.7% (12)	33.9% (774)	38.5% (25)	51.2% (320)
Unemployed	13.0% (7)	2.9%* (59)	22.6% (7)	3.8%* (87)	30.8% (20)	8.3%* (52)
Part of the week (Weekdays)	60.0% (48)	72.8%* (1719)	63.3% (31)	72.9% (1669)	65.1% (41)	68.8% (512)
Time of ER visit						
0:00-8:00 h	20.0% (16)	4.0%* (95)	26.5% (13)	9.4%* (254)		
8:00-16:00 h	45.0% (36)	60.1%* (1418)	36.7% (18)	57.0%* (1540)	Data not available	
16:00-24:00 h	35.0% (28)	35.9% (848)	36.7% (18)	33.6% (906)		
Referral						
Ambulance	20.0% (16)	4.4%* (103)	32.7% (16)	12.4%* (335)		
Own initiative	62.5% (50)	54.4% (1284)	6.1% (3)	4.1% (111)	Data not available	
GP	15.0% (12)	34.7%* (819)	42.9% (21)	67.5%* (1823)		
Other	2.5% (2)	6.6% (155)	18.4% (9)	16.0% (431)		
Reason for visit (% Injury)	83.3% (45)	70.6%* (1474)	56.7% (17)	39.4% (869)	58.7% (37)	60.7% (370)
Type of visit						
Traffic accident	18.5% (10)	12.6% (263)	20.0% (6)	7.3% (160)	14.3% (9)	13.3% (81)
Accident	48.1% (26)	54.7% (1142)	30.0% (9)	30.1% (663)	33.3% (21)	38.5% (235)
Violence	16.7% (9)	3.0%* (62)	6.7% (2)	1.5% (34)	9.5% (6)	7.9% (48)
Illness	16.7% (9)	29.4% (614)	43.3% (13)	60.6% (1336)	41.3% (26)	39.3% (240)
Suicide/ self-mutilation	0%	0.3% (7)	0%	0.5% (12)	1.6% (1)	1.0% (6)
Illicit drug use last year	8.5% (4)	4.4%* (76)	80.8% (21)	1.9%* (34)	100.0% (65)	9.2%* (51)
Alcohol use 6h	13.8% (11)	15.3% (360)	10.0% (5)	18.3% (501)	22.5% (16)	10.3%* (83)
Alcohol consumption						
Abstainer	18.0% (9)	24.7% (455)	25.9% (7)	38.8% (737)	16.9% (10)	31.6% (158)
Moderate drinker	42.0% (21)	61.6%* (1133)	48.1% (13)	50.4% (957)	49.2% (29)	54.8% (274)
Occasional excessive drinker	18.0% (9)	6.0%* (111)	3.7% (1)	4.8% (91)	13.6% (8)	8.0% (40)
Frequent excessive drinker	22.0% (11)	7.6%* (140)	22.2% (6)	6.0%* (114)	20.3% (12)	5.6%* (28)

* significant difference between injured and non-injured patients $p < 0.05$

5.3.3 Illicit drug use

Self-reported drug use 24 hours prior to the injury/illness ranged from 1.4% in SZE to 10.1% in EMC (Table 5.1). Prevalence rates did not increase when staff judgement was included. Drugs most frequently used were cannabis and cocaine with hard drugs more prevalent in the EMC (not shown in table). Illicit drug use during the previous year was also more prevalent in the EMC than in the other hospitals (18.7% vs. 3.1 and 6.7%, respectively). All three hospitals showed differences regarding illicit drug use (self-report, self-report combined with staff judgement) and illicit drug use in the previous year, with the highest percentages in the EMC and the lowest percentages in the SZE. Characteristics of patients positive for illicit drug use <24 hours prior to the injury/illness event are given in Table 5.3. In all hospitals, illicit drug positive (D+) patients were younger (18-35 years) than the drug negative (D-) patients and are more likely unemployed. D+ patients mostly arrived during the night hours and in 30-50% this was because of an injury other than a car accident. In 50-60% this injury or illness occurred at home (not shown in table). In all three hospitals D+ patients were more likely to have used drugs during the previous year than D- patients, and 75% of them consumed these drugs at home (not shown in table). D+ patients were also more likely to be excessive alcohol consumers.

5.3.4 Risk group for substance use prior to the ER visit: men aged 18-35 years, Dutch cultural background

Table 5.4 shows that alcohol use 6 hours prior to the injury, based on self-report and staff judgement combined, ranged from 10-20%. Differences emerged between the three hospitals, with the EMC showing higher alcohol prevalence compared to the other two hospitals. Among the group of men aged 18-35 years with a Dutch cultural background, around 30-40% can be classified as excessive drinkers, showing no differences between the hospitals. Illicit drug use (self-report and staff judgement) ranged from almost 5% (SZE) to 14% in the EMC. Illicit drug use in the previous year ranged from 11-26%. Differences were found among the three hospitals, with the EMC showing both more illicit drug use during the 24 hours prior to the injury and more illicit drug use in the previous year.

Table 5.4 Characteristics of men aged 18-35 years with a Dutch cultural background from the three emergency rooms

	Hospitals			Level of significance		
	MMC	SZE	EMC	MMC Vs SZE	MMC Vs EMC	SZE Vs EMC
Self-reported alcohol use (6h)	9.9% (47)	16.4% (22)	20.4% (22)	0.044	0.004	NS
Alcohol use (self-report 6h and staff)	10.3% (49)	9.1% (22)	20.0% (22)	NS	0.009	0.008
Alcohol consumption						
Abstainer	11.8% (54)	12.3% (28)	11.8% (12)	NS	NS	NS
Moderate drinker	57.1% (261)	47.1% (107)	58.8% (60)	NS	NS	NS
Occasional excessive drinker	13.3% (61)	20.3% (46)	14.7% (15)	NS	NS	NS
Frequent excessive drinker	17.7% (81)	20.3% (46)	14.7% (15)	NS	NS	NS
Self-reported illicit drugs (24h)	7.0% (32)	4.5% (10)	14.3% (15)	NS	0.030	0.003
Illicit drug use (self-report 24h and staff)	6.6% (31)	4.1% (10)	13.6% (15)	NS	0.018	0.003
Illicit drug use past year	16.0% (69)	10.7% (23)	26.2% (27)	NS	0.022	0.001

* significant difference $p < 0.05$ (Bonferroni correction), NS; difference not significant

5.4 Discussion

The present study shows that from all patients looking for medical help at an emergency room in a Dutch hospital, 11-18% has used alcohol within 6 hours prior to their injury/illness event. These percentages are relatively consistent for the hospitals studied irrespective of the size, type (university, regional or local) and location in the Netherlands. In contrast to alcohol, illicit drug use 24 hours prior to the ER visit ranged from 1.4% in a rural area to 10.1% in the city of Rotterdam. Patients positive for alcohol are more likely to be male, aged 36-60 years, more likely to be excessive drinkers, and to have an injury as a result of violence. Patients positive for illicit drug use are younger compared to patients positive for alcohol, and are 28-38 years of age, unemployed, and frequent excessive drinkers. Studies on alcohol use among ER populations in countries like the United States and United Kingdom report similar alcohol prevalence rates (El-Guebaly et al., 1998). The present study shows that, even within a small country like the Netherlands, large variations exist between ER samples and, as a result, variations also exist regarding alcohol and illicit drug prevalence rates and patient characteristics. This is confirmed by the finding that, also among the specific risk group of men aged 18-35 years with a Dutch cultural background, differences between

the three hospitals emerge. Therefore, differences between regions are not only due to different demographic characteristics of the ER population. Despite this, no differences exist between the hospitals regarding general alcohol consumption, and alcohol use prior to the injury/illness varies. Regarding illicit drug use, the differences between hospitals are more pronounced. These findings on alcohol and illicit drug use among ER populations suggest that data from three different hospitals from three different regions in one country do not represent data for the whole country.

The present study was not designed to detect a causal relationship between the use of alcohol and/or drugs and ER visit, but rather to look for specific characteristics of the users. However, certain data do suggest such a relationship, with alcohol positive visitors being more likely to be excessive drinkers and to use drugs than those negative for alcohol. Injuries (especially those resulting from violence) were more prevalent in the alcohol positive group. Such a causal role for alcohol in violent acts has been reported recently by others (Macdonald et al., 2005; Cherpitel et al., 2005). Although a higher incidence of accidents, especially car accidents, has been attributed to the use of alcohol (ELDD, 2003; Kurzthaler et al., 2003; Ramaekers et al., 2004), this association was not found in our study. This may be the result of a more reserved attitude of the Dutch population in recent years towards drinking and driving, but may also be due to study bias. Study bias can occur because in critical situations involving considerable work and pressure on the ER team (e.g. due to traffic accidents with many people) the handing out of questionnaires as well as judging and filling in the forms obviously has a low priority. In those situations patients themselves are often not able to fill in the forms, while bystanders do not feel competent to offer adequate judgement. Because alcoholic drinks are most frequently consumed during evenings and in the weekends, the higher rate of alcohol positive persons arriving during the evening/night hours and in the weekends was not a surprise.

ER visits by illicit drug users seems to be much more concentrated in the western part of the Netherlands reflecting differences in population characteristics compared with the rest of the land. In the EMC, drug positive patients were seen during all parts of the day whereas in the other two hospitals (representing another part of the Netherlands) such patients were mostly seen during the night (0.00-8.00 a.m.). Cannabis was the most frequently reported drug followed by cocaine, which is in accordance with reports from other western nations (Macdonald et al., 2003; Vitale and Van de Mheen, 2006).

A positive answer concerning the use of drugs within the 24 hours prior to the visit seems predictive for chronic use and also for excessive alcohol consumption. It was remarkable that in most cases (and in contrast to general public ideas) the drugs were used at home where the problems leading to ER visit also arose. However there is no really clear association between injury/illness characteristics and drug use, a finding also reported by others (Blondell et al., 2005; Vitale and Van de Mheen, 2006).

A limitation of the present study is the low response rate at all sites, which led to selection bias because not all eligible patients could be interviewed, e.g. fatally and seriously injured patients. This type of sample selection bias was also identified by Treno et al. (1998). Previous studies did not find a relationship between injury severity and substance use (Cherpitel, 1993; Vitale and Van de Mheen, 2006). The present sample most probably was not biased regarding the main objective of this study; i.e. alcohol and illicit drugs prevalence rates.

The best results are obtained when questionnaires are handed out either by a special team not involved in ER activities or by motivated secretarial personnel. Because nursing and medical staff are heavily involved in medical care they may not find time for the questionnaires, although they are better than research staff in judging the involvement of alcohol or drugs (Vitale et al., 2005). Furthermore, they may find it difficult to broach topics such as alcohol or drug use, especially in case of fatalities or aggressive behaviour from ER visitors. When the patients are handed a questionnaire they tend to be very cooperative, as reflected in the response rate of 80% in this study.

The results of this study stress the importance of prevention activities, since particularly alcohol use places a considerable burden on healthcare facilities (such as ERs and ambulances) as well as on budgets. Because of the low prevalence rates of illicit drug use and the indistinct relationship between types of injuries/illnesses and drugs, it is not yet clear whether such an approach is also useful in case of drug use. Based on the characteristics found, the ER is a location where patients with alcohol problems can be identified. In particular, our data show that more variation exists between the regions regarding illicit drug use compared to alcohol use. This may suggest that interventions on alcohol use can be initiated in all hospitals and focus on men aged 18 to 35 years with a Dutch cultural background, because almost 40% of this group is an excessive drinker. Interventions aimed at illicit drug use should focus more specifically on hospitals serving an at-risk region and population; this may initiate interventions already proven effective (Longabagaugh et al., 2001; Woolard et al., 2003; Crawford et al., 2004) using motivational interviewing techniques. However, because this study shows that the contact between emergency room staff and the patients is brief and does not provide an occasion to talk about a patient's alcohol or illicit drug use, interventions should not take place during the emergency room visit, but after the medical treatment has taken place.

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Chapter 6

Substance use among emergency room patients; identifying predictive factors for the visit

Abstract

Aims: The aim of this study is to identify predictive factors (demographic, emergency room and substance use characteristics) for patients positive for substance use when entering the emergency room.

Methods: Data from the emergency room and patients' self-report on substance use from four different hospitals were combined.

Results: This study shows that the time of emergency room visit (between 16:00 and 8:00 h), the type of referral to the emergency room (by ambulance), being a frequent excessive drinker, drinking in public places and illicit drug use 24 hours prior to the injury/illness were positively associated with having used alcohol prior to the injury/illness event leading to the emergency room visit. For illicit drug use, positive associations were found with age (being between 18 and 35 years), being unemployed, part of the week (weekdays), time of the emergency room visit (between 8:00 and 16:00 h), alcohol use 6 hours prior to the injury and being a occasional excessive drinker.

Discussion: The emergency room seems a location where identification of a patient's alcohol and illicit drug use prior to the injury/illness event can take place; however, identifying specific risk groups is difficult. Alcohol interventions initiated at the emergency room might be cost-effective, but this remains more doubtful in the case of illicit drug use.

6.1 Introduction

Substance use has been associated with injuries in general (Cherpitel, 1993; El-Guebaly et al., 1998; Macdonald et al., 2003; Blondell et al., 2005) and, more specifically, with violence (Buss et al., 1995; Borges et al., 1998; Macdonald et al., 1999; Boles and Miotto, 2003; Cunningham et al., 2003;

Macdonald et al., 2005), and with traffic accidents (Del Rio and Alvarez, 2000; Del Rio et al., 2002; Weber et al., 2002; ELDD 2003; Kurzthaler et al., 2003; Ramaekers et al., 2004). Stronger associations have been found between alcohol and injuries than between illicit drug use and injuries. It has been reported that the injured population positive for blood alcohol are more likely to be male, aged 25 to 45 years and to be admitted to the emergency room during the weekend evening or early morning hours (Cherpitel 1993). Emergency room patients positive for illicit drug use are more likely to be males, aged 20 to 40 years, whereas no association with the day and time of the emergency room visit has been found (Vitale and Van de Mheen, 2006). In addition, no association has been found between injury severity and substance use (Cherpitel, 1993; Vitale and Van de Mheen, 2006). Identifying emergency room patients under the influence of substance use can serve two main purposes. First, to assess the type and level of intoxication during the patient's initial treatment (e.g. to avoid drug interactions). Second, to refer patients for (further) substance use intervention, or to initiate the intervention. This type of injury treatment offers a good opportunity for this because patients are directly confronted with the negative consequences of their substance use. Earlier studies of interventions on substance use among emergency room patients have shown that brief interventions are particularly effective (Dunn et al., 2001; Longabagaugh et al., 2001; Crawford et al., 2004; Kunz et al., 2004). An important factor in providing an effective brief intervention is the selection of patients with alcohol and/or illicit drugs-related injuries. Apart from identifying these patients in order to reduce substance use, information on the event leading to the injury may help to prevent further injuries. Therefore, this study aimed to identify predictive factors for being positive for substance use when entering the emergency room based on self-reported information.

6.2 Methods

6.2.1 Data collection

Data for this study were obtained from a study on substance use among emergency room patients conducted at four emergency rooms in the Netherlands between July 2003 and December 2004. Two university hospitals; i.e. Erasmus MC in Rotterdam (EMC) and the University Hospital in Maastricht (AZM), and two general hospitals; Meander MC in Amersfoort (MMC) and Scheper Ziekenhuis Emmen (SZE) participated. The EMC is in the western part of the Netherlands, the AZM in the south, the SZE in the north, and the MMC is situated in the centre of the country. The medical review boards of the four hospitals approved the study protocol.

All research sites used the same inclusion/exclusion criteria and identical measures. Patients treated in the emergency room for injuries or illness were included; excluded were those attending for a control visit, and/or those younger than 12 years. Patients were approached either by the

emergency room staff or by the research staff. A previous study showed that being approached by either type of staff has no effect on the self-reported alcohol prevalence rates (Vitale et al., 2005). Patients with minor injuries/illnesses meeting the inclusion criteria were given a questionnaire by the staff shortly after entering the emergency room; the questionnaire was then completed in the waiting room. Patients with more serious/severe injuries/illness were approached in the treatment room by the staff before or shortly after treatment; the patient then filled in the questionnaire.
The reasons for non-participation were recorded by the staff as being: due to the medical condition, refusal, or insufficient command of the Dutch language.

6.2.2 Measurements

Data were collected using a combination of patient self-report and emergency room data. A self-report questionnaire was used because self-report of alcohol consumption has been proven a valid method to measure alcohol use prior to the injury event (Cherpitel, 1993; El-Guebaly et al., 1998; Treno et al., 1998), and self-report provides more accurate information on actual illicit drug use compared to biochemical markers (Vitale et al., 2006).
The patient questionnaire used was identical in each hospital and addressed the following topics: reason for the emergency room visit (traffic accident, accident, injury/illness, aggression/violence, suicide attempt or self-mutilation), location of the accident or illness (home, other people's home, public place, catering establishment, work, school or street), demographic data (cultural background, work and living situation), alcohol use, location of alcohol consumption, licit drug use, illicit drug use and location of illicit drug use. Location of alcohol and illicit drug use was divided into public use (public place, catering establishment, or on the street), and home use (at one's own home, the home of others, or at work or school).
Alcohol use in the 24 hours and in the 6 hours prior to the visit was asked, as well as the general alcohol consumption pattern (number of drinking days in the weekend/during the week, average number of consumptions on a drinking day in the weekend/during the week). Based on the quantity and frequency of the alcohol consumption the patient was classified as an abstainer, moderate drinker, occasional excessive drinker or frequent excessive drinker. Illicit drug use. The questionnaire also asked about the use of marijuana, cocaine, amphetamines, ecstasy, heroin, hallucinogenics, GHB and methadone 24 hours prior to the visit, as well as consumption of these illicit drugs during the past 4 weeks and during the past year.
Information on main demographic data (gender and age) and emergency room data (date and time of emergency room visit, type of referral to the emergency room) were retrieved from the hospital database for all patients visiting the emergency room during the study period. In one hospital data on the type of referral to and time of the emergency room visit were not registered in the emergency room database. Data from the patient questionnaire and emergency room data were combined using the unique patient identification number. This resulted in two groups of patients: patients who filled in a questionnaire, and patients that did not fill in the questionnaire. For both groups demographic and emergency room data were available.

6.2.3 Statistical analysis

Logistic regression was used to identify predictive factors for a positive self-report for substance use (dependent variable). Alcohol positive (A+) is defined as alcohol use less than 6 hours prior to the onset of illness or injury event (self-report), and alcohol negative is defined as: no alcohol for more than 6 hours prior to the onset of illness or injury event (self-report). Illicit drug use positive (D+) is defined as its use 24 hours prior to the onset of the injury event (self-report), and illicit drug use negative as no illicit drug use for more than 24 hours prior to the onset of the injury event (self-report).
Predictive factors for a visit to the ER for A+ and D+ patients were entered in one model. This was done in three blocks successively. The first block contains demographic characteristics and included gender, age category (12-17, 18-35, 36-60, >60 years), cultural background (Dutch or non-Dutch), living situation (alone/with others), working situation (employed, unemployed). For the analyses of illicit drug use the two age categories 36-60 and >60 years were combined because there were very few patients in these two groups. The second block included ER characteristics: part of the week (weekend/weekdays), time of visit (0-8, 8-16, 16-24 hours), referral to ER (ambulance, general practitioner, own initiative), type of accident (traffic, non-traffic, violence), location of accident/illness (home, public place). The third block included data on substance use: either illicit drug use 24 hours (when alcohol use was the dependent variable) or alcohol use 6 hours prior to the injury/illness event (when illicit drug use was the dependent variable), location of alcohol consumption (home/public place), and general alcohol consumption (moderate drinker, occasional excessive, frequent excessive). Predictors of A+ were entered into the regression model in three steps: (1) demographic characteristics, (2) emergency room characteristics, and (3) substance use characteristics. For each variable the reference category is shown in the table. Due to missing data on the location of the illicit drug consumption this variable was excluded from analyses. Variables were simultaneously entered separately for alcohol and illicit drugs into the equation in each model. A Hosmer-Lemeshow test was conducted to assess the goodness-of-fit of the model. Nagelkerke R Square was reported for each block that was entered. Odds ratios (OR) and 95% confidence intervals (CI) are reported for each variable. Data from each individual block are not reported.

6.2.4 Sample characteristics

Of the 26,443 patients that visited the four emergency rooms 6,922 (26.2%) patients were approached to participate. Secretarial staff not being available 24 hours and medical treatment being first priority were the main reasons for the low overall response rate; these reasons are described more extensively in a previous study (Vitale et al., 2005). We assume that sample selection occurred randomly, with the exception that the most seriously injured were not approached to participate due to medical treatment being the first priority; however, because no association has been found between injury severity and alcohol and drug use (Cherpitel, 1993; Vitale & Van de Mheen, 2006) our study results were probably not affected. Of the patients approached, 1,422 patients did not participate (20.5%): 897 (63%) due to their medical condition, 367 (25.8%) refused, 134 (9.5%) because of insufficient command of the Dutch language, and for 24 (1.7%) patients the staff failed to fill in the reason. Table 6.1 presents data on the patients included in the present study: 5,500 patients filled in the questionnaire. The reason for the emergency room visit was available for 5,384 patients, with 10.5% of these patients visiting the emergency room as a result of a traffic accident (n = 563), 41.5% after another type of accident (n = 2,213), 3.2% as a result of aggression/violence (n = 170), 44.2% was treated for an illness (n = 2,361), and 0.6% visited after a suicide attempt or auto-mutilation (n = 30). The participating patients were more likely to be male (57.3% vs. 52.3%, P = 0.001), younger (45.1 vs. 54.2 years, P = 0.003) and less likely to arrive by ambulance (6.8% vs. 23%, P = 0.000) compared with the patients that did not participate (due to their medical condition, refusal and insufficient command of the Dutch language). Of all patients that filled in the questionnaire, 7.8% reported alcohol use in the 6 hours prior to the injury/illness event and 2.6% of the patients reported illicit drug use 24 hours prior to the injury/illness event. When staff judgement on the patient's substance use is combined with self-reported substance use, the prevalence rate for alcohol use increases to 14.6%, and that for illicit drug use increases to 3.2%.

6.3 Results

6.3.1 Patients positive for alcohol use

The first block (demographic characteristics) accounted for 2.8% of the variation, including the second block (emergency characteristics) accounted for 44.5%, and including the third block (substance use characteristics) accounted for 48.1%. Finally all these variables explained almost 48% of the variation in an A+ patient. Table 6.2 shows the variables from each block that are included in the model. No demographic variables could be identified as predictors of A+ patients. Only the time of the emergency room visit was strongly associated with A+ patients (between 0:00 and 8:00 (OR = 3.26, 95% CI[1.70-6.28]) and between 8:00 and 16:00 (OR = 0.07, 95% CI[0.04-0.12])).

Also type of referral to the emergency room (by ambulance) (OR = 4.19, 95%CI [1.94-9.05]), illicit drug use 24 hours prior to the injury/illness (OR = 5.97, 95%CI [1.51-23.57]) and being a frequent excessive drinker (OR = 1.93, 95% CI [1.06-3.49] were positively associated with an A+ patient. Location of alcohol consumption (drinking at home) (OR = 0.41, 95%CI [0.25-0.67]) was negatively associated with an A+ patient .

6.3.2 Patients positive for illicit drug use

Predictive factors for a visit to the ER for D+ patients were also entered in three steps: (1) demographic characteristics, (2) ER characteristics, and (3) substance use characteristics. The first block of variables accounted for 12.9% of the variation, including the second block accounted for 19.8%, and including the third block explained 23.7% of the variation in a D+ patient. Finally almost 24% of the variation in a D+ patient was explained by these variables. Table 6.3 shows those variables from each block that are included in the final model. As can be seen, age (18-35 years) (OR = 4.55,95% CI [1.76-11.75]), time of the emergency room visit (between 8:00 and 16:00) (OR = 2.97, 95%CI [1.20-7.35]), referral on own initiative (OR = 3.94, 95% CI [1.38-11.28]), alcohol use 6 hours prior to the injury (OR = 4.99, 95% CI [1.74-14.34]), and being an occasional excessive drinker (OR = 2.58, 95% CI [1.06-6.32]) were positively associated with a D+ patient. Being employed (OR = 0.28, 95% CI [010-0.78]), and part of the week (weekend) (OR = 0.29, 95%CI [0.12-0.71]) were negatively associated with an D+ patient.

Table 6.1 Characteristics of the patients included in the study

Variables	
N = 5500	
Gender (male)	57.3%
Mean age (years)	45.1
Age category	
12-17 years	7.7%
18-35 years	30.8%
36-60 years	35.0%
> 60 years	26.6%
N = 5,384	
Cultural background (Dutch)	90.7%
Type of visit	
Traffic accident	10.6%
Accident	41.5%
Violence	3.2%
Illness	44.2%
Suicide/self-mutilation	0.5%
Alcohol use 6 h prior (self-report)	7.8%
Illicit drug use 24 h prior (self-report)	2.6%
Alcohol use 6 h prior (self-report and staff judgement)	14.6%
Illicit drug use 24 h prior (self-report and staff judgement)	3.2%

Table 6.2 Predictive factors for patients reporting alcohol use

Block 1	*OR*	95% CI	P Value
Gender (0 = Male)	0.87	0.52-1.45	NS
Age (vs. > 60 years)			
12-17 years	0.85	0.19-3.67	NS
18-35 years	0.92	0.43-1.95	NS
36-60 years	1.34	0.70-2.43	NS
Living situation (0 = Alone)	1.36	0.76-2.43	NS
Cultural background (0 = Dutch)	1.62	0.51-5.20	NS
Employed (0 = Unemployed)	0.88	0.32-2.41	NS
Block 2			
Part of the week (0 = Weekdays)	1.51	0.94-2.42	NS
Time of ER visit (vs. 16:00-24:00 h)			
0:00-8:00 h	3.26	1.70-6.28	0.000
8:00-16:00 h	0.07	0.04-0.12	0.000
Referral to ER (vs. GP)			
Ambulance	4.19	1.94-9.05	0.000
Own initiative	1.24	0.73-2.12	NS
Type of accident (vs. Illness)			
Traffic	2.14	0.92-5.02	NS
Non-traffic accident	1.30	0.71-2.38	NS
Violence	2.23	0.76-6.49	NS
Location of accident (0 = Public place)	0.92	0.50-1.68	NS
Block 3			
Illicit drug use 24h prior to injury/illness	5.97	1.51-23.57	0.011
Alcohol consumption (vs. Moderate drinker)			
Occasional excessive drinker	1.29	0.56-2.99	NS
Frequent excessive drinker	1.93	1.06-3.49	0.031
Location of alcohol consumption (0 = public place)	0.41	0.25-0.67	0.000

Model fit: Chi-square = 4.44, p = 0.82
NS = nonsignificant difference

Table 6.3 Predictive factors for patients reporting illicit drug use

Block 1	*OR*	95% CI	p-value
Gender (0 = Male)	0.76	0.32-1.89	NS
Age (vs. > 35 years)			
12-17 years	2.30	0.41-12.77	NS
18-35 years	4.55	1.76-11.75	0.002
Living situation (0 = Alone)	0.55	0.25-1.20	NS
Cultural background (0 = Dutch)	2.22	0.60-8.20	NS
Employed (0 = Unemployed)	0.28	0.10-0.78	0.015
Block 2			
Part of the week (0 = Weekdays)	0.29	0.12-0.71	0.007
Time of ER visit (vs. 16:00-24:00 h)			
0:00-8:00 h	0.94	0.20-4.31	NS
8:00-16:00 h	2.97	1.20-7.35	0.018
Referral to ER (vs. GP)			
Ambulance	1.73	0.31-9.74	NS
Own initiative	3.94	1.38-11.28	0.010
Type of accident (vs. Illness)			
Traffic	2.08	0.56-7.79	NS
Non-traffic accident	0.83	0.28-2.42	NS
Violence	4.08	1.00-16.78	NS
Location of accident (0 = Public place)	1.54	0.70-3.40	NS
Block 3			
Alcohol use 6 h prior to injury/illness	4.99	1.74-14.34	0.003
Alcohol consumption (vs. Moderate drinker)			
Occasional excessive drinker	2.58	1.06-6.32	0.038
Frequent excessive drinker	1.78	0.73-4.32	NS

Model fit: Chi-square = 3.72, p = 0.88
NS = nonsignificant difference

6.4 Discussion

Because the emergency room can function as point of referral for substance abuse interventions (Rockett et al., 2005) the identification of patients under the influence of alcohol and illicit drugs is necessary. In our study sample approximately 15% of the patients had used alcohol and around 3% had used illicit drugs prior to the emergency room visit. Similar data have been reported by others, with prevalence rates of alcohol use ranging from 9 to 24.4% (El-Guebaly et al., 1998) and illicit drug use ranging from 1 to 5% (Vitale and Van de Mheen, 2006).

The present study shows that some predictive factors can be identified among our group of emergency room patients. Concerning the differences in predictive factors between alcohol and illicit drug use, demographic characteristics explain more of the variation for illicit drug use compared with alcohol use. In contrast, emergency room characteristics are more likely to predict alcohol use prior to the injury/illness event. Both these findings are likely explained by the fact that alcohol is more commonly used among the general population, i.e. in the Netherlands 85% of the population (aged 16 years and over) report alcohol use on some occasion (Van Laar et al., 2004). Illicit drug use is far less common and mainly occurs among younger people. Patients visiting the emergency room between 0:00 and 8:00h, being brought to the emergency room by ambulance and consumed alcohol in a public place have a higher chance of having used alcohol prior to their injury/illness. Alcohol and illicit drugs are sometimes used in combination, with self-reported illicit drug use increasing the chance of reporting alcohol use, and vice versa. Being a frequent excessive drinker increases the chance of alcohol use prior to the emergency room visit and being an occasional excessive drinker was associated with illicit drug use. More studies are needed to determine which groups of patients enter the emergency room by ambulance and which types of illicit drugs are used in combination with alcohol prior to the injury/illness event. Regarding illicit drug use, compared to alcohol use, different predictive factors emerge; patients aged 18-35 years, and visiting the emergency room in the weekend or during the day are more likely to have used illicit drugs. These latter differences may be explained by the fact that illicit drug use, especially cannabis, is used among younger patients and among patients that are less likely to be employed. This may lead to more daytime as well as weekday use. Similar to other results (Cherpitel, 1993), our study reports that more alcohol positive patients were admitted during the night and early morning hours. In contrast, the relationship with gender (more males) and age (20-40 years) (Cherpitel, 1993) was in our study only found in the results at step 1 (data not shown), and was eventually not a significant predictor. Similar to previous ER studies (Buss et al., 1995; Borges et al., 1998; Macdonald et al., 1999; Boles and Miotto, 2003; Cunningham et al., 2003; Macdonald et al. 2005) we found an indication of a relationship, however not significant, between illicit drug use and

injuries resulting from violence. In contrast to these latter studies, we found no association between alcohol and violence-related injuries. A possible explanation for this (and for the fact that we found no relationship between alcohol and traffic accidents) is that seriously injured patients were excluded from our study. Despite the earlier studies claiming no association between injury severity and alcohol and illicit drug use, future studies should further explore the relationship between the type of injury and referral to the emergency room in relation to alcohol and illicit drug use. Our study included only those patients that were able to consent to provide self-report on their substance use, and showed that differences do occur between patients providing self-report and patients not providing self-report. For example, patients that were able to fill in a questionnaire were less likely to arrive by ambulance, reflecting the fact that the more severely injured/ill patients were excluded and, therefore, that sample selection bias occurred in our study. This selection bias arose because the emergency room staff were mainly responsible for the data collection and (especially during busy periods) their care of the patient obviously had priority over our study procedures. However, when patients were approached for study participation, the response was about 80% and similar to that reported previously (Vitale & Van de Mheen, 2006). These results suggest that identifying patients under the influence of alcohol and illicit drugs by emergency room staff remains complicated due to factors associated with the organisation of the emergency room. The use of self-report to predict the patient's substance use means that information will then be collected from a specific, less-injured, population.

Future studies on selecting emergency room patients for (brief) interventions should use different measures to assess substance use among their patients, with self-report for those patients able to fill in a questionnaire and blood and/or urine samples for those with more severe injuries arriving by ambulance (Vitale et al., 2006).

Based on the results of the present study, (brief) interventions for alcohol use could be adjusted in the Netherlands to fit the characteristics of the emergency room and be tested for feasibility and effectiveness among this population. Those (brief) alcohol interventions already proven effective (Dunn et al., 2001; Longabagaugh et al., 2001; Crawford et al., 2004; Kunz et al., 2004) should be implemented in Dutch emergency rooms. Regarding interventions for illicit drug use, future studies should focus on two issues. Firstly, because findings from our present and previous studies (Vitale & Van de Mheen, 2006) showed that alcohol and illicit drug use are usually combined, interventions should be developed that addresses both alcohol and illicit drug use together. Secondly, because the prevalence rates for illicit drug use among emergency room patients are lower than for alcohol use cost-effectiveness studies are needed to establish whether the emergency room is the appropriate location to initiate such interventions.

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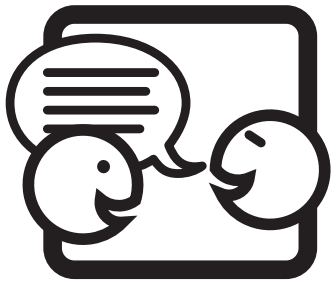
Part IV

General discussion



Chapter 7

General discussion and conclusions

The research presented in this thesis has focused on alcohol and illicit drug use among emergency room patients in the Netherlands; these data are needed, because no recent figures for the Netherlands are available. Prior to collecting data, however, adequate measures and appropriate methods of research among an emergency room population should be studied. Therefore, we investigated methodological issues regarding the measurement of alcohol and illicit drug use among emergency room patients, as well as the prevalence rates and the characteristics of those patients positive for alcohol and illicit drug use. This final chapter provides a discussion on the methodological issues involved and the main study results regarding prevalence rates and patient characteristics among emergency room patients in the Netherlands. The first section of this chapter (7.1) briefly summarizes the main study results. In section 7.2 the limitations of this study are discussed. Subsequently, the three main research questions posed in the Introduction (section 1.2) are discussed: i.e. section 7.3 addresses the methodological considerations, section 7.4 concerns the prevalence rates of alcohol and illicit drug use among emergency room patients in the Netherlands, and section 7.5 discusses the characteristics of those patients positive for alcohol and illicit drugs. The final two sections present recommendations for further research (7.6), and for prevention and treatment of substance abuse (7.7).

7.1. Summary of the study results

International emergency room studies on illicit drug use and injuries are reviewed and presented in Chapter 2. In contrast to the relationship between alcohol use and injuries that have been studied intensively and reviewed by other authors, few studies have investigated illicit drug use and related injuries and no review study is available on this topic. Overall prevalence rates of illicit drug use in studies using blood and urine toxicology range from 35 to 40% and from 1 to 5% in studies using self-report methods. No international study has included data collected from the Netherlands. These large differences in prevalence rates are mainly caused by the different measures used in the various studies, with blood and urine toxicology leading to higher prevalence rates as a result of metabolites that persist long after the pharmacological effect has vanished. Types of illicit drugs most prevalent are cannabis and cocaine. In the USA, in contrast to other countries, higher prevalence rates were found for cocaine. Despite differences in methodological aspects and country and location of the study, some general conclusions can be presented. The reviewed studies show that alcohol and illicit drugs are often used in combination, and that none of the studies identify a relationship between injury severity and illicit drug use. Illicit drug use appeared to be more prevalent among men aged 20-40 years and is strongly associated with injuries as a result of violence.

In order to determine the validity of self-reported alcohol and illicit drug use among emergency room patients, in Chapter 3 the validity of self-reported alcohol and illicit drug use was investigated. Self-reported alcohol use was compared with the results of alcohol breath analyser tests, and self-reported illicit drug use was compared with urine toxicology results. In addition to the issue of validity, the process of selection bias and the influence on prevalence rates was explored. This study shows that self-reported alcohol use resulted in a higher prevalence rate, with 7.5% of the patients admitting alcohol use prior to the injury event compared to 4.7% of the patients having a positive breath analyser result. In the case of illicit drug use the results are the opposite, i.e. self-reported illicit drug use resulted in a prevalence rate of 9%, while urine toxicology resulted in a higher prevalence rate of 30%. Two major factors can explain these findings. Firstly, the use of urine toxicology leads to higher prevalence rates due to the detection time of illicit drugs in urine. A positive urine screen does not imply that the illicit drug was used within 24 hours prior to the injury, whereas self-report provides a more accurate estimate. Secondly, sample selection bias may occur as a result of differences between patients consenting to participate and those refusing to participate. Study results may indicate that patients refusing an alcohol breath analyser are more likely to have consumed alcohol prior to the injury or illness event compared with patients consenting to participate. The reverse seems to be the case for illicit drug use, where patients having used illicit drugs were more likely to consent to provide a urine sample for toxicology than patients not having used illicit drugs. The results strengthen the hypothesis that self-report is a more reliable and accurate measure to use among emergency room patients to study alcohol and illicit drug use prior to the injury or illness event.

In Chapter 4 the use of self-reported alcohol use is studied more closely with respect to differences in alcohol prevalence rates which occur due to methodological differences. Three different methods of data collection were employed, but using an identical self-report questionnaire, among emergency

room patients in one hospital. Patients were approached in three different ways; by emergency room staff, by research staff, or by means of questionnaire sent to their home 7-10 days after their emergency room visit. In addition, the feasibility of using staff judgement about the patient's alcohol use was investigared. Results show that, depending on the method of data collection, differences in alcohol prevalence rates range from 4.6 to 9.1%.
Sample selection due to the method used resulted in these variations in the prevalence rates, with data collection by the research staff who were available 24 hours resulting in almost no selection bias. Using emergency room staff resulted in a sample selection bias influenced by the emergency room characteristics. The use of a retrospective postal survey also resulted in selection bias, and included a relatively older sample with age-related, lower alcohol use. Despite data collection through emergency room personnel resulting in the most sample bias, a higher alcohol prevalence rate was found because emergency room staff were better able to judge the patient's alcohol use compared with the research staff.
The prevalence rates and the characteristics of patients positive for alcohol and illicit drug use in the Netherlands are presented in Chapter 5. Results are given from three different Dutch hospitals in three different regions for alcohol and illicit drug use. Patients positive and patients negative for alcohol and illicit drug use prior to the injury were compared on demographic, emergency room and substance use characteristics. Self-reported substance use and self-report in combination with staff judgement (of the patient's substance use) resulted in alcohol prevalence rates ranging from 4.9 to 18.2%, and illicit drug prevalence rates ranging from 1.8 to 8.1%, with regional differences between the three hospitals. Similarities and differences in the characteristics of the patients positive for substance use were found. Patients that used alcohol prior to the injury were more likely to be male, aged 48 to 58 years, and were more likely to be frequent excessive drinkers and have violence-related injuries. Illicit drug use prior to the injury was associated with being male, unemployed, aged 28 to 38 years and also with frequent excessive drinking. Among men aged 18-35 years with a Dutch cultural background, almost no differences emerge regarding alcohol consumption between the various hospitals, with around 30-40% of the patients in this age group classified as excessive drinkers. Most variation exists in the case of illicit drug use, with large differences occurring in relation to illicit drug use during the 24 hours prior to the injury and illicit drug use in the previous year between the various hospitals.
In Chapter 6 predictive factors were identified for emergency room patients that used alcohol or illicit drugs prior to their injury/illness event leading to the emergency room visit. When identifying patients based on demographic characteristics, emergency room data and self-reported information, it appears that some factors increase the likelihood of finding alcohol or illicit drug use (prior to the injury/illness event). Results show that the time of the emergency room visit (between 0:00-8:00), referral to the emergency room (by ambulance), and illicit drug use 24 hours prior to the injury/illness are associated with having used alcohol prior to the injury/illness event leading to the emergency room visit. Regarding illicit drug use, associations were found with the living situation (alone), part of the week (weekend), and alcohol use 6 hours prior to the injury. Although specific risk groups cannot be identified, the emergency room seems to be a location where identification of patient's alcohol and illicit drug use prior to the injury/illness event could take place. Alcohol interventions could be initiated at the emergency room because patients are then directly confronted with the results of their alcohol use; however, whether interventions on illicit drug use would prove to be cost effective remains doubtful.

7.2. Study limitations

Before discussing the results of the three research questions of this thesis, the main study limitations are presented below.
First, overall response rates in this study were low and did not exceed 40% (described in Chapters 5 and 6). The low response rates are mainly caused by the organisation of the emergency rooms and the method of data collection. As a result of this, not all patients visiting the emergency room during the study period could be included, thus causing a biased study sample, with relatively more younger males and relatively less patients arriving by ambulance. In all four hospitals this bias was consistent. Based on the results of another study (Cherpitel, 1993) and the findings from this thesis (Chapter 2), our study seems to include more patients "suspected" of alcohol and illicit drug use and exclude more severely injured patients, when assuming that the latter category of patients arrives by ambulance. A possible mechanism behind the bias including more "suspected" patients may lie with the subject of our research, i.e. mentioning that the study addresses alcohol and illicit drug use might lead to the selection of only those patients that consider themselves to be the subject of the study.
The most probable explanations for recruiting fewer patients arriving by ambulance is that their medical condition is the first priority, and that older patients who most probably arrive by ambulance were excluded. However, this bias most likely did not result in a large underestimation of the prevalence rates found, because until now no associations have been found between injury severity and alcohol or illicit drug use. This is illustrated by the results presented in Chapter 4 where no difference was found between included and excluded patients regarding arrival by ambulance when research staff collected the data. Bias existed using emergency room staff (including less patients by ambulance) and a postal survey (including more patients arriving by ambulance). However, despite using research staff 24 hours a day, information on a patient's alcohol use (self-report or staff judgement) does not exceed a response rate of 75%. This leaves approximately 25% of the patients for whom we have no information on their alcohol and illicit drug use, but the selection of these

patients seems to be at random (Chapter 4). Despite these low overall prevalence rates, response percentages (approximately 75%) of those patients that were approached by research or emergency room staff were comparable to response rates found (72-93%) in other emergency room studies (Cherpitel et al., 2003). This study limitation illustrates that it remains difficult to obtain data on alcohol and/or illicit drug use from all emergency room patients.

A second limitation concerns variations in the method of data collection due to organisational differences between the participating emergency rooms. In two of the four hospitals the administrative staff was present only during working hours, and in the two other hospitals the administrative staff was present 24 hours a day. In order to minimize the effects, research staff were hired to assist when administrative staff was not present for 24 hours a day. Despite this, a possible influence on the study results caused by the structure of the emergency room can not be excluded, with the main consequences being selection bias, with research staff resulting in almost no selection bias and variations in the judgement of a patient's substance use, and with emergency room staff being better in judging a patient's alcohol use compared to research staff.

The third limitation is the use of a control group that was composed of other ill, but non-injured, patients. Our study, like all other emergency room studies, used the non-injured as a control group because a non-emergency room control group was not available. However, it remains unclear whether such a control group provides a valid comparison. It can be assumed that people who are ill generally use less alcohol or illicit drugs because, for example, they use prescribed medication. This is illustrated by previous studies (Macdonald et al., 1999; Cherpitel and Borges, 2002) that report the use of more prescription drugs in the non-injured group compared to injured patients. In contrast, other findings suggest that the non-injured patients tend to be heavier drinkers and to report more alcohol-related problems than those in the general population (Cherpitel, 1993), making it difficult to generalize findings to the total population of e.g. a country, region or particular hospital.

The fourth study limitation is the criteria that were used to determine whether a patient can be identified as positive for alcohol and/or illicit drugs. Alcohol use 6 hours prior to the injury/illness event was asked for, because alcohol use before the injury/illness event can be measured by both blood alcohol concentration and by self-reported alcohol use within 6 hours prior to the injury/illness event (Cherpitel et al., 2003). In our study, the criterion for being positive for illicit drugs differs from that of alcohol, with illicit drug use being assessed for the 24 hours prior to the injury or illness. The rationale behind this criterion is twofold. First, because the effects of illicit drugs can occur later and persist long after the actual use of the substance. Second, because illicit drug use is far less common than alcohol use among the general population. Because low numbers of patients positive for illicit drug use were expected in the study sample, illicit drug use 24 hours prior to the injury/illness was explored. Another issue concerning the criteria for alcohol and illicit drug use is that data analyses were conducted for alcohol and illicit drug use, without making any distinction between types of alcohol or between the various types of illicit drugs. Moreover, different types of drugs can result in different effects (which can be summarized as over-stimulation and under-stimulation) which will probably influence the type of injury (Schmitt et al., 2002).

Fifth, due to low prevalence rates for illicit drug use compared to alcohol use, this thesis did not include data on the influence of the method of data collection on the prevalence rate of illicit drug use. A longer study period is needed to obtain a larger study sample and this could not be realized within the allocated budget and period of data collection available. This leads to the sixth limitation, whereby two of the four hospitals collected data for only a few weeks during the winter. Seasonal influences on alcohol and illicit drug use may have influenced our study results. However, this is only important for the study in which data from the hospitals were compared (Chapter 5), and is not an issue in the other studies in this thesis.

The seventh limitation is related to the inclusion/exclusion criteria applied in our study; i.e. excluding patients without a sufficient command of the Dutch language. About 5-7% of the non-response patients had an inadequate command of the Dutch language, which was as high as 30.3% of the non-response patients in one of the hospitals. However, because the results of this study show no association between cultural background and the risk for injury as a result of alcohol or illicit drug use, this probably did not affect our results.

The final limitation discussed in this section is based on the assumption made in the Introduction of this thesis, that the selection of four hospitals from different regions in the Netherlands would (probably) represent the total emergency room population in the Netherlands. However, the results presented in Chapters 5 and 6 show that the hospitals differ not only with regard to alcohol and illicit drug prevalence rates and patient characteristics, but also with regard to the organisation of the emergency room. Therefore the four hospitals included in our study, despite covering different regions in the country, do not give a realistic representation of the whole country. On the other hand, these differences show that large variations do exist between regions and between individual hospitals within the Netherlands, making the selection of a representative sample for the whole of the Netherlands doubtful. This limitation therefore constitutes an important study result and will be discussed more extensively in the following sections.

7.3. Methodological issues concerning substance use among emergency room patients

The first aim of this thesis was to identify the main methodological considerations when studying alcohol and illicit drug use among emergency room patients. The main methodological issues identified by the present thesis are those related to the measurements of alcohol and illicit drug

use and those involving the method of data collection. First, we discuss the use of different alcohol and illicit drug measurements, then we address the methods of data collection and their effects on selection of the patient sample.

First, methodological aspects related to the measurement of alcohol and illicit drug use are discussed making a distinction between self-report, the use of biochemical markers (blood/urine toxicology and breath analysers), and of staff judgement.

Self-report shows good validity regarding alcohol use and sufficient validity regarding illicit drug use (Chapter 3). However, large variations are reported between studies using blood and urine toxicology compared to studies using self-report. The review on illicit drug use and injuries (Chapter 2) and the results from this thesis (Chapter 3) show that self-reported illicit drug use leads to lower prevalence rates and blood/urine toxicology leads to higher prevalence rates. This is caused by an overestimation of illicit drug use when using blood/urine toxicology, because metabolites can persist long after a pharmacological effect has vanished. This probably explains why although self-report shows only moderate validity, it is still the preferred measure when assessing use of illicit drugs prior to the injury/illness event. In the case of illicit drugs, the use of biochemical markers leads to an overestimation, whereas their use in the case of alcohol leads to an underestimation (Chapter 3). Breath analyser results show lower prevalence rates due to the time elapsed between alcohol consumption and the moment that the patient is actually admitted and undergoes the breath analysis test. Combined with findings from previous studies (Cherpitel, 1993; El-Guebaly et al., 1998; McNagny & Parker, 1992; Peden et al., 2000; Treno et al., 1998) and the results presented in Chapter 3 showing that self-report of alcohol has good validity, the use of self-report among emergency room patients is also prefered when information on a patient's alcohol use prior to the injury/illness event is required. However, the previous discussion only applies to the assessment of alcohol and illicit drug use for the purposes of scientific research. When the detection of alcohol and illicit drug use is part of a medical treatment (e.g. in order to exclude drug interactions), blood/urine toxicology is preferred because the relationship between the emergency room visit and the patient's substance use is not relevant, and only information on the level and type of intoxication is needed.

Thus, although self-report seems to be the preferred measure to obtain information on alcohol and illicit drug use among emergency room patients, it does not provide information on all emergency room patients because it excludes those patients not able to provide a self-report on their substance use due to their medical condition and also those patients that refuse. Among these latter patients staff judgement on the patient's substance use can be considered. However, previous studies have shown variable results regarding the detection of substance use by emergency room staff (El-Guebaly et al., 1998; Gentilello et al., 1999). More specifically, our study shows that when judging a patient's alcohol use emergency room staff are more capable compared to research staff (Chapter 4). This is not the case with illicit drug use, where staff judgement resulted in lower prevalence rates. This could indicate that a patient's illicit drug use is more difficult to judge by emergency room staff than a patient's alcohol use, because the visible signs and odour of alcohol use are much clearer compared to those for illicit drug use. However, when information is needed as part of a study, those patients refusing cannot be included because of medical ethical considerations which make it legally impossible to collect data on patients that do not give consent for study participation.

Regarding patients consenting and non-consenting, Chapter 3 of this thesis shows that despite alcohol being used by a large part of the Dutch population, with almost 90% of those aged 16 to 69 years reporting alcohol use (Van Dijck & Knibbe, 2005), and alcohol being socially more accepted, people who have indicated alcohol use prior to the injury/illness by self-report are less likely to consent to an alcohol breath analyser test. The opposite applies regarding illicit drug use, where patients reporting illicit drug use are more likely to provide urine samples, despite the social taboo on illicit drugs. Two possible reasons can be identified. First, in the case of alcohol, it is legally prohibited to drive a vehicle under the influence of alcohol, whereas in the case of illicit drugs, it is not (yet) legally prohibited to drive a vehicle. In the Netherlands, the possession and sale of illicit drugs is prohibited, but for some illicit drugs personal use is not. Second, the results of alcohol breath analysers results are acquired instantly with the researcher or emergency room staff present, making it less anonymous and more confrontational for the patient. In contrast, urine samples are sent to the laboratory making the process more anonymous.

Thus, not only the characteristics of the measures used, but also their effects on the inclusion of a patient in the study lead to the second major methodological consideration; namely, sample selection bias. As a result of this sample selection, variations in prevalence rates occur caused by the inclusion of different populations (Chapter 4). Selection bias can occur at different moments during the study (Chapter 3), with the first moment being before the study begins because not all those who are injured or ill after the use of alcohol or illicit drugs visit the emergency room. Some of these people visit, for example their general practitioner (GP) or dentist, or do not seek medical treatment at all. Taking this into consideration implies that the emergency room population is a biased population and therefore not representative for the general population of persons that have sustained acute negative health consequences as a result of alcohol or illicit drug use. The second moment of possible sample selection is caused by the organisation of the emergency room, which varies between countries and within countries. For example, in the USA variations in the type of emergency room (public or private) and level of trauma care exist. In the Netherlands these variations do not exist, but variations emerge as a result of the location and admittance policy of the emergency room; for example, some hospitals combine the emergency room with a GP centre. This results in a different emergency room population with different patient characteristics compared with

other hospitals. Hospitals that combine an emergency room with a GP centre have lower prevalence rates at the emergency room due to excluding patients with minor injuries related to alcohol or illicit drug use (because they are seen at the GP centre). The third moment of sample selection bias emerges from the results of this thesis, that show that the method of data collection leads to an inclusion of different study samples (Chapter 4). Variations regarding the included study sample exist between emergency room staff and research staff responsible for data collection, i.e. the use of research staff results in almost no selection bias (Chapter 4). This selection bias is most probably the result of patient care being the first priority for the emergency room staff, but also because the research is not part of their daily routine and there may even be some hesitation about approaching patients for research. More variation occurs when patients are not approached during their visit (by either the emergency room or research staff), but after their emergency room visit (e.g. by posting a questionnaire to their home address). The fourth moment arises bacause patients willing to participate and approached during treatment in the emergency room are younger and more likely to be male, compared with the non-response patients. The opposite applies to those patients participating, approached after their emergency room visit by a postal questionnaire, who tend to be older and female.

In conclusion, the results from the two studies presented in part two of this thesis (Chapters 3 and 4) have implications for how studies among emergency room patients in the Netherlands can best be designed. Regarding measurement of alcohol and illicit drug use, a self-report questionnaire seems to be preferable to biochemical markers, because self-report shows sufficient validity and measures actual use before the injury/illness event (Chapter 3). Data collection should preferably take place using research staff present 24 hours a day, because the use of research staff resulted in the highest response (approximately 75%) and almost no sample selection bias (Chapter 4). Additionally, staff judgement on the patient's alcohol use and blood/urine toxicology on the patient's illicit drug use are suitable to obtain information on those patients not able to participate in the study due to their medical condition.

This section shows that methodological issues, such as measures and methods, strongly influence the study results by distorting data and causing selection bias. Considering this, the next section reports the prevalence rates found for alcohol and illicit drug use is the Netherlands.

7.4. Prevalence of substance use among emergency room patients in the Netherlands

The second aim of this thesis was to provide alcohol and illicit drug use prevalence rates among emergency room patients in the Netherlands. The alcohol prevalence rates found among emergency room patients in the Netherlands (self-report and staff judgement combined) range from 11.3 to 18.2% in the four hospitals. Illicit drug use prevalence rates range from 1.8 to 8.1%, with cannabis and cocaine being the most prevalent in that order. The alcohol and illicit drug use prevalence rates among Dutch emergency room patients (Chapter 2) are comparable to those found in other countries (El-Guebaly et al., 1998). The prevalence rates for alcohol and illicit drug use are higher than those reported in earlier Dutch studies, because these earlier studies did not use total emergency room populations but specific groups of patients. General alcohol consumption patterns among the emergency room patients in this study show that excessive drinking (ranging from 11 to 15.8% for all hospitals) is slightly higher than recent estimations in the general Dutch population where 10.3% of the population is classified as a problem drinker (Van Dijck & Knibbe, 2005). Among men aged 18-35 years with a Dutch cultural background, a considerably larger percentage (approximately 30-40%) could be classified as excessive drinkers. In the case of illicit drug use, the prevalence rates found in our study are higher than the prevalence of illicit drug use among the general population presented in the Introduction of this thesis. This seems to confirm international findings that excessive alcohol use and illicit drug use are risk factors for an emergency room visit (Cherpitel, 1999). However, previous research (Cherpitel et al., 2003) and results from our study (Chapter 5) also suggest the opposite, because people who are regular excessive drinkers may be more tolerant to the effects of alcohol. Various studies have reported on the differences between 'wet' (higher alcohol consumption) and 'dry' (lower alcohol consumption) cultures, suggesting that people from the latter category are not used to drinking and its related effects (e.g. Bloomfield et al., 2003). The same mechanism may apply to regions within a country in the case of alcohol use and injuries among emergency room populations (Cherpitel, 1997; Cherpitel, 1999; Room and Bullock, 2002). People from 'wet' regions may be at less risk for an injury after drinking compared to those that are less frequent drinkers. This may explain our findings that in the hospital with the lowest prevalence rate of alcohol use among emergency room patients, the highest percentage of excessive drinkers was found (Chapter 5). The findings from this thesis show that prevalence rates for alcohol and illicit drug use vary between emergency rooms in one country (Chapter 5), with illicit drug use showing more variation between the various regions compared to the prevalence of alcohol use. A large part of these variations can be explained by alcohol and illicit drugs consumption patterns in the region where the hospital is located. In the Netherlands illicit drug use is more prevalent in cities compared to rural areas (Van Laar et al., 2004), which is reflected by the variation in prevalence rates between the hospitals in our study (Chapter 5). Therefore, data on alcohol and illicit drug use in a specific region or city provide some indication about the prevalence rates found among an emergency room population. However, the variation in alcohol and illicit drug use prevalence rates can also be influenced by the organisation and admittance policy of the emergency room department (Cherpitel, 1997; Cherpitel et al., 2003) as described in the previous section.

This present thesis suggests (and confirms findings from other countries) that there seems to be a relationship between alcohol and illicit drug use consumption and injury treatment in the emergency room. In the case of causality between alcohol and an emergency room visit, our studies indicate that more patients have used alcohol 6 hours prior to the injury event leading to an emergency room visit compared to patients visiting the emergency room for treatment of an illness. However, whether or not the alcohol consumption caused the injury remains unclear. This is also the case with illicit drugs, but these studies do imply that a lifestyle related to illicit drug use put people at higher risk, because different associations between non-recent drug use (such as during the past week, month, past three months and lifetime drug use) and emergency room treatment have been found (Chipman, 1995; Verhaeghe et al., 1996; Cherpitel, 1999; Cunningham et al., 2003; Woolard et al., 2003). Besides this, previous studies and results from Chapters 5 and 6 show that alcohol and illicit drug use are usually combined and illicit drug use is associated with excessive drinking. This combined use of substances makes it difficult to determine the exact effect of the substance and to establish a causal relationship (EMCDDA, 1999).

7.5. Characteristics of patients having used alcohol or illicit drugs

The third and final aim of this study was to describe the characteristics of those emergency room patients that used alcohol or illicit drugs prior to the injury/illness. These data could be used to determine prevention policy and initiate development and implementation of substance use treatment.

The results presented in this thesis show that the characteristics of Dutch emergency room patients to a large extent correspond with findings from international emergency room studies. However, some differences between the hospitals emerge as a result of regional differences related to alcohol consumption and characteristics of the emergency room population (Chapter 5). In accordance with these international findings, patients that used alcohol prior to the event leading to the emergency room visit are more likely to be male, to be excessive drinkers and to have an injury as a result of violence. Similarly, associations between time of emergency room visit (during the night and early morning hours) and part of the week (weekend) found in our study are similar to international data. Our data on alcohol positive patients differed from the international findings, especially regarding the age category of those patients that used alcohol prior to the injury/illness. In our study the mean age of these patients is approximately ten years higher. This may be explained by the differences in emergency room populations between the included hospitals, with two hospitals having a relatively older population compared to the other two hospitals in this study (Chapter 5), and compared to other international studies. No association was found in our study between the involvement of alcohol and car accidents, as reported by others (Kurzthaler et al., 2003; Ramaekers et al., 2004). A Dutch study on alcohol use among emergency room patients involved in traffic accidents showed that these patients were aged between 20 and 29 years (Kingma and Klasen, 1994). Because our study was conducted using a total emergency room sample (with no distinction made between subgroups) such a specific association did not emerge.

Despite relatively few studies investigating illicit drug use, the international studies reviewed in Chapter 2 reported similar results to those presented in this thesis, with patients positive for illicit drug use being mainly male, aged 20-40 years, and visiting the emergency room as a result of violence. In addition, our study results show that patients positive for illicit drugs were also visiting the emergency room during the nights and were more likely frequent excessive drinkers. This thesis also showed a consistent association in all hospitals between illicit drug use and being unemployed (Chapter 5) and a relationship with living alone, which were not found in previous international studies (Chapter 2). The latter could probably be explained by drug users being relatively young and therefore not yet involved in a relationship. The association previously reported between an emergency room treatment after the use of soft drugs by tourists (Elshove-Bolk et al., 2002) was not found in our study, suggesting that some associations may be specific for each individual emergency room.

These earlier data on patients positive for alcohol and illicit drug use suggest that, despite some differences between the characteristics of these two categories (the latter are younger) many similarities exist. Particularly in the case of violence-related emergency room visits, patients positive for alcohol and illicit drug use are excessive alcohol users, and show substance use in general. More detailed information is required about this, because the effects of alcohol combined with certain types of drugs (e.g. cocaine or marijuana) do differ. Also, no association was found between injury severity and alcohol and illicit drug use in previous studies, or in the results presented in this thesis. Our findings suggest that patients brought in by ambulance are more likely to be older and are less likely to have used alcohol and/or illicit drugs.

Concluding, can these data on patient characteristics for those patients that used alcohol and illicit drugs prior to the injury/illness event lead to the identification of specific risk groups?

This study shows that identifying specific risk groups from an emergency room population remains difficult, particularly in case of alcohol use which is common among the general population. Thus, because alcohol use occurs among the total emergency room population, interventions cannot be focused on specific groups. However, because this thesis showed that excessive drinking is common among Dutch men aged 18-35 years visiting the emergency room. There, interventions could focus on this group of patients. Identifying risk groups of patients who have used illicit drugs can be done based on demographics and/or region or even hospital specific. However, the lower prevalence rate of illicit drug use can be seen as a complicating factor and raises the issue of cost effectiveness. The

only clear relationship emerging from many studies, and confirmed for the Netherlands in the present study, is that between substance use and an emergency room treatment as a result of violence. Because both alcohol and illicit drug use are more common among this group, this is a specific risk group for whom interventions could be initiated.

7.6. Recommendations for further research

The results of the studies presented in this thesis allow two major recommendations to be made. First of all, based on the results of our first research question, recommendations will be made on how future studies on alcohol and illicit drug use among emergency room patients should be designed. Second, recommendations for topics of further research are discussed.

First, identification of the patient's substance use can be done either to study a causal relationship with the injury/illness event or to initiate preventive interventions. The aim of the study will enable to determine whether to use self-report or biochemical markers, and also depends on the substance involved. When the goal is to study a direct relationship between the patient's substance use and their injury/illness event the use of self-report among emergency room patients results in more accurate information on the substance use prior to the injury compared to biochemical markers. Regarding identification of patients in the case of interventions, differences exist between alcohol use and illicit drug use. When the goal is to initiate interventions on the patient's illicit drug use, the use of blood/urine toxicology is preferred. In the case of illicit drug use this measure includes those patients that lead a more at-risk lifestyle, especially because (as indicated earlier) other studies have shown that non-recent illicit drug use is a predictor of injury treatment (Cherpitel, 1999; Chipman, 1995; Cunningham et al., 2003; Verhaeghe et al., 1996; Woolard et al., 2003). Regarding alcohol use, the use of blood samples or an alcohol breath analyser cannot be seen as a marker for an at-risk lifestyle, because these tests only indicate recent use; for alcohol use self-report seems to be preferred. More research is needed on this subject, with future studies focusing on the use of self-report and blood/urine toxicology for illicit drug use in order to establish the amount of overreporting and underreporting of illicit drug use.

Furthermore, the study limitations show that the influence of the method of data collection on illicit drug use prevalence rates was not well explored; this, together with staff judgement on a patient's illicit drug use, should be studied in the future.

Second, besides methodological issues, future studies should also focus on various topics with regard to the content of research. For example, more detailed information on the event leading to the emergency room would provide useful data for prevention activities. Data on the exact amount and type of alcohol and illicit drug of consumption are needed, especially because, in the case of illicit drugs, different susbtances have different effects (stimulants vs. depressants). Various categories of patients should be studied (e.g. patients involved in traffic accidents, young people, violence-related visits), because this can provide more detailed information for more specific recommendations for prevention activities.

7.7. Recommendations for prevention and treatment of alcohol and/or illicit drug use

Based on the results presented in this thesis and the conclusions drawn, some recommendations for prevention and treatment of substance (ab)use can be made. The recommendations made here will focus mainly on the situation in the Netherlands.

This thesis shows that, even within a small country like the Netherlands, large variations exist between emergency room samples based on type and location of hospital. As a result of this, prevalence rates and patient characteristics related to alcohol and illicit drug use show similarities as well as differences, with excessive alcohol use and illicit drug use being prevalent among a substantial part of the emergency room population and likely involved in the event leading to the emergency room visit. In the most ideal situation, screening for (problematic) alcohol and illicit drugs should be part of the routine procedures of the emergency room staff. However, considering the costs of implementation and the time-consuming demands on the emergency room staff, other prevention activities are needed. Therefore, before prevention and intervention programmes can be initiated nationally, policymakers should first identify priority regions or hospitals. This might be done based on alcohol or illicit drug use consumption patterns in the location or region concerned. This thesis showed that in the case of illicit drugs this is very useful, because illicit drug use is more region specific compared to alcohol use.

Previous studies have shown that brief interventions on alcohol use and problem drinking are effective (Crawford et al., 2004; Kunz et al., 2004; Spirito et al., 2004), and sustaining an injury as a result of substance use makes a person more amenable to behavioural change. In contrast, evidence for the effectiveness of opportunistic brief interventions in a general hospital for problem drinking is still inconclusive (Emmen et al., 2005). The existing validated interventions could be adjusted and applied in the Netherlands.

Emergency room staff can serve as a starting point for the initial selection of those patients that could benefit from interventions. The most suitable moment to identify whether a patient used alcohol and/or illicit drugs is shortly before or shortly after treatment, depending on the severity of the patient's medical situation. The physician or paramedic personnel can ask whether he or she used alcohol (6 hours prior) and/or illicit drugs (24 hours) prior to the injury and note this in the patient's hospital record. Those hospitals that use a triage system when a patient enters the emergency room could do these steps during the triage. In order to identify patients who used

alcohol or illicit drugs, in the most ideal situation risk groups should be specified; however, based on the findings from this study (Chapters 5 and 6) this remains difficult because only a small and diverse group of patients are involved. The results of this thesis show that emergency room staff can detect alcohol use more easily than illicit drug use. Therefore, priority should be given to interventions for alcohol use rather than for illicit drugs, because alcohol is far more prevalent among the general population and among emergency room patients than to illicit drugs.
The actual intervention should ideally take place during the emergency room visit, because patients are then directly confronted with the consequences of their behaviour and are more likely to change their behaviour. However, this scenario is very complicated. Firstly, because most patients under the influence of alcohol and/or illicit drugs visit the emergency room during the evening and night shifts; during these hours the emergency room usually has fewer staff and faces unexpected rush hours making the environment too hectic to start an intervention. Second, the first priority of emergency room staff is to provide medical care, with the brief contact between physician or paramedic personnel and patient leaving little time for extra activities such as discussing substance abuse. This point has been mentioned several times in this thesis (Chapters 5 and 6). Third, some of these patients are intoxicated, or too injured or aggressive to openly discuss their substance use. This leaves no other option than to ask them about participation in the emergency room, but to carry out the intervention at another time in a quieter environment. Whether it would be cost effective to appoint specific intervention staff remains highly doubtful. The start of the intervention could be combined with a control visit to the emergency room or to the policlinic. This may lead to a decrease of substance use and/or to less risky behaviour, resulting in less visits to the emergency room.

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Appendix

(patient questionnaire in Dutch)

Algemeen

1. Wat is de reden van uw komst naar de Spoedeisende hulp?

☐ Verkeersongeval ☐ met auto ☐ met motor ☐ met brommer ☐ met fiets ☐ als voetganger

☐ Ongeval (anders dan verkeersongeval)

☐ Agressie/ geweld

☐ Ziekte/ onwelwording

☐ Suïcide poging, opzettelijke zelfverwonding (automutilatie)

2. Plaats van ongeval/ onwelwording

☐ Thuis ☐ Op werk

☐ Bij anderen thuis ☐ Op school

☐ In openbare gelegenheid (sportkantine,club/vereniging) ☐ Op straat

☐ In horecagelegenheid (café/ bar, discotheek) ☐ Anders, namelijk: .....

3. Hoeveel tijd zat er tussen het ongeval / de onwelwording en het bezoek aan de Spoedeisende hulp?

☐ minder dan 6 uur ☐ 6 tot 12 uur ☐ 12 tot 24 uur ☐ meer dan 1 dag

4. Heeft u in de 24 uur voor het ongeval / de onwelwording medicijnen gebruikt? Zo ja, wat? (meerdere antwoorden mogelijk)

☐ Nee, ik heb geen medicijnen gebruikt in de 24 uur voorafgaande aan het ongeval/onwelwording

☐ Ja -> ☐ Slaapmiddelen ☐ Antipsychotica

☐ Kalmeringsmiddelen ☐ Pijnstillers

☐ Antidepressiva ☐ Anders, namelijk: .....

Demografische gegevens

5. Wat is uw culturele herkomst? (meerdere antwoorden mogelijk)

☐ Nederlands ☐ Antilliaans ☐ Turks ☐ Marokkaans ☐ Surinaams ☐ Anders

6. Wat is uw werksituatie? Kies het antwoord dat het meest van toepassing is op uw situatie

☐ Betaald werk ☐ Werkloos ☐ Arbeids-ongeschikt ☐ Gepensioneerd ☐ Huishouden ☐ Studie ☐ Anders

7. Wat is uw leefsituatie: woont u alleen of met anderen?

☐ Alleen ☐ Met partner ☐ Met familie/ouders ☐ Anders.....

Alcoholgebruik

8. Heeft u in de 24 uur voorafgaande aan het ongeval/ onwelwording alcohol gedronken? Zo ja, hoeveel? (meerdere antwoorden mogelijk) LET OP: Het gaat om glazen. Blikjes en flesjes a.u.b. omrekenen naar glazen! Reken voor een blikje of flesje 1 ½ glas.

☐ Nee, ik heb geen alcohol gedronken in de 24 uur voorafgaande aan het ongeval/ onwelwording **ga door naar vraag 11**

☐ Bier (geen alcoholarm of alcoholvrij bier) ___ glazen

☐ Wijn, sherry, port, vermouth ___ glazen

☐ Jenever, likeur, vieux, rum, cognac, whisky, wodka of ander gedistilleerd ___ glazen

☐ Alcoholische drank gemengd met frisdrank of vruchtensap (breezers) ___ glazen

☐ Shooters ___ glazen

9. Plaats waar u de alcohol heeft gedronken (meerdere antwoorden mogelijk)

☐ Thuis ☐ Op werk

☐ Bij anderen thuis ☐ Op school

☐ In openbare gelegenheid (sportkantine,club/vereniging) ☐ Op straat

☐ In horecagelegenheid (café/bar, discotheek) ☐ Anders, namelijk: .....

10. Wanneer heeft u uw laatste alcoholische consumptie gedronken?

☐ minder dan 6 uur geleden ☐ 6 tot 12 uur geleden ☐ 12 tot 24 uur geleden ☐ meer dan 1 dag geleden

11. Heeft u na het ongeval / de onwelwording nog alcohol gedronken?

☐ Nee ☐ Ja

LET OP: Het gaat om glazen. Blikjes en flessen a.u.b. omrekenen naar glazen!
Reken voor een blikje of flesje 1 ½ glas. Indien U geen alcohol drinkt de overige vragen toch invullen!!!!!!

12. Op hoeveel van de drie weekenddagen drinkt u meestal alcohol (vrijdag tot en met zondag)?

☐ 3 dagen ☐ 2 dagen ☐ 1 dag ☐ Minder dan 1 dag (niet elk weekend) ☐ Nooit in het weekend **naar vraag 14**

13. Als u op zo'n dag in het weekend alcohol drinkt, hoeveel glazen drinkt u dan meestal per dag?

__ glazen per dag

14. Op hoeveel van de vier doordeweekse dagen drinkt u meestal alcohol (maandag tot en met donderdag)?

☐ 4 dagen ☐ 3 dagen ☐ 2 dagen ☐ 1 dag ☐ Minder dan 1 dag (niet elke week) ☐ Nooit doordeweeks **naar vraag 16**

15. Als u op zo'n doordeweekse dag alcohol drinkt, hoeveel glazen drinkt u dan meestal per dag?

__ glazen per dag

Middelengebruik

16. Heeft u in de 24 uur voor het ongeval / de onwelwording drugs gebruikt? Zo ja, wat? (meerdere antwoorden mogelijk)

☐ Nee, ik heb geen hard- of softdrugs gebruikt in de 24 uur voorafgaande aan het ongeval/ onwelwording **naar vraag 18**

☐ Ja ->
- ☐ Cannabis
- ☐ Cocaïne
- ☐ Amfetaminen (speed)
- ☐ Ecstasy
- ☐ Heroïne
- ☐ Paddestoelen (ook LSD)
- ☐ GHB
- ☐ Methadon
- ☐ Anders, namelijk: .....

17. Waar heeft u de drugs gebruikt? (meerdere antwoorden mogelijk)

☐ Thuis ☐ Op werk

☐ Bij anderen thuis ☐ Op school

☐ In openbare gelegenheid (sportkantine,club/vereniging) ☐ Op straat

☐ In horecagelegenheid (café/ bar, discotheek) ☐ Anders, namelijk: .....

18. Heeft u na het ongeval / de onwelwording nog drugs gebruikt?

☐ Nee ☐ Ja

19. Heeft u in de afgelopen 12 maanden de volgende drugs gebruikt? Zo ja, hoe vaak in de afgelopen 4 weken? (meerdere antwoorden mogelijk)

☐ Nee, ik heb geen hard- of softdrugs gebruikt in de afgelopen 12 maanden -> **einde vragenlijst**

☐ Ja -> ☐ Cannabis	__ keer in de afgelopen 4 weken
☐ Cocaïne	__ keer in de afgelopen 4 weken
☐ Amfetaminen (speed)	__ keer in de afgelopen 4 weken
☐ Ecstasy	__ keer in de afgelopen 4 weken
☐ Heroïne	__ keer in de afgelopen 4 weken
☐ Paddestoelen (ook LSD)	__ keer in de afgelopen 4 weken
☐ GHB	__ keer in de afgelopen 4 weken
☐ Methadon	__ keer in de afgelopen 4 weken
☐ Anders, namelijk:	__ keer in de afgelopen 4 weken

20. Heeft u in de afgelopen 2 weken nog een van de volgende drugs gebruikt? (meerdere antwoorden mogelijk)
Zo ja, wanneer was dat voor het laatst? (geef per drug aan hoeveel dagen geleden)

☐ Nee, ik heb geen hard- of softdrugs gebruikt in de afgelopen 2 weken -> **einde vragenlijst**

☐ Cannabis	__ dag(en) geleden voor het laatst **(vul het aantal dagen in van 1 tot maximaal 14 dagen)**
☐ Cocaïne	__ dag(en) geleden voor het laatst
☐ Amfetaminen (speed)	__ dag(en) geleden voor het laatst
☐ Ecstasy	__ dag(en) geleden voor het laatst
☐ Heroïne	__ dag(en) geleden voor het laatst
☐ Paddestoelen (ook LSD)	__ dag(en) geleden voor het laatst
☐ GHB	__ dag(en) geleden voor het laatst
☐ Methadon	__ dag(en) geleden voor het laatst
☐ Anders	__ dag(en) geleden voor het laatst

Administratief gedeelte, in te vullen door het personeel of de onderzoekers

1. Wat is de reden dat de vragenlijst niet is ingevuld (meerdere antwoorden mogelijk)

☐ Patiënt was niet in staat te antwoorden, reden: ☐ Fysieke toestand ☐ Psychische toestand

☐ Patiënt weigerde

☐ Patiënt spreekt de Nederlandse taal niet voldoende om vragenlijst in te vullen

2. Inschatting alcohol- en/ of drugsgebruik: (meerdere antwoorden mogelijk)

☐ Vermoedelijk sprake van alcoholgebruik door patiënt

☐ Vermoedelijk sprake van drugsgebruik door patiënt

3. Blaastest en urinemonster:

☐ Blaastest wel afgenomen, resultaat: _ , __ promille

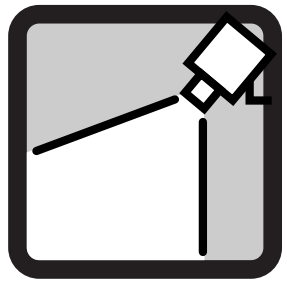
☐ Blaastest niet afgenomen, patiënt weigerde blaastest

☐ Blaastest niet afgenomen, reden:

☐ Urinemonster wel afgenomen

☐ Urinemonster niet afgenomen, patiënt weigerde

☐ Urinemonster niet afgenomen, reden:



Summary

Alcohol and illicit drug use have adverse health effects. However, a large part of the general population still consumes alcohol and, especially among young people, illicit drug use is common. Alcohol and illicit drugs also influence health as a result of intentional and unintentional accidents. International emergency room studies show that substance use and injuries are related. Despite this, emergency room studies on alcohol and illicit drug use in the Netherlands do not provide recent and complete data. Therefore, the focus of this thesis will be twofold. First, methodological aspects of assessing substance use among emergency room populations are studied. Second, this study provides recent data on substance use prevalence rates and patient characteristics among emergency room populations in the Netherlands. Data were collected in four different emergency rooms in different regions in the Netherlands; including two university hospitals and two general hospitals.
Chapter 2 of this thesis presents a review of published international emergency room studies on illicit drug use. Until now, most emergency room studies have focused on alcohol and injuries and less is known about the relationship between illicit drugs and injuries. This chapter showed that prevalence rates ranged from 1 to 5% in self-report studies and from 35 to 40% in studies using blood and urine toxicology. These large differences were mainly attributed to the characteristics of the measures used, but other methodological issues also influenced the prevalence rates and patient characteristics found. Regarding illicit drug use among emergency room patients, the reviewed studies showed that cannabis and cocaine were the most commonly used substances and usually in combination with alcohol use. No relationship was found between illicit drug use and injury severity. Illicit drug use was higher among men aged 20 to 40 years, and was associated with violence-related injuries.
Methodological issues concerning substance use among emergency room patients were further explored in part two of this thesis, with Chapter 3 assessing whether to use self-report or biochemical markers among emergency room patients. Self-reported alcohol use was compared with breath analyser results, and self-reported illicit drug use was compared with urine toxicology results. Results from this chapter showed that self-report leads to higher alcohol prevalence rates and lower prevalence rates for illicit drug use. This was caused by sample selection bias and was also a result of the validity of the measure used. The validity of self-reported alcohol use was good whereas for self-reported illicit drug use the validity was moderate. This chapter showed that self-report seems to be preferable to biochemical markers when aiming for the actual use prior to the reason for the emergency room visit. Chapter 4 studies the influence of the method of data collection on the alcohol prevalence rates found. Three different ways of collecting data on a patient's alcohol use were conducted in one emergency room using an identical self-report questionnaire. A comparison was made of the distribution of the questionnaire by emergency room staff, or by research staff, or posted to the patient's home a few days after the emergency room visit. The results showed that variations in prevalence rates occurred as a result of the methodological differences leading to variations in sample selection, with the use of research staff resulting in almost no selection bias. More bias was found when emergency room staff handed out the questionnaire and when the patients received the questionnaire by post, with variation between both methods. Using emergency room staff resulted in the highest prevalence rates because they were better in judging a patient's alcohol use, and the use of a postal questionnaire showed the lowest prevalence rate because this method included an older population that, therefore, consumed less alcohol.

The third part of the thesis reported data on alcohol and illicit drug use among emergency room patients in the Netherlands. Chapter 5 provides emergency room data on alcohol and illicit drug use in the Netherlands. The results from the different hospitals were compared in order to study variations between the regions. Variations in prevalence rates and patient characteristics were found between the various emergency rooms. Both alcohol and illicit drug positive patients are more likely to be male and to be frequent excessive drinkers. Alcohol positive patients are more likely to be aged 48 to 58 years and to have an injury as a result of violence, with illicit drug use positive patients more likely to be aged 28 to 38 years and more likely to be unemployed. When we focus on men aged 18-35 years with a Dutch cultural background more similarities were found between the emergency rooms regarding alcohol use. In the case of illicit drug use larger differences existed between the various emergency rooms. This chapter concluded that alcohol interventions are more hospital and region independent, and that illicit drug use interventions are more region specific.
Chapter 6 aimed to identify predictive factors for an emergency room visit. Predicting patients who had used alcohol prior to the injury/illness event leading to the emergency room visit could focus on the time of the emergency room visit being around midnight, arrival by ambulance, and the use of illicit drug use. In the case of illicit drug use predictive factors were being aged 18 to 35 years, weekend visits to the emergency room, emergency room visits during the day, injuries as a result of violence, and alcohol use. Based on these findings, it was concluded that the emergency room is a suitable location to identify alcohol and illicit drug use prior to an injury/illness event. Identifying specific risk groups was more difficult, because alcohol seems to be used among different age groups with less specific characteristics compared to illicit drug use. Illicit drug use is more common among specific age groups, but with a lower prevalence compared to alcohol use which makes the cost-effectiveness of interventions doubtful.
In the final chapter of this thesis, Chapter 7, conclusions are made based on the study results presented in the previous chapters. This thesis concludes that the main methodological issues involved in emergency room studies are the characteristics of the alcohol and illicit drug use

measures, and sample selection bias. The preferred measure to study alcohol and illicit drug use among emergency room patients in order to determine a relationship between their substance use and the reason for the emergency room visit, is self-report. In contrast to the biochemical markers, often labelled as the gold standard, self-report provides more reliable data on the actual use prior to the injury/illness event. Besides the measures used, the method of data collection and sample bias also influence the study results. Study bias occurs at various moments before and during the emergency room treatment which leads to an injured population that does not represent the total emergency room population of injured persons as a result of alcohol and/or illicit drug use. Future studies should use research staff 24 hours a day, using a self-report patient questionnaire, with a combination of staff judgement on the patient's alcohol use and blood/urine toxicology on the patient's illicit drug use for those patients unable to fill in a self-report questionnaire. This study suggests that staff judgement on the patient's alcohol use is easier than the staff judgement on the patient's illicit drug use. Despite that alcohol use is socially more accepted compared to illicit drug use, patients seem to be more likely to admit their illicit drug use compared to their alcohol use. Alcohol and illicit drug use prevalence rates and patient characteristics in the present studies are comparable to international findings, with variations between the different regions in the Netherlands. Alcohol was reported by 10 to 18% of the patients and illicit drug use was admitted by 2 to 8% of the emergency room patients, with both groups more likely to be males, excessive drinkers and with combined use of substances. The results of our studies indicate that: interventions could be initiated at the emergency room, and should focus more on a patient's alcohol use than on illicit drug use because alcohol use is easier to detect, less region specific, more prevalent, and for which more effective interventions are available.

Samenvatting

Alcohol en drugs kunnen negatieve gevolgen hebben voor de gezondheid. Desondanks gebruikt een groot gedeelte van de algemene bevolking nog steeds alcohol en komt drugsgebruik met name onder jongeren regelmatig voor. Alcohol en drugs beïnvloeden de gezondheid ook als gevolg van opzettelijke en onopzettelijke ongelukken. Internationale spoedeisende hulp studies laten zien dat er een relatie is tussen middelengebruik en ongevallen. Ondanks dit zijn er in Nederland nauwelijks recente en complete gegevens over alcohol en drugsbebruik op de spoedeisende hulp van ziekenhuizen beschikbaar. Deze studie is een aanzet daartoe. Het doel van dit proefschrift is tweeledig. Ten eerste zullen de methodologische aspecten van het meten van middelengebruik onder spoedeisende hulp populaties worden bestudeerd. Ten tweede zal deze studie recente prevalentie gegevens over middelengebruik op de spoedeisende hulp in Nederland opleveren. De gegevens in deze studie zijn verzameld op de spoedeisende hulp afdeling van vier verschillende ziekenhuizen, waarvan twee academische ziekenhuizen en twee algemene ziekenhuizen, in verschillende regio's in Nederland. *Hoofdstuk 2* van dit proefschrift geeft een overzicht van internationaal gepubliceerde spoedeisende hulp studies over het gebruik van drugs. Tot op heden hebben de meeste spoedeisende hulp studies zich gericht op alcohol en ongevallen en is er minder bekend over de relatie tussen drugs en ongevallen. Dit hoofdstuk laat zien dat prevalentie cijfers voor drugs varieerden van 1 tot 5% als het gaat om zelfrapportage en varieerden van 35 tot 40% in studies die gebruik maakten van bloed- en urine toxicologie. Deze grote verschillen zijn vooral het gevolg van de eigenschappen van de gebruikte meetinstrumenten, maar worden ook beïnvloed door andere methodologische aspecten. Wat betreft drugsgebruik onder spoedeisende hulp patiënten laten de beschreven studies zien dat cannabis en cocaïne de meest gebruikte middelen zijn en dat zij meestal in combinatie met alcohol worden gebruikt. Er is geen relatie gevonden tussen drugsgebruik en de ernst van het letsel. Het drugsgebruik is hoger onder mannen in de leeftijd van 20 tot 40 jaar en is geassocieerd met geweldsgerelateerd letsel.

In het tweede gedeelte van dit proefschrift zijn de methodologische aspecten betreffende middelengebruik onder patiënten op de spoedeisende hulp verder onderzocht, waarbij *hoofdstuk 3* het gebruik van zelfrapportage en biochemische markers beschrijft bij patiënten op de spoedeisende hulp. De zelfrapportage van alcohol is vergeleken met de resultaten van blaastesten en de zelfrapportage van drugs is vergeleken met de resultaten van urinesamples. De resultaten van dit hoofdstuk laten zien dat zelfrapportage leidt tot hogere alcohol prevalentie cijfers en tot lagere drugs prevalentie cijfers. Dit wordt veroorzaakt enerzijds door een selectie bias en anderzijds door de validiteit van de vergeleken meetinstrumenten. De validiteit van zelfrapportage bij alcohol is goed, terwijl bij drugsgebruik de validiteit van zelfrapportage voldoende is. Dit hoofdstuk laat zien dat zelfrapportage de voorkeur heeft boven biochemische markers wanneer het doel is het daadwerkelijke alcohol en/of drugsgebruik te meten voorafgaande aan de reden van het spoedeisende hulp bezoek. *Hoofdstuk 4* beschrijft de invloed van de methode van data verzameling op alcohol prevalentie cijfers. Drie verschillende manieren van gegevensverzameling werden gebruikt om het alcoholgebruik van patiënten in een spoedeisende hulp met behulp van één identieke vragenlijst te onderzoeken. Er is een vergelijking gemaakt tussen het verspreiden van de vragenlijst door het spoedeisende hulp personeel, het verspreiden door onderzoeksmedewerkers en het versturen van de vragenlijst een aantal dagen na het spoedeisende hulp bezoek per post naar het huisadres van de patiënt. De resultaten laten zien dat er variaties in prevalentie cijfers optreden als gevolg van variaties in de selectie van de onderzoekspopulatie bij de drie gebruikte methoden. Verspreiding door de onderzoeksmedewerkers resulteerde nauwelijks in een selectie bias. Meer bias werd gevonden wanneer spoedeisende hulp personeel de vragenlijsten uitdeelden en wanneer de patiënten de vragenlijst per post thuis gestuurd kregen. De inzet van spoedeisende hulp personeel resulteerde in de hoogste prevalentie cijfers omdat zij beter in staat lijken te zijn om alcoholgebruik bij een patiënt te herkennen. Het gebruik van een vragenlijst per post resulteerde in de laagste prevalentie cijfers omdat bij deze methode de respons onder de oudere populatie hoger was met als gevolg een lagere alcoholconsumptie.

Het derde gedeelte van dit proefschrift presenteert gegevens over alcohol- en drugsgebruik onder spoedeisende hulp patiënten in Nederland. In h*oofdstuk 5* zijn de resultaten van de verschillende ziekenhuizen vergeleken om eventuele verschillen tussen de regio's te bestuderen. Er zijn verschillen in prevalentie cijfers en kenmerken van patiënten gevonden tussen de verschillende spoedeisende hulp afdelingen. Zowel alcohol als drugs positieve patiënten zijn vaker man en vaker frequente excessieve drinkers. Patiënten positief voor alcohol zijn vaker tussen de 48 en 58 jaar oud en hebben vaker letsel als gevolg van geweld, terwijl patiënten positief voor drugs vaker tussen de 28 en 38 jaar oud zijn en vaker werkloos zijn dan patiënten die geen drugs hebben gebruikt. Wanneer de focus ligt op de groep van Nederlandse mannen tussen de 18 en 35 jaar oud zijn er meer overeenkomsten dan wanneer we de totale populatie bekijken tussen de verschillende spoedeisende hulp afdelingen wanneer het alcohol betreft. In het geval van drugsgebruik zijn er meer verschillen tussen de verschillende spoedeisende hulp afdelingen. In dit hoofdstuk wordt geconcludeerd dat alcoholinterventies daardoor meer ziekenhuis en regio onafhankelijk dienen te zijn en drugsinterventies meer regiospecifiek. *Hoofdstuk 6* heeft als doel voorspellende factoren voor een aan alcohol en/of drugs gerelateerd spoedeisende hulp bezoek te identificeren. Wat betreft alcoholgebruik onder patiënten op de spoedeisende hulp blijkt dat een

spoedeisende hulp bezoek rond middernacht, aankomst per ambulance en gelijktijdig drugsgebruik voorspellers zijn. In het geval van drugsgebruik zijn voorspellende factoren de leeftijdscategorie 18 tot 35 jaar, bezoeken doordeweeks, letsel als gevolg van geweld en alcoholgebruik. Specifieke risicogroepen identificeren is complex, omdat alcohol door verschillende leeftijdsgroepen wordt gebruikt met minder specifieke eigenschappen in vergelijking tot drugsgebruik. Drugsgebruik is meer gebruikelijk onder specifieke leeftijdsgroepen, maar als gevolg van een lagere prevalentie dan bij alcoholgebruik is de kosteneffectiviteit van drugsinterventies waarschijnllijk niet groot.
In het laatste hoofdstuk van dit proefschrift, *hoofdstuk 7*, worden de conclusies getrokken gebaseerd op de resultaten van de studies uit de voorafgaande hoofdstukken. Belangrijke methodologische aspecten van studies op de spoedeisende hulp zijn de meetinstrumenten en selectie bias. Het aanbevolen meetinstrument om de relatie tussen het alcohol- en drugsgebruik en de reden van het spoedeisende hulp te onderzoeken is een zelfrapportage vragenlijst. In tegenstelling tot bio-chemische markers, vaak de gouden standaard genoemd, levert zelfrapportage betrouwbaardere gegevens op over het daadwerkelijke gebruik voorafgaande aan het letsel/de ziekte. Naast de gebruikte meetinstrumenten beïnvloeden ook de methode van dataverzameling en selectie bias de onderzoeksresultaten. Selectie bias kan op verschillende momenten optreden, zowel voor als tijdens de spoedeisende hulp behandeling. Dit leidt vervolgens tot een populatie ongevalspatiënten als gevolg van alcohol en/of drugsgebruik, die niet de totale spoedeisende hulp populatie representeert van daadwerkelijke ongevallen als gevolg van alcohol en/of drugsgebruik. Voor toekomstige onderzoeken luidt de aanbeveling: 24 uur per dag onderzoeksstaf, een zelfrapportage vragenlijst in combinatie met een inschatting van een patiënt's alcoholgebruik door het spoedeisende hulp personeel en bloed en urinesamples voor drugsgebruik onder patiënten die niet in staat zijn om een vragenlijst in te vullen. Dit onderzoek veronderstelt dat de inschatting van een patient's alcoholgebruik door onderzoeksmedewerkers of spoedeisende hulp personeel eenvoudiger is dan een inschatting van een patient's drugsgebruik. Ondanks het feit dat alcoholgebruik sociaal meer geaccepteerd is, lijken patiënten eerder bereid om hun drugsgebruik toe te geven dan hun alcoholgebruik. De gevonden prevalentie cijfers van alcohol- en drugsgebruik en de gevonden verschillen tussen regio's zijn vergelijkbaar met internationale bevindingen, waarbij eveneens verschillen tussen de diverse regio's gevonden zijn. Alcohol werd gerapporteerd door 10 tot 18% van de spoedeisende hulp patiënten en drugsgebruik werd gerapporteerd door 2 tot 8% van de patiënten, waarbij beide groepen vaker uit mannen bestaan, vaker excessieve drinkers zijn, en vaker een combinatie van beide middelen gebruiken. De resultaten van dit onderzoek wijzen er op dat interventies geïnitieerd kunnen worden op de spoedeisende hulp, waarbij de focus meer op het alcoholgebruik van de patiënt dient te liggen dan op het drugsgebruik. Dit omdat alcoholgebruik eenvoudiger te signaleren is, minder regiospecifiek is, vaker voorkomt en er meer effectieve alcoholinterventies beschikbaar zijn.

Dankwoord

Na ruim vier jaar werken schrijf ik met dit dankwoord dan eindelijk de laatste woorden van mijn proefschrift. De afgelopen anderhalf jaar heb ik volgens mij tegen bijna iedereen die vroeg hoe het nu met mijn proefschrift stond gezegd: “het is bijna af...”. Uiteindelijk zag ik dan ook bij velen een verbaasde blik toen ik vertelde dat het klaar was en dat ik een zelfs een promotiedatum had!

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Curriculum Vitae

Salvatore Vitale was born in Delft on the 12th of May 1976. After completing his secondary school Gymnasium at the Sint Stanislas College Delft in 1994 he continued his studies at Leiden University. There he obtained a master's degree in Clinical and Health Psychology in 2000. His master's thesis entailed a detailed study of the differences in smoking behaviour between Dutch and Italian adolescents which he partially conducted in Rome, Italy, at the Università degli studi di Roma "La Sapienza". Upon graduation he commenced his research career at the Addiction Research Institute (IVO) in Rotterdam focusing on various addiction-related topics such as dual diagnoses, illicit drug addiction among the elderly, adolescent smoking behaviour, and drug abuse among prostitutes. Here, in November 2002, he started on his Ph.D on alcohol and illicit drug use among emergency room patients in the Netherlands.

Since 2001 Salvatore has also been working as a psychologist at the GGZ Groep Europoort, and since June 2005 has been combining this with work at the department of neuropsychology and psychodiagnostics at the GGZ Dijk en Duin.

As of February 2007 Salvatore works as a psychologist and researcher at the department of psychiatry at the Erasmus MC Rotterdam.