CHAPTER 10 : SURVEILLANCE AND MONITORING OF ACUTE ALCOHOL-RELATED PROBLEMS IN THE EMERGENCY ROOM

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Summary

The ability to *monitor* rates of serious alcohol-related harms in the population, both across time and place, is an essential cornerstone of any comprehensive policy to address these harms. Emergency Rooms (ERs) are ideal settings to identify and monitor new emerging trends in risky patterns of alcohol and other substance use that increase the risk of injury, overdose or poisoning and many of the acute harms caused by excessive drinking. The establishment of ongoing population based *surveillance* ER systems to detect such trends can be an invaluable approach for early detection and intervention for a variety of health problems. One challenge to overcome in relation to alcohol-related trauma is the reliable identification of cases which are at least partially caused by alcohol. Five main opportunities for monitoring and surveillance are discussed: (i) surveys of attendees, (ii) objective tests of breath or blood alcohol level, (iii) brief additional questions, flags or codes in routine records, (iv) application of etiologic fractions to diagnostic data, and (v) the development of surrogate measures indicative of high alcohol involvement. While some of these measures have been validated and applied in the evaluation of local harm reduction interventions, they are rarely employed in surveillance and monitoring systems. We argue in this chapter that multi-method approaches can be created in sentinel ER sites as a component of comprehensive monitoring and surveillance systems. Such an approach is perhaps best located within a broad injury and/or poisoning surveillance system.

Introduction

National and international statistics on alcohol-related harms tend to emphasise estimates of total numbers of deaths (e.g. Rehm et al, 2006) or total economic costs (e.g. Collins and Lapsley, 2003) but rarely report trends or variations across place and time. Monitoring such trends can be valuable as a means of guiding the development and evaluation of interventions, whether these are at the national, regional or local level (WHO, in press). While a single estimate of lives lost and economic impacts can raise awareness and build momentum towards new policy initiatives, the monitoring of trends using repeated measures provides a sharper focus on whether prevention and treatment policies are being well directed and effective. When such monitoring achieves a continuous coverage or includes very frequent assessments, this is often termed "surveillance" (Hirshon, 2000). Continuous monitoring of alcohol and other substance use in the ER has the potential to identify new and emerging patterns of risk for serious injury, overdose and poisoning events in a timely way that may reduce or prevent future occurrences.

There is growing international interest in the broadening of national alcohol monitoring beyond general population surveys to "harder" measures of estimated rates of alcohol-caused mortality and morbidity (WHO, 2000 and in press; Chikritzhs et al, 2003). General population surveys tend to be periodic (e.g. every 3 to 10 years), suffer from substantial underreporting of drinking (Stockwell et al, 2005), have variable (mostly falling) rates of compliance and rely on self-attributions of causation for alcohol-related problems (e.g. Adlaf et al, 2005). By contrast, harm indicators derived from coroner and health statistics offer comprehensive coverage of rates of serious harms over both time and place. The major challenge with these sources is the identification of cases that are specifically alcohol caused or those with a high probability of being so. This challenge is especially apparent in relation to presentations to ERs: while these are more numerous than either deaths or hospital episodes, information specifically linking ER presentations with previous alcohol consumption is mostly absent. This chapter will discuss the potential for different types of data collection in the ER to contribute to comprehensive national alcohol and other drug monitoring in a significant way.

Monitoring and surveillance systems, whether at the national, regional or local level, have tended to focus more on illicit drug use and related harms than on alcohol. Well developed drug surveillance systems exist in several countries such as the Illicit Drug Reporting System (IDRS) in Australia (Topp et al, 2004), the Drug Abuse Warning Network (DAWN) in the US (Kraman, 2004), the South African Community Epidemiological Network on Drug Use (SACENDU) (Parry et al, 1997), the Canadian Community Epidemiological Network on Drug Use (CCENDU) (e.g. Buxton et al, 2005) and the US Arrestee Drug Abuse Monitoring (ADAM) (Ashcroft et al, 2003). Each of these systems has only a limited focus on alcohol despite global evidence of substantially greater harm associated with alcohol misuse (Rehm et al, 2004). One exception is the Australian National Alcohol Indicators Project (Chikritzhs et al, 2003) which has reported on trends in risky patterns of alcohol use and per capita consumption. This reports serious alcohol-related harms across all Australian jurisdictions as well as within major subpopulations defined by age and ethnic background (see www.ndri.curtin.edu.au). This monitoring system has been explicitly developed on the basis of the *International Guide to Monitoring Alcohol Consumption and Related Harms* (WHO, 2000 and in press) and has been applied in the evaluation of major policy initiatives such as alcohol tax changes (Stockwell et al, 2001; Chikritzhs et al, 2005).

As is apparent from many of the contributions to this volume, there has been an upsurge of data collection initiatives in the ER which now span a few dozen countries and mostly use comparable protocols. This has facilitated cross-cultural analyses of the extent to which alcohol contributes causally to various kinds of injury presentations (e.g. Macdonald et al, 2005) and also provides possible directions for monitoring and surveillance (Young et al, 2004).

Advantages of the ER for surveillance and monitoring

The great potential of the ER for alcohol surveillance is indicated by the fact that a substantial proportion of alcohol-related morbidity and mortality is often related to the short term effects of heavy episodic alcohol use. It has been estimated that 68% of cases of in-patient hospital care in Australia caused by alcohol misuse were from the acute effects of alcohol (Chikritzhs et al, 2003). In addition,

over two-thirds of these episodes were from acute causes, mostly some form of injury (Chikritzhs et al, 2003). Another advantage of an ER setting for monitoring purposes is the high volume of people presenting with conditions related to their alcohol and other substance use. In Canada it was reported that as many as 13% of Canadians visited an ER in 2003, most of whom were not admitted and not therefore otherwise entered into the hospital record system (Carriere, 2004).

One significant advantage of ER data is that people often seek medical attention for acute injuries and illnesses provided they can physically reach treatment sites. For example several studies have found that many people that present violence related injuries to the ER do not report these incidents to the police (Brinkman et al, 2000). This is not to say that there are no biases in these data sets (see below), however, in the main, the existing biases limit the direct comparability *between sites* rather than within *one site* over time.

Challenges of the ER for surveillance and monitoring

There is a challenge to identify reliable subsets of presentations with a high probability of alcohol involvement in order to form the basis for an indicator of alcohol-related harm. These ER presentations are highly variable among hospitals and reflect the unique geographic composition of the catchment area, density, hours of opening, availability of transportation and waiting times for treatment – as well as changes in these in one location over time. ER staff are generally too busy to do more than respond to the immediate presenting problem and will often be selective of whom they will ask about alcohol use (Brinkman et al, 2000). An additional challenge is that even standard medical diagnostic information is often not readily accessible in an electronic format from ER departments. This at least has been the experience of the first author in both the Australian and Canadian context. While it is possible to hire interviewers to collect alcohol and other drug use information by self-report and breathalyser from persons presenting, this is usually too costly a procedure for routine surveillance and monitoring but may be possible with recurrent sampling.

Available Strategies for ER Monitoring

Special surveys

Following the lead of Cherpitel and colleagues work over two decades examining alcohol-related injuries in the ER and reviewed extensively in this volume, over 30 countries have developed and implemented consistent protocols to assess alcohol and other substance use through interviews focusing on the six-hour period leading up to an injury or acute illness event. These protocols typically serve an analytic purpose rather than that of monitoring. They typically involve approaching a representative sample of ER patients round-the-clock for several weeks. Interviews last between 15 and 30 minutes and include a request to take a breathalyser sample. Response rates have typically been in the region of between 70 and 80% (Cherpitel, 1993).

While alcohol-related presentations to the ER have been used as one indicator in the evaluation of local community intervention in the US (e.g. Puttnam et al, 1991; Treno and Holder, 1997) and in Australia (e.g. Burns et al, 1995) these have not involved the use of such interviews. In one case the prohibitive cost of doing so was a major reason for the creation of an alternative surrogate measure (Treno and Holder, 1997).

The DAWN surveillance tool, used in US ERs, introduced some limited coverage of alcohol-related presentations in 2003: visits involving the misuse of alcohol for minors are recorded and also for adults when this is judged to occur in conjunction with another drug (Ball et al., 2005). DAWN involves the rating of case notes of ER attendees and has coverage rates ranging from 45% to 77% (SAMHSA, 2006). Clearly this procedure is dependent on the clinical staff detecting the presence of alcohol and reporting this in the case notes.

With obvious cost considerations for ongoing monitoring, options for ER surveillance relying on special surveys might be affordable in some jurisdictions provided careful time sampling is applied. Key ER departments in a particular jurisdiction would need to be selected as "sentinel sites", chosen on the basis of serving a significant catchment area in a city or region of interest. Establishing consistent data collection protocols would enable tracking variations in levels and types of alcohol-related harm over time. Time sampling (e.g. see Room et al, 1987) would need to allow for seasonal variation in drinking patterns and levels of related harms and focus on high risk times (e.g. between 10 p.m. and 6 a.m. on weekends).

Another approach to collecting data from ER patients is through self-administered questionnaires. This approach allows for the collection of information from a large number of people at much lower costs than interviews and avoids the possibility of interview biases that could skew the results. This approach is more appropriate in jurisdictions with a high literacy rate, such as developed countries, because those who cannot read would be excluded from the study, introducing possible biases in the data.

Objective tests for alcohol use

The issue of objective tests in the ER is beset with ethical and technical difficulties, whether it be a routine sample of urine, blood, breath or saliva. In relation to assessing presence of alcohol, the evidence, to date, is that self-reported consumption is a more sensitive test. This is because by the time an individual is interviewed in the ER and they submit to a test, blood alcohol levels may have ready fallen to zero – as well alcohol consumption may have occurred since the injury or illness event (McLeod et al, 2000). There is no doubt, however, that high levels of compliance with a simple breath test can be achieved, being a more cost-effective objective method. A clear advantage for objective tests is that despite the lack of sensitivity in many cases, a relatively standard procedure can be applied for taking the measurement and hence utilising the results to develop indicators over time for a particular area or sentinel site. Restricting data used in these indicators to those tests conducted within a relatively short time of the injury event would increase the sensitivity of the measure. Some ER departments already implement routine urine, blood or breath alcohol assessments and it is possible that such clinical assessments are easier to institutionalize in acute medical care settings than are interview protocols (e.g. Treno and Holder, 1997). There are also clinical reasons for assessing blood-alcohol levels in the management of many acute conditions which may also help to cement routine alcohol screening in an ER department. Anecdotally, some policy makers and health-care workers have objected to the application of breathalyser testing in health care settings because of the association of this procedure with police and law enforcement. There

is a concern that the implied lack of trust in this procedure may interfere with the doctor-patient or nurse-patient relationship. One possible way of diminishing the conflict here is to use measurements, the accuracy and specificity of which fall below legal standards; for example, saliva sticks that change color (Guang-chou et al, 1992) or handheld breathalyzers (which look like a torch/flashlight and sometimes used by traffic police for screening using random breath testing) that measure alcohol in the air around the subject. For basic epidemiological monitoring and surveillance complete accuracy is not a great concern, although inaccurate measurement is of no use to the legal system.

A predominant research issue with ER studies is that informed consent is typically required for ethical reasons from patients to be interviewed or to obtain breath samples for research purposes. Consent can introduce a bias in that those who refuse to participate are more likely to have consumed alcohol than those who consent. This bias can be especially strong for events where criminal liability may be involved (i.e. drinking and driving) but also can occur due to social desirability effects. One method of avoiding non-response bias is to take samples without consent to use for research purposes. This situation can occur when blood samples are required for medical purposes, often in cases of severe trauma where the patient is unconscious. In some jurisdictions, procedures can be implemented where the results of blood tests can be used for epidemiological research studies, while preserving the identity of the subjects. The National Trauma Registry in Canada is an example of this type of injury surveillance system (Public Health Agency of Canada, 2005). The trauma registry includes 40 participating hospitals and utilizes external causes of injury (E codes), blood alcohol levels (BAL) from designated hospitals and the cause of death extracted from coroners records.

Alcohol flags, use of Y-codes and other adaptations of medical record forms

A variety of simple devices have been tried both in healthcare and police settings with the objective of making it easy for emergency personnel to indicate if alcohol was a factor in a presenting problem. Examples include a simple box to be ticked, a couple of questions to be administered by a triage nurse or the use of the under-utilised "Y-codes" in ICD-10. The latter has been discussed in some detail in the preceding chapter in this volume. In each case one major problem is that an individual has to make a difficult judgment in a busy stressful environment regarding whether alcohol is likely to have played a contributory role in a presenting complaint. This judgment has many subjective elements regarding interpretation of verbal reports and clinical signs (Brinkman et al, 2000).

Brinkman et al (2000) cite examples where the use of such flags and special codes often decline over time leading to a particular ambiguity that the absence of a tick can variously mean a failure to consider the question, not being certain of the answer or just the absence of alcohol as a risk factor. Indeed, with one or two exceptions, the experience of a WHO exercise to increase compliance with Y-codes confirmed that rates of their use vary considerably between sites and overtime, thus compromising the interpretation of data as indicators (see Chapter 9 in this volume). Y-codes require ongoing training of staff and are plagued by compliance issues and inconsistent interpretation of the codes. We recommend that consideration be given to these devices only in situations where the completion of the flag, box or code is compulsory so that missing data problems are reduced.

The application of etiological fractions to ER attendance data

In the absence of reliable local estimates of alcohol's contribution to injury, well developed and widely used methods now exist for estimating the proportions of cases presenting to hospital departments with particular ICD-9 or ICD-10 diagnoses in which alcohol was a causal factor, otherwise known as "etiologic fractions" (see WHO, 2000 and in press). Estimates of these are derived from meta-analyses of national and/or international studies linking levels of alcohol consumption to different injury and illness outcomes and take account of different rates of hazardous alcohol use in different age and gender groups in a particular population (e.g. English et al, 1995; Rehm et al, 2004). In theory, it is possible to apply these fractions to ER attendance data. In practice, it is often not the case that the necessary diagnostic information is both assessed routinely in the ER and, where it is, that it is then also entered into an electronic database. This, however, is changing as more information is recorded electronically in different healthcare environments.

International ER studies are increasingly providing a rigorous basis for the calculation of relative risks and alcohol etiological fractions (e.g. Cherpitel et al, 2005a; McLeod et al, 2000). Some studies have simply estimated relative risks for all injury events rather than breaking them down into smaller diagnostic categories – such as those found in the International Classification of Diseases (ICD). In practice, this amounts to the weighting of each injury presentation to an ER according to age and gender using meta-analyses such as Cherpitel et al, (2005b) to estimate the probability of alcohol consumption in each case. It cannot be assumed that relative risks and etiologic fractions are universally transferable across all cultures and settings (WHO, 2000) and hence the meta analyses used for these estimates should, as far as possible, be based on the most recent studies of broadly comparable populations. Again, local data (when available) provides the most reliable estimates of relevant etiologic fractions, conventionally taken to be the proportion of cases with injuries presenting with a BAC above 0.08 mg/100ml (e.g. see English et al, 1995).

Other surrogate measures of alcohol-related injury

A recent analysis of the international ERCAAP dataset found that 75% of young, single males presenting an injury between 12 midnight and 4am had recently consumed some alcohol (Young et al, 2004). Variations were also analysed and confirmed for other sociodemographic subgroups of ER attendance at different times of day and week. The authors recommended that these data could be used to derive surrogate measures for local rates of alcohol-related injuries. The WHO International Guide on Monitoring Alcohol Consumption and Related Harm (WHO, 2000) recommends this as a surrogate indicator of alcohol-related harm. It should be noted that variations in trading hours will impact upon the application of this surrogate measure in one local area and may also require variations in the specific time period employed.

A similar 'surrogate' measure involving weekend injury presentations to ERs was successfully used to evaluate the US Community Trials Project (Holder and Treno, 1997). These authors noted the high prevalence of alcohol-related injuries in the US and evaluated alternative means of monitoring levels of these, both for epidemiological and evaluation purposes. They identified characteristics of certain hospital discharge cases indicative of alcohol-involvement and used

these to develop a highly cost-effective monitoring tool method compared with the use of regular population surveys. They identified advantages such as the availability of data for many years baseline prior to an intervention being implemented, good statistical power when interventions cover a large population, very low costs and good accessibility of the data for researchers. A weighting method was developed and applied to reflect the probability of any individual injury presentation being alcohol-related based on estimates derived from a sizeable hospital database that included BAC measures on admission. Weighted hospital discharge data were then used as part of the evaluation of the Community Trials Project and, along with other measures, demonstrated a significant impact on overall injury rates (Treno & Holder, 1997). The final model demonstrated a significant increase in the probability of injuries being alcohol-related variously for males, patients age 21 to 34, patients presenting on Fridays and Saturdays, those presenting between midnight and 4am, and also those presenting with head injuries. Disadvantages of this method include a significant delay before the key data usually become available and that, for smaller geographic areas and short time periods, numbers of discharged patients with injuries may not be large enough for analysis. Furthermore, the highest probabilities of alcohol-involvement available from the model were relatively modest, being only in the region of 40% (e.g. for a young male, admitted on a Saturday with a head injury).

Young et al (2004), however, extended the Treno and Holder (1997) approach by applying it to the "walking wounded", i.e., ER attendees who are not admitted. They provided analyses of different subsets of attendees who varied in the extent to which their injuries were alcohol-related as evidenced by self-report or BAC, using the international ERCAAP dataset. A trade-off was identified between having a high-volume of cases but with a lower proportion being alcohol-related (e.g. 46% of all persons attending between the hours of 10 pm and 6 am) versus a relatively small volume of more narrowly defined cases containing a much higher proportion with prior alcohol consumption (e.g. 75% of all young single males presenting between midnight and 4 am). The authors recommend developing surrogate measures that optimise the specificity of alcohol involvement with a sufficient volume of data to generate requisite statistical power for any required analyses of these surrogate measures of local rates of alcohol-related harm (Young et al, 2004).

Conclusions and Recommendations

The above five general approaches to monitoring acute alcohol-related harm in the ER are not mutually exclusive and an optimal strategy might involve encouraging elements of each to be applied in a consistent manner – depending on the availability of resources and access to requisite data. The single most specific, cost-effective and objective indicator would be the number of injuries involving young single males presenting between midnight and 4 am on Friday and Saturday nights (Young et al, 2004). This could also be presented as a proportion of all presentations to that ER on Fridays and Saturdays to control for seasonal variations in the local population. Such an indicator could be used to contribute to the evaluation of a local alcohol harm reduction initiative. Total number (or proportion) of positive BAC cases would also be a specific, but less cost-effective, indicator given the expense of conducting breath tests, calibrating the

breathalysers and compiling the data. Applying etiologic fraction weights to all admissions depending on age, sex and presenting problem would also be a useful, reasonably cost-effective though less specific approach. Its value would be increased greatly if local data collection was used to estimate alcohol etiologic fractions for injuries presenting to a particular ER (e.g. Treno and Holder, 1997). In the latter case, it would be ideal to base etiologic fraction estimates on BAC levels obtained no more than two hours after the injury event and also after determining no alcohol consumption had occurred since the injury event. As discussed by Room (Chapter 9 in this volume), further work is needed to simplify the use of the new Y-codes in ICD-10 where they are related to categories of blood alcohol level and/or ratings of degree of intoxication so as to increase the likelihood that they are used reliably.

As one component of a national surveillance and monitoring system, it would be feasible to establish sentinel sites in major cities where the above indicators of acute alcohol-related harm could be collected routinely. Their added value to more traditional alcohol harm indicators based on alcohol-related mortality and morbidity data lies in the much higher frequency of ER presentations than of either hospital admissions or deaths. When combined with sample interviews at high risk times (i.e. late weekend nights), it would also be possible to gather information about the combined use of alcohol with other psychoactive substances, both licit and illicit (Sturge et al, 2006). Combined use of alcohol with other substances such as opioids or other central nervous system depressants is known to present special risks for drug overdose or injury indicating potential value in monitoring trends in patterns of combined substance used in a comprehensive alcohol and other drug surveillance system (Sturge et al, 2006).

References

Adlaf EM, Begin P, Sawka E, eds (2005). *Canadian Addiction Survey (CAS): A national survey of Canadians' use of alcohol and other drugs: Prevalence of use and related harms: Detailed Report*. Ottawa: Canadian Centre on Substance Abuse.

Ashcroft J, Daniels DJ, Hart SV (2003). 2000 *Arrestee Drug Abuse Monitoring: Annual Report*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, National Institute of Justice.

Ball JK, Ducharme L, Green J (2005). The DAWN Report – New DAWN: Why It Cannot Be Compared with Old DAWN.
(Available at: http://dawninfo.samhsa.gov/files/DAWN_TDR_new_old.pdf)

Brinkman S et al. (2000). "An indicator approach to the measurement of alcohol-related violence." In: Williams P, ed. *Alcohol young people and Violence, Australian*. Australian Institute of Criminology, Research and Public Policy, Canberra.

Burns L et al. (1995). Policing pubs: what happens to crime? *Drug and Alcohol Review* (14):369-376.

Buxton J (2005). Vancouver Drug Epidemiology, Vancouver Site Report for the Canadian Community Epidemiology Network on Drug Use.
(Available at: http://www.vancouver.ca/fourpillars/pdf/report_vancouver_2005.pdf)

Carriere G. Use of Hospital Emergency Rooms. *Health Reports* 16, 1 (October 2004), Statistics Canada, catalogue no. 82-003.

Cherpitel CJ (1993). Alcohol and injuries: A review of international emergency room studies. *Addiction* **88**: 923-937.

Cherpitel CJ, Ye Y, Bond J (2005a). Attributable risk of injury associated with alcohol use: a cross-national meta-analysis from the Emergency Room Collaborative Alcohol Analysis Project. Am. J. *Public Health* **95**:266-272.

Cherpitel CJ et al. (2005b). Multi-level analysis of alcohol-related injury among emergency room patients: A cross-national study. *Addiction* **100**, 1840-1850.

Chikritzhs T et al. (2003). *Australian Alcohol Indicators, 1990-2001: Pattern of alcohol use and related harms for Australian states and territories*. National Drug Research Institute, Curtin University of Technology, Perth, West Australia. ISBN 1 74067 300 X.

Chikritzhs T, Stockwell T, Pascal R (2005). "The impact of the Northern Territory's Living With Alcohol Program, 1992-2002: revisiting the evaluation." *Addiction*. **100**, 1625-1636.

Collins D, Lapsley H (2002). *Counting the cost: estimates of the social costs of drug abuse in Australia in 1998/9*. Canberra: Commonwealth Department of Human Services and Health, Monograph Series Number 49.

Cummings GE et al. Health Promotion and Disease Prevention in the Emergency Department: A feasibility study. Can J Emerg Med 2006;8:100-5.

English D et al. (1995). *The Quantification of Drug Caused Mortality in Australia 1992*, Commonwealth Department of Human Services and Health, Canberra.

Guang-chou T, Bhushan K, Isreal Y (1992). Characteristics of a New Urine, Serum, and Saliva Alcohol Reagent Strip. *Alcoholism: Clinical and Experimental Research*, **16**, 222.

Hirshon JM. The rationale for developing public health surveillance systems based on emergency department data. *Acad Emerg Med* 2000;7:1428-32.

Kraman P (2004). *Drug Abuse in America: Rural Meth*. Lexington: The Council of State Governments.

McLeod R et al. (2000). *The influence of alcohol and drug use, setting and activity on the risk of injury – a case-control study*. National Drug Research Institute, Curtin University of Technology, Perth, Western Australia.

Parry CDH et al. (1997). The South African Community Epidemiology Network on Drug Use (SACENDU): description, findings (1997-99) and policy implications. *Addiction* **97**:969-976.

Public Health Agency of Canada. *Inventory of Injury Data Sources and Surveillance Activities*. Centre for Surveillance Coordination. 2005 (ISBN: H121-3/2005E-PDF 0-662-40052-6)

Putnam S, Rockett I, Campbell M (1993). Methodological issues in community-based alcohol-related injury prevention projects: attribution of program effects, in *Experiences with Community Action Projects: Research in the Prevention of Alcohol and other Drug Problems*. Greenfield TK, Zimmerman R, eds. US Department of Health and Human Services: Rockville, Maryland.

Rehm J et al. (2004). *Alcohol Use*. In: Ezzati M et al., eds. Comparative Quantification of Health Risks. Global and Regional Burden of Disease Attributable to Selected Major Risk Factors. 1: 959-1108. Geneva: World Health Organization.

Rehm J et al. in collaboration with Adlaf E, Recel M, Single E (2006). *The Costs of Substance Abuse in Canada 2002*. Ottawa, ON: Canadian Centre on Substance Abuse.

Room R (1987). Models for future work on alcohol's role in casualties. In: Norman Giesbrecht, Honey Fisher, eds. *Alcohol-Related Casualties: Proceedings of an International Symposium held at the Guild Inn, Toronto, Canada, August 12-16, 1985*. Toronto: Addiction Research Foundation, pp 85-94.

Substance Abuse and Mental Health Services Administration, Office of Applied Studies. Drug Abuse Warning Network, 2004: *National Estimates of Drug-Related Emergency Department Visits*. DAWN Series D-28, DHHS Publication No. (SMA) 06-4143, Rockville, MD, 2006.

Stockwell TR et al. (2001). "The public health and safety benefits of the Northern Territory's Living With Alcohol program." *Drug and Alcohol Review*, 20, (2), pp. 167-180.

Stockwell T, Sturge J, Macdonald S (2005). *Patterns of risky alcohol consumption in British Columbia: Analysis of the 2004 Canadian Addiction Survey*. Statistical Bulletin number 1: Centre for Addictions Research of BC, University of Victoria, British Columbia.

Sturge J, Stockwell T, Macdonald S (2006). A comprehensive alcohol and other drug epidemiological monitoring system for Canada: A pilot project in British Columbia and Ontario, Canada. Paper presented at the 32nd annual symposium of the Kettil Bruun Society for Social and Epidemiological Research on Alcohol, Maastricht, the Netherlands, May 28-June 2, 2006.

Topp L et al. (2004). Adapting the Illicit Drug Reporting System (IDRS) to examine the feasibility of monitoring trends in the markets for 'party drugs'. *Drug and Alcohol Dependence* **73**(2):189-197.

Treno AJ, Holder HD (1997). Measurement of alcohol-involved injury in community prevention; the search for a surrogate. *Alcoholism: clinical and experimental research* **21**(9), 1695-1703.

World Health Organization (2000). *International guide for monitoring alcohol-related problems, consumption and harm*, World Health Organization: Geneva.

World Health Organization (in press). *International guide for monitoring alcohol-related problems, consumption and harm, 2nd Edition*. World Health Organization: Geneva.

Young D et al. (2004). Emergency room injury presentations as an indicator of alcohol-related problems in the community: A multilevel analysis of an international study. *Journal of Studies son Alcohol* **65**(5), 605-612.