

Tourists as inpatients in Queensland regional hospitals

JENNIFER NICOL, JEFFREY WILKS AND MARYANN WOOD

Jennifer Nicol is a Lecturer in the School of Public Health, Queensland University of Technology. Jeffrey Wilks is a Psychologist and Attwood Marshall Fellow in the School of Law, Bond University. Maryann Wood is Health Information Manager with the National Reference Centre for Classification in Health, Queensland University of Technology.

Abstract

This study analysed medical record data from seven regional hospitals in Queensland to determine the types of medical conditions and injuries that resulted in overseas and interstate tourists being admitted to hospital. From a total of 135 128 admissions to the participating hospitals, 695 (0.51 per cent) were identified as overseas tourists and 3479 (2.57 per cent) were from interstate. The main reasons for admission of overseas tourists, based on principal diagnoses, were injuries and poisonings (37.6 per cent), circulatory disorders (11.7 per cent), digestive conditions (9.8 per cent), and genito-urinary disorders (8.8 per cent). For interstate tourists, the main reasons for admission were genito-urinary disorders (19.8 per cent), injuries and poisonings (15.4 per cent), neoplasms (11.4 per cent) and circulatory disorders (10.6 per cent). These findings are discussed in relation to current literature in the field of travel medicine, emphasising the burden of care placed on the admitting hospital's resources, and the growing number of visitors to Queensland needing health care.

Introduction

Each year the number of international visitors to Australia increases substantially. In 1994 there were 3 361 700 overseas visitors to the country (Australian Bureau of Statistics 1995); by the year 2000 it is predicted that this number will rise to in excess of six million (Australian Tourism Forecasting Council 1994). Australian domestic tourists also constitute a large travelling group, with 11 638 000 interstate trips reported during 1992–93 (Bureau of Tourism Research 1994).

Australian travel medicine authorities estimate that, of the current 3.3 million overseas tourists to this country, 45 per cent or 1.49 million may experience some health problem during their travels (Yung & Ruff 1994). Extrapolating from international figures, Wilks and Oldenburg (1995) have recently estimated that up to 22 500 overseas visitors may require treatment in a hospital. It should be noted, however, that these estimates are based on data for travel to African and Asia-Pacific nations which do not have the same high standards of public health that Australia enjoys. In reality, overseas visitor health needs may be considerably lower than these figures. Estimates of the potential health problems for domestic tourists within Australia are not currently available (Wilks & Oldenburg 1995).

As visitor numbers increase, the Commonwealth Department of Tourism (1992) anticipates that additional pressures will be placed on the capacity of health and safety services to meet the needs of visitors. Moreover, as Australia is a major international holiday destination, it is important that Australian medical practitioners, and health and tourism authorities have detailed information on the health and safety needs of tourists, as well as on the types of medical problems and injuries they are likely to experience (Wilks & Atherton 1994).

From the international literature, the more common medical problems that tourists are likely to experience are heart attacks and cardiovascular disease (Paixao et al. 1991), gastro-intestinal complaints such as diarrhoea (Cossar et al. 1990), sunburn (Ross & Sanchez 1990) and sexually transmitted diseases (Daniels et al. 1992). In the older age groups, cardiovascular disease is the leading cause of death for travellers (Hargarten, Baker & Guptill 1991; Paixao et al. 1991; Prociv 1995).

Injuries are also a significant cause of morbidity and mortality among travellers. Paixao et al. (1991) report that traumatic deaths accounted for 21 per cent of travel-related fatalities in their sample of 952 Scottish travellers. Injuries were also the most common cause of death among younger age groups. These findings are supported by Hargarten, Baker and Guptill (1991), who found that 25 per cent of deaths in American travellers were due to injuries, particularly injuries related to motor vehicle accidents and drownings.

Injuries resulting from marine-based activities can be a particular problem for tourists. For example, reporting on ocean sports-related injuries in Hawaii, Hartung et al. (1990) found that 25 per cent of those injured were tourists. More than 10 per cent of the injuries in that study required hospitalisation, including four fatalities due to drowning, 12 near-drownings, and 20 cases of decompression illness related to scuba diving. Other common marine injuries included lacerations (28 per cent of all injuries) and marine stings (24 per cent).

In a recent review of health services at three tropical island tourist resorts, Wilks et al. (1995) examined 1183 clinic patient records. They found that 62 per cent of clinic visits were related to medical conditions (mainly respiratory, digestive, skin and genito-urinary) and 38 per cent were injury-related (lacerations, bites and stings, sprains and fractures). Fourteen cases required emergency evacuation from the island resorts, and all were subsequently admitted to hospital. The reasons for evacuation included angina, deep vein thrombosis, asthma, fractured ankle, barotrauma and abdominal pain. These are clearly some of the more serious medical conditions and injuries tourists might experience and suggest that similar serious conditions will be present in general hospital samples.

While not specifically concerned with tourists, presentations at emergency departments provide a broad description of the types of illnesses and injuries that are commonly treated. Emergency department presentations also give some indication of the general patient profile that can be anticipated for travellers as hospital inpatients. Liaw (1992), for example, found that the most frequent reason for presentation at a small rural hospital was injury-related. These injuries included lacerations, sprains and strains, fractures, dislocations and foreign bodies. Respiratory conditions were next in frequency, followed by ear problems, ill-defined conditions, gastro-intestinal disorders, circulatory disorders, infections and skin problems. A similar pattern of general medical and injury-related presentations was anticipated with tourists in the current project.

As part of their general review on the use of Australian hospitals by overseas visitors, Barraclough and McBain (1992) surveyed a small sample of public and private hospitals in Sydney and Melbourne. These hospitals acknowledged that there is a large amount of bad debt associated with treating overseas patients (for example, the Royal North Shore Hospital had to write off \$394 689 in 1990–91; at Royal Prince Alfred Hospital, 70 per cent of bad debts were from non-resident patients). Barraclough and McBain (1992) concluded that it is important that accurate information be collected about visitors accessing Australian hospitals so that the types of treatment provided and the actual number of patients can be identified.

In response to concerns about the use of Queensland hospital services by international and interstate visitors, Walker et al. (1995a) examined a 2.2 per cent random sample of all admissions from six hospitals for the peak holiday periods of December to January and June to August, 1993. In total, 1295 medical records were reviewed to determine if there was any information recorded to indicate that the patient was not a Queensland resident. Overall, there was a detection rate of 4.6 per cent for visitors being incorrectly classified as Queensland residents.

Because more overseas and interstate patients were detected at the Gold Coast than at Brisbane metropolitan hospitals, Walker et al. (1995a) recommended that future studies in this area should target hospitals in major tourist destinations such as Cairns, the Whitsunday area, and the Sunshine and Gold Coasts. This recommendation was adopted as part of the hospital sampling criteria in the present research.

Walker et al. (1995a) also found that many of the diagnoses which necessitated admission to hospital were not routine, but very resource-intensive. They included psychiatric disorders with extended lengths of stay, coronary artery disease requiring coronary artery surgery, other cardiovascular disorders, carcinomas, plastic surgery, renal disease and related procedures, and serious motor vehicle accidents.

Based on the Australian and international literature reviewed above, the following predictions were made for this study.

The main medical conditions resulting in admission to hospital would be circulatory conditions (especially myocardial infarctions and cerebrovascular disease) and gastro-intestinal conditions (cf. Hargarten, Baker & Gupitill. 1991; Paixao et al. 1991). The most common injuries would be related to motor vehicle accidents and drownings (cf. Hargarten 1994; Prociv 1995).

Given that participating hospitals were in coastal or marine locations, it was expected that a considerable number of injuries would be related to water-based activities (for example, scuba diving, swimming, boating). This was directly predicted from the professional literature (for example, Hartung et al. 1990; Wilks & Atherton 1994).

General reasons for admission to regional hospitals were also expected. These included sprains, fractures and foreign bodies (cf. Liaw 1992), and respiratory, circulatory, skin, musculoskeletal and gastro-intestinal disorders (DiGiovanna et al. 1992; Gillett, Liu & Solon 1993).

Methods

Defining the sample

According to Holloway (1989, p 9) a tourist is, by definition, 'a temporary visitor staying at least 24 hours, whose purpose could be classified as leisure (whether for recreation, health, sport, holiday, study or religion), or business, family, mission or meeting'. This general definition applies to both domestic and international visitors in all countries (World Tourism Organization 1993). For the purpose of this research, all people visiting Queensland destinations who were

not residents of the regional health authority in which they were admitted to hospital were considered tourists.

Hospital selection

Following the recommendation of Walker et al. (1995a) that tourist health research should target hospitals at the major tourist destinations in Queensland, the present study chose seven regional hospitals for the sample – Cairns, Townsville, Mackay, Proserpine, Rockhampton, Nambour and Gold Coast. These facilities were chosen because they are the main hospitals in each of the State's major coastal tourist destinations, as identified by the Queensland Tourist and Travel Corporation (1995).

Characteristics of the hospitals

Table 1 presents the main characteristics of each of the participating hospitals. With the exception of Proserpine, which was selected because it is an important mainland facility servicing the Whitsunday Island group, all hospitals are medium to large-sized teaching hospitals (224 to 503 beds) which offer an extensive range of speciality medical services.

Data sampling

Permission was obtained from Queensland Health to purchase data from the seven target hospitals for all separations in the 1993–94 financial year, providing that specific guarantees were made that no individual patients could be identified. The following data fields were obtained.

- *Age groups.* Patients were arranged into five-year age groups (from 0 years to 70+ years) so that individual patients could not be identified by age.
- *Sex.* Gender is identified as an important variable in the international travel medicine literature (for example, Cossar et al. 1990).
- *Area of usual residence.* This was required to identify overseas and interstate visitor groups.
- *All diagnoses, procedures and external causes of injury and illness coded according to the ICD-9-CM* – International Classification of Diseases, Ninth Revision, Clinical Modification (National Centre for Health Statistics 1978).
- *Diagnosis related groups and main diagnostic categories* (DRG/MDC).
- *Total number of separations for each of the hospitals.* Separation is the process by which an admitted patient completes an episode of care in a hospital. Separation may be by discharge, transfer or death (National Health Data Committee 1995).

Table 1: Characteristics of the participating hospitals

Hospital	Beds ^(a)	Separations ^(b)	Specialty areas ^(c)
Cairns	376	24 675	Obstetrics, paediatrics, psychiatry, ICU (level III), ACAU, alcohol and drug, CCU, renal dialysis
Townsville	338	19 834	Oncology, paediatrics, psychiatry, ICU (level III), nursing home care, ACAU, CCU, neurosurgery, renal dialysis, renal dialysis satellite centre, infectious diseases, MRI, AIDS/HIV, diabetes, rehabilitation
Proserpine	34	1 985	Obstetrics
Mackay	224	14 639	Obstetrics, psychiatry, ICU (level III), ACAU, CCU, renal dialysis, domiciliary care
Rockhampton	269	15 640	Obstetrics, paediatrics, psychiatry, ICU (level III), ACAU, alcohol and drug, CCU, neurosurgery, renal dialysis, diabetes, rehabilitation
Nambour	292	25 719	Obstetrics, oncology, paediatrics, neonatal ICU (level III), psychiatry, ICU (level III), nursing home care, ACAU, alcohol and drug, CCU, renal dialysis, renal dialysis satellite centre, AIDS/HIV, rehabilitation
Gold Coast	503	32 636	Obstetrics, oncology, paediatrics, ICU (level III), CCU, ACAU, psychiatry, alcohol and drug, neurosurgery, renal dialysis, diabetes, rehabilitation

ICU = intensive care unit; ACAU = aged care assessment unit; CCU = coronary care unit;
MRI = magnetic resonance imaging

(a) Queensland Health, Finance and Activities Statistics, 1993–94, for public hospitals, residential and related facilities.

(b) Queensland Health, Medicare Monthly Activity Statistics, 1993–94.

(c) Queensland Health, Finance and Activities Statistics, 1993–94, for public hospitals, residential and related facilities.

Results

Patient numbers by participating hospitals

A total of 135 128 patients were admitted to the seven hospitals over the one-year study period. Table 2 shows the number of overseas and interstate patients from each of the participating hospitals.

Table 2: Inpatient numbers in participating hospitals, by origin of patient

Hospital	Total inpatients	Overseas visitors (%)	Interstate visitors (%)
Cairns	24 675	345 (1.40)	400 (1.60)
Townsville	19 834	74 (0.37)	188 (0.95)
Proserpine	1 985	21 (1.06)	66 (3.32)
Mackay	14 639	21 (0.14)	113 (0.78)
Rockhampton	15 640	16 (0.10)	102 (0.65)
Nambour	25 719	63 (0.25)	440 (1.70)
Gold Coast	32 636	155 (0.47)	2 170 (6.65)
Total	135 128	695 (0.51)	3 479 (2.57)

Interstate visitors accounted for 2.57 per cent of inpatient admissions, these visitors being from all other States and Territories of Australia. Of the seven hospitals, the Gold Coast admitted the highest percentage of interstate visitors (6.65 per cent) and Mackay the least (0.78 per cent).

Overseas visitors were a much smaller group, accounting for 0.51 per cent of total admissions. Table 2 shows that Cairns hospital had the greatest percentage of overseas visitor admissions (1.40 per cent), while Rockhampton had the smallest (0.10 per cent).

Reason for admission (principal diagnosis)

Table 3 presents the reasons for admission or principal diagnoses, based on ICD-9-CM chapter headings for all overseas and interstate visitors.

Injuries and poisonings were the main reason for admission for overseas visitors, and second in frequency for interstate travellers. Table 4 shows specific details of injury admissions.

In terms of medical conditions resulting in hospital admission, table 3 shows that circulatory, digestive and genito-urinary disorders rank among the top five problems for both groups of visitors, closely followed by respiratory disorders. Specifically, circulatory disorders included ischaemic heart disease (92 cases), cerebrovascular disease (90), acute myocardial infarction (80), cardiac dysrhythmias (52) and vessel disorders (50). The main digestive problems experienced were diarrhoea (38 cases), cholecystitis/cholelithiasis (36), oesophageal disorders (30), and gastric or duodenal ulcers (27).

Table 3: Reasons for admission for overseas and interstate visitors

Diagnostic category	Overseas visitors			Interstate visitors		
	Frequency	%	Rank	Frequency	%	Rank
Injuries & poisoning	261	37.6	1	535	15.4	2
Circulatory disorders	81	11.7	2	369	10.6	4
Digestive disorders	68	9.8	3	265	7.6	5
Genito-urinary disorders	61	8.8	4	689	19.8	1
Respiratory diseases	44	6.3	5	229	6.6	6
Infectious & parasitic diseases	28	4.0	6	80	2.3	10
Nervous system & sense organ disorders	24	3.5	7	123	3.5	9
Neoplasms	24	3.5	7	397	11.4	3
Musculoskeletal disorders	19	2.7	9	136	3.9	7
Skin conditions	18	2.6	10	63	1.8	12
Obstetrics	15	2.1	11	68	2.0	11
Mental disorders	11	1.6	12	128	3.7	8
Other	41	5.9	–	397	11.4	–
Total	695			3 479		

The most common genito-urinary problems included admission for renal dialysis (589 cases), followed by renal calculus/renal colic (49). The most common respiratory conditions were asthma (67) and pneumonia (51).

Among the admissions for infectious and parasitic diseases there were 12 cases of malaria (11 being overseas visitors), seven patients with chlamydia, one case of cholera, and three interstate patients with HIV/AIDS. Epilepsy was the most common nervous system and sense organ disorder (26 cases). Of the 421 patients admitted due to neoplasms, 298 were admitted for chemotherapy.

The main musculoskeletal conditions were back pain (40 cases) and disc disorders (40). Cellulitis accounted for 46 admissions related to skin conditions. Miscarriages or intra-uterine foetal deaths accounted for 45 obstetric conditions, and there were 11 deliveries recorded. Alcohol or drug dependence or abuse resulted in 41 admissions related to mental disorders, and there were 33 admissions for psychotic disorders, mainly schizophrenia.

The 'other' category included conditions such as syncope, anaemia, endocrine disorders, headaches, fever, chest pain and abdominal pain. Also included were three admissions for sterilisation and three for cosmetic surgery.

Hospital admissions for injuries

Table 4 shows the main types of injuries that required hospitalisation.

Table 4: Details of injury admissions for overseas and interstate visitors

Type of injury	Overseas visitors			Interstate visitors		
	Frequency	%	Rank	Frequency	%	Rank
Fractures	107	41.0	1	214	40.0	1
Decompression illness	35	13.4	2	11	2.1	10
Open wounds	21	8.0	3	70	13.1	2
Intracranial injury – no fracture	18	6.9	4	54	10.1	3
Drowning/non-fatal submersions	9	3.5	5	7	1.3	12
Internal injury to chest, abdomen and pelvis	9	3.5	5	12	2.2	8
Poisoning and toxic effects	9	3.5	5	44	8.2	4
Complications of medical/surgical care	9	3.5	5	32	6.0	5
Contusions	8	3.1	9	18	3.4	6
Dislocations	8	3.1	9	15	2.8	7
Sprains	6	2.3	11	11	2.1	10
Burns	4	1.5	12	6	1.1	13
Effect of foreign body	2	0.8	13	12	2.2	8
Other	16	6.1	–	29	5.4	–
Total	261			535		

Fractures (40 per cent), particularly of the limbs, were the most common type of injury for both groups of visitors. Also ranking in the top four injuries were open wounds (11 per cent), such as lacerations, and intracranial injuries (9 per cent). Of the latter, 44 were non-specific head injuries, followed by 14 haemorrhages and 11 concussions. Sixteen patients were hospitalised as a result of a drowning or non-fatal submersion (near drowning).

Internal injuries to the chest, abdomen or pelvis accounted for 21 injury-related admissions. This category included such conditions as traumatic pneumothorax and rupture of organs, for example, the spleen. Fifty-three patients were admitted to hospital as a result of poisoning by, or toxic effects of, drugs or non-medicinal substances such as alcohol, solvents or carbon monoxide.

Complications of medical/surgical care accounted for 41 injury-related admissions. This category includes patients suffering from conditions such as post-operative infections, problems with joint prostheses, and transfusion reactions.

Contusions (26 cases), dislocations (23), sprains (17), effect of a foreign body (14) and burns (10) were the remaining types of injuries requiring admission to hospital. The 'other' category (45) consisted of miscellaneous injuries such as abrasions, allergic reactions, barotrauma and spinal cord injuries.

Discussion

As predicted from the travel medicine literature, the most common medical conditions that resulted in tourists being admitted to seven Queensland hospitals were circulatory and gastro-intestinal disorders. In keeping with general patient profiles in regional hospitals (Liaw 1992) and presentations to clinics on passenger cruise ships (DiGiovanna et al. 1992), other common inpatient medical conditions identified in this study were related to genito-urinary and respiratory disorders, musculoskeletal problems and skin conditions.

Circulatory disorders were a leading reason for hospital admission among overseas (11.7 per cent) and interstate tourists (10.6 per cent). The types of circulatory disorders identified in this research were largely of a pre-existing nature, such as ischaemic heart disease or cerebrovascular disease, or associated with pre-existing conditions in the case of acute myocardial infarction or embolism. The fact that cardiac problems are a major cause of death for Australians in general (Australian Institute of Health and Welfare 1994), and travellers in particular (Paixao et al. 1991), suggests that circulatory conditions in travellers will continue to be a serious medical problem requiring hospital treatment.

The international literature identifies gastro-intestinal disorders, particularly diarrhoea, as a major reason for tourists to seek medical care (Cossar et al. 1990; Bryant et al. 1991; Looke et al. 1992). This study also identified diarrhoea as the most common gastro-intestinal disorder resulting in hospital admission for overseas and interstate visitors. As noted by Bushell (1993), changes in diet,

climate and alcohol consumption associated with travel are all possible contributors to this condition.

It should also be noted that the ICD-9-CM classifies infectious diarrhoea and non-infectious diarrhoea in separate categories. Non-infectious diarrhoea is classified as a digestive disorder and is therefore included in the gastro-intestinal category. However, any tourist diagnosed with infectious diarrhoea is classified under the infectious and parasitic diseases category. In order to make accurate comparisons across studies, the use of a standardised international classification scheme is recommended for future research. The ICD-9-CM is one classification system that has been shown to be very appropriate for tourist health studies (Wilks et al. 1995; 1996) and enabled accurate coding of the full range of hospital admissions in the present research.

Genito-urinary disorders were also identified in this study as being a frequent reason for tourist hospital admission. Little has been documented in the literature about tourists seeking medical care for genito-urinary disorders. One exception is the recent study by Wilks et al. (1995), where presentations at clinics on three tropical islands included a number of minor genito-urinary conditions such as cystitis and urinary tract infections.

For both groups of tourists studied, hospital admission for renal dialysis was the most common genito-urinary condition. The only other reference to this condition in the literature is the study by Walker et al. (1995a) on the use of Queensland hospitals by tourists. This diagnostic category should be of particular concern to health authorities, given the large number of tourists admitted for renal dialysis (589 cases), the potential costs associated with such treatment, and the financial burden visiting patients place on regional health services.

Neoplasms were identified as the third most common reason for admission for interstate tourists (397 cases) and seventh in rank for overseas tourists (24). Again there is little in the literature about tourists being treated for neoplasms, except for the Walker et al. (1995a) study, where neoplasms were identified as one of the most resource-intensive conditions treated. For both groups of tourists, chemotherapy treatment was the main reason for a neoplasm-related admission. For the interstate group there were 282 admissions for chemotherapy, the potential cost of this treatment to Queensland Health being substantial.

As noted by Bryan (1993), Australia is situated in a major malaria and dengue fever zone. While this study did not identify any cases of dengue fever, it did identify 12 cases of malaria: 11 with overseas tourists and one for an interstate tourist. While these numbers are not large in the overall study, they are still of concern, given that malaria is a potentially fatal, yet preventable infectious disease

(Froude et al. 1992; Behrens & Curtis 1993). Froude and his colleagues (1992) note that malarial infections are often caused by tourists not taking their prophylaxis, or not complying with the correct prophylaxis; the worst compliance occurring in tourists from countries where malaria is endemic. The current finding suggests that there is a need to further develop health promotion and education programs targeting travellers visiting Australia from destinations where infectious diseases are known to exist.

Given that the literature identifies AIDS as the most recent infectious disease to be spread globally by travel (Chapman 1992; Patterson 1992; Cossar 1994), it was surprising that only three cases were identified in this study. Upon reflection, it was realised that according to national coding standards (Eagar & Innes 1992), it is the manifestation of the patient's AIDS condition, such as Kaposi's sarcoma or pneumocystis carinii pneumonia, that must be coded as the principal diagnosis and not the AIDS condition itself. Therefore, no AIDS cases should have been identified by analysing principal diagnosis data. The fact that three cases were identified suggests that some clinical coders are not following correct coding standards. In this instance, to determine the correct number of AIDS cases admitted to the participating hospitals, a further analysis of the data was performed looking at the other conditions diagnosed during the patients' admissions. This secondary analysis identified another 11 cases of AIDS, giving a total of 14 cases: 13 for interstate tourists and one for an overseas tourist.

An unexpected finding in the current study was that of one overseas tourist and two interstate tourists admitted for cosmetic surgery. There were also two overseas tourists and one interstate tourist admitted for sterilisation. Neither of these treatments have been documented in the literature as being tourist-related and seem somewhat inappropriate. As noted by Walker et al. (1995a), further detailed analysis of tourist hospital admissions is urgently required to identify patients who are currently abusing the public health system for elective services. At least on the surface, cosmetic surgery and sterilisation appear to be elective-type procedures rather than emergency procedures. This is an area which should be targeted for future research, especially to determine whether overseas visitors are legitimately paying full fees for their elective health services (Barracrough & McBain 1992).

Injuries and poisonings were the most frequent reason for admission to the participating hospitals for overseas visitors, and the second most frequent reason for interstate visitors. As previously reported by Hartung et al. (1990), Liaw (1992), Purkiss (1990), Johnson et al. (1991) and Wilks et al. (1995), and supported by the findings of this research for both groups of inpatients, the most common types of injuries that tourists experience are fractures, particularly of

the extremities, lacerations or open wounds, and head injuries. Lacerations, in particular, have been noted as a common problem for tourists, especially lacerations from sharp rocks (Grenfell & Ross 1992) and coral (Wilks et al. 1995). Where primary health care services are available, these injuries can be treated on the spot, with only the most severe wounds requiring hospital admission. In the present study, most of the lacerations were of a more serious nature and were mainly caused by sharp objects such as knives, rather than rocks or coral.

Since the participating hospitals were located in coastal areas, it was predicted that there would be a considerable number of injuries unique to the marine environment and water-based activities. In partial support of this prediction, decompression illness was the second most common injury experienced by overseas tourists, a result which supports the findings of previous international studies (Hartung et al. 1990). While 11 interstate tourists experienced decompression illness, it was not identified as a particularly common injury for this group and ranked tenth in their overall list of injuries.

One explanation for the large number of overseas visitors who experienced decompression illness is that, due to language barriers, they may be unable to clearly understand instructions from scuba diving supervisors and consequently get into difficulties. Other factors that have been identified as contributing to scuba diving injuries, especially for international visitors such as the Japanese, include inexperience, poor diver training and inadequate preparation for diving (Mano & Shibayama 1989; Wilks 1993a; 1993b). Because 'country of origin' was not one of the data elements provided by Queensland Health for this research, these specific causes were unable to be verified. Identifying country of origin for all tourists should be a priority in future research.

Poisonings by drugs and toxic effects of substances such as solvents, carbon monoxide and alcohol were the fourth most common injury-related problem for interstate tourists, and ranked fifth for overseas tourists. This finding has not previously been highlighted in the international literature, except where alcohol has been cited as a contributing factor to motor vehicle accidents and drownings (Hargarten 1994), rather than as a poisoning.

The international literature cites drownings as being a major injury suffered by tourists (Hartung et al. 1990; Hargarten, Baker & Guptill 1991; Prociv 1995) and it was predicted that the present study would support this literature. Results provided partial support for the predictions. While drownings or non-fatal submersions were a fairly common injury for overseas tourists (3.5 per cent), they were less frequent for interstate tourists (1.3 per cent). It is likely that many

overseas tourists are not familiar with Australian water conditions and, in fact, may never have swum in an ocean or open water before. These visitors may not understand or take notice of beach warnings and beach flags (Price Waterhouse Urwick 1992; Wilks & Atherton 1994). Future research should therefore examine mechanisms by which water safety messages are conveyed to tourists (Wilks & Oldenburg 1995).

Based on the international literature, drowning figures in this study were quite low. This is possibly due to the fact that the research was based on hospital inpatients. For a person to become an inpatient, he or she must be alive on admission. Therefore, these figures include only tourists who suffer a non-fatal submersion (near drowning) or those who are alive on admission and subsequently die from drowning. Any tourists who are either found dead from drowning or who die before admission to hospital would be identified in Coroners' records rather than hospital inpatient data sets. In the present study this has resulted in a lower number of drownings than expected. To date, there has been no comprehensive study conducted on tourist deaths in Australia. This is a very important area for future research.

As predicted, this study identified sprains, strains and dislocations as being fairly common injury-related reasons for hospital admission among tourists. However, other injuries described in the literature as being common for tourists, such as abrasions (Hartung et al. 1990), sunburn (Ross & Sanchez 1990; Grenfell & Ross 1992), bites, stings and coral cuts (Grenfell & Ross 1992; Wilks et al. 1995) were not highlighted in this research. This is probably because these injuries are relatively minor in nature and visitors are more likely to be treated outside the hospital setting or in an emergency department, rather than as a hospital inpatient.

Finally, it was predicted that one of the main causes of injuries resulting in hospital admission would be motor vehicle accidents. The results support this prediction, with motor vehicle accidents being the leading external cause of injury among overseas visitors (57 cases), and the second most frequent for interstate visitors (97). For foreign drivers, being unfamiliar with Australian road rules and driving conditions may account for some of the problems in this area. However, despite their familiarity with driving conditions, interstate visitors also experienced serious difficulties on the roads.

Other transport accidents such as bicycle accidents or accidents involving an animal being ridden were also common causes of injury for both groups of tourists. Since some travel insurance policies specifically exclude cover for certain activities such as horse riding and motor cycling, further research on the nature of all transport accidents would be of benefit to insurance companies and health

service providers. In this area, the ICD-10 diagnostic coding framework (World Health Organization 1992) has recently been shown to offer greater detail than the ICD-9-CM (Walker et al. 1995b). Again, the use of a standard classification system across studies would greatly enhance the comparison of research findings.

Conclusions

Regional hospitals at popular tourist destinations provide an extensive range of health services for visitors to their local areas. The main reasons for inpatient admission in the present study were injuries, followed by genito-urinary, circulatory, digestive and respiratory disorders. Many of these services are very resource-intensive and place a financial burden on the host hospital. In order to maintain high levels of care for non-residents, some financial acknowledgement must be given to regional hospitals with substantial visitor responsibilities. Future research can assist this process by clarifying actual costs through casemix funding formulas, identifying patients for whom a fee-for-service charge is appropriate, and developing a detailed national profile of tourist health needs.

References

- Australian Bureau of Statistics 1995, *Short term overseas visitor arrivals*, Australian Bureau of Statistics, Canberra.
- Australian Institute of Health and Welfare 1994, *Australia's health 1994*, The fourth biennial health report of the Australian Institute of Health and Welfare, Australian Government Publishing Service, Canberra.
- Australian Tourism Forecasting Council 1994, *International visitor arrival forecasts*, Australian Tourism Forecasting Council, Canberra.
- Barracrough S & McBain C 1992, 'The use of Australian health care services by overseas visitors: Some data-related problems for policy makers', *Australian Medical Record Journal*, vol 22, no 2, pp 51–5.
- Behrens R & Curtis C 1993, 'Malaria in travellers: Epidemiology and prevention', *British Medical Bulletin*, vol 49, no 2, pp 363–81.
- Bryan J 1993, 'Mosquito-borne disease: Malaria and dengue fever' in *Travel and health in the Pacific region – conference proceedings*, Pacific Asia Travel Association, Sydney, pp 25–9.

- Bryant H, Csokonay W, Love M & Love E 1991, 'Self-reported illness and risk behaviours amongst Canadian travellers while abroad', *Canadian Journal of Public Health*, vol 82, no 5, pp 316–19.
- Bureau of Tourism Research 1994, *Domestic tourism monitor*, Bureau of Tourism Research, Canberra.
- Bushell R 1993, 'Food hygiene – travellers' diarrhoea, hepatitis' in *Travel and health in the Pacific region – conference proceedings*, Pacific Asia Travel Association, Sydney, pp 57–68.
- Chapman S 1992, 'Dogma disputed: Potential endemic heterosexual transmission of human immunodeficiency virus in Australia', *Australian Journal of Public Health*, vol 16, no 2, pp 128–41.
- Commonwealth Department of Tourism 1992, *Tourism – Australia's passport to growth: A national tourism strategy*, Commonwealth Department of Tourism, Canberra.
- Cossar J 1994, 'Influence of travel and disease: An historical perspective', *Journal of Travel Medicine*, vol 1, no 1, pp 36–9.
- Cossar JH, Reid D, Fallon RJ, Bell EJ, Riding MH, Follett EA, Dow BC, Mitchell S & Grist NR 1990, 'A cumulative review of studies on travellers, their experience of illness and the implications of these findings', *Journal of Infection*, vol 21, no 1, pp 27–42.
- Daniels D, Kell P, Nelson M & Barton S 1992, 'Sexual behaviour amongst travellers: A study of genitourinary medicine clinic attenders', *International Journal of STD & AIDS*, vol 3, no 6, pp 437–8.
- DiGiovanna T, Rosen T, Forsett R, Sivertson K & Kelen GD 1992, 'Shipboard medicine: A new niche for emergency medicine', *Annals of Emergency Medicine*, vol 21, no 12, pp 1476–9.
- Eagar K & Innes K 1992, *National coding standards for inpatient data collections*, 1st edn, Report of the National Patient Abstracting and Coding Project, vol 3, New South Wales Health Department, Sydney.
- Froude J, Weiss L, Tanowitz H & Wittner M 1992, 'Imported malaria in the Bronx: Review of 51 cases recorded from 1986 to 1991', *Clinical Infectious Diseases*, vol 15, no 5, pp 774–80.
- Gillett S, Liu Z & Solon R 1993, *Hospital utilisation and costs study 1989–90, volume 2, the use of acute hospitals – a summary of hospital morbidity*, Australian Government Publishing Service, Canberra.
- Grenfell R & Ross K 1992, 'How dangerous is that visit to the beach? A pilot study of beach injuries', *Australian Family Physician*, vol 21, no 8, pp 1145–8.

- Hargarten S 1994, 'Injury prevention: A crucial aspect of travel medicine', *Journal of Travel Medicine*, vol 1, no 1, pp 48–50.
- Hargarten S, Baker T & Guptill K 1991, 'Overseas fatalities of United States citizen travellers: An analysis of deaths related to international travel', *Annals of Emergency Medicine*, vol 120, no 6, pp 622–6.
- Hartung G, Goebert D, Taniguchi R & Okamoto G 1990, 'Epidemiology of ocean sports-related injuries in Hawaii: Akahale O Ke Kai', *Hawaii Medical Journal*, vol 49, no 2, pp 52–6.
- Holloway J 1989, *The business of tourism*, 3rd edn, Pitman, London.
- Johnson J, Maertins M, Shalit M, Bierbaum T, Goldman D & Lowe R 1991, 'Wilderness emergency medical services: The experiences at Sequoia and Kings Canyon national parks', *American Journal of Emergency Medicine*, vol 9, no 3, pp 211–16.
- Liaw S 1992, 'Casualty encounters at a small rural hospital', *Australian Family Physician*, vol 21, no 4, pp 469–74.
- Looke D, Mills D, Kass R & Grove D 1992, 'The "welcome home" letter and questionnaire as a valuable quality assurance tool for an Australian traveler's medical clinic' in Lobel H, Steffen R & Kozarsky E (eds) *Travel medicine 2: proceedings of the 2nd conference on international travel medicine*, International Society of Travel Medicine, Atlanta, pp 287–9.
- Mano Y & Shibayama M 1989, 'Aspects of recent scuba diving accidents', *Marine Technology Society Journal*, vol 20, pp 38–41.
- National Centre for Health Statistics 1978, *The international classification of diseases, 9th revision, clinical modification – ICD-9-CM*, Commission on Professional and Hospital Activities, Ann Arbor, Michigan.
- National Health Data Committee 1995, *National health data dictionary*, Version 4.0, Australian Institute of Health and Welfare, Canberra.
- Paixao ML, Dewar RD, Cossar JH, Covell RG & Reid D 1991, 'What do Scots die of when abroad?' *Scottish Medical Journal*, vol 36, no 4, pp 114–16.
- Patterson J 1992, 'The pre-travel medical evaluation: The traveler with chronic illness and the geriatric traveler', *Yale Journal of Biology and Medicine*, vol 65, pp 317–27.
- Price Waterhouse Urwick 1992, *Review of the Commonwealth's role in safety in sport, recreation and fitness activities*, Final report prepared for the Department of the Arts, Sport, the Environment and Territories, Price Waterhouse Urwick, Brisbane.

- Prociv P 1995, 'Deaths of Australian travellers overseas', *Medical Journal of Australia*, vol 163, pp 27–30.
- Purkiss S 1990, 'Motorcycle injuries in Bermuda', *Injury*, vol 21, no 4, pp 228–30.
- Queensland Tourist and Travel Corporation 1995, 'Queensland visitor survey', *Queensland Tourism & Travel Trends*, Issue 6, pp 2–3.
- Ross S & Sanchez J 1990, 'Recreational sun exposure in Puerto Rico: Trends and cancer risk awareness', *Journal of the American Academy of Dermatology*, vol 23, no 6, pp 1090–2.
- Walker S, Wilks J, Ring I, Nicol J, Oldenburg B & Mutzelburg C 1995a, 'Use of Queensland hospital services by interstate and overseas visitors', *Health Information Management*, vol 25, no 1, pp 12–15.
- Walker S, Wood M, Wilks J & Nicol J 1995b, 'Comparing ICD-9-CM and ICD-10 classification systems in a primary health care setting: Some initial observations', *Health Information Management*, vol 25, no 3, pp 83–6.
- Wilks J 1993a, 'Profiles of the travelling diver' in Wilks J, Knight J & Lippmann J (eds) *Scuba Safety in Australia*, JL Publications, Melbourne, pp 64–75.
- Wilks J 1993b, 'Strategies for preventing accidents' in Wilks J, Knight J & Lippmann J (eds) *Scuba Safety in Australia*, JL Publications, Melbourne, pp 85–93.
- Wilks J & Atherton T 1994, 'Health and safety in Australian marine tourism: A social, medical and legal appraisal', *Journal of Tourism Studies*, vol 5, no 2, pp 2–16.
- Wilks J & Oldenburg B 1995, 'Tourist health: The silent factor in customer service', *Australian Journal of Hospitality Management*, vol 2, no 2, pp 13–23.
- Wilks J, Walker S, Wood M, Nicol J & Oldenburg B 1995, 'Tourist health services at tropical island resorts', *Australian Health Review*, vol 18, no 3, pp 45–62.
- Wilks J, Walker S, Wood M, Nicol J & Oldenburg B 1996, 'Working in paradise: Health services provided for staff at island tourist resorts', *Journal of Occupational Health and Safety – Australia and New Zealand*, vol 12, no 1, pp 41–8.
- World Health Organization 1992, *ICD-10: International Statistical Classification of Diseases and Related Health Problems*, 10th revision, World Health Organization, Geneva.
- World Tourism Organization 1993, *Recommendations on tourism statistics*, World Tourism Organization, Madrid.
- Yung AP & Ruff TA 1994, 'Travel medicine. 2. Upon return', *Medical Journal of Australia*, vol 160, no 4, pp 206–12.