

Review Article

Demand for hospital emergency departments: a conceptual understanding

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BACKGROUND: Emergency departments (EDs) are critical to the management of acute illness and injury, and the provision of health system access. However, EDs have become increasingly congested due to increased demand, increased complexity of care and blocked access to ongoing care (access block). Congestion has clinical and organisational implications. This paper aims to describe the factors that appear to influence demand for ED services, and their interrelationships as the basis for further research into the role of private hospital EDs.

DATA SOURCES: Multiple databases (PubMed, ProQuest, Academic Search Elite and Science Direct) and relevant journals were searched using terms related to EDs and emergency health needs. Literature pertaining to emergency department utilisation worldwide was identified, and articles selected for further examination on the basis of their relevance and significance to ED demand.

RESULTS: Factors influencing ED demand can be categorized into those describing the health needs of the patients, those predisposing a patient to seeking help, and those relating to policy factors such as provision of services and insurance status. This paper describes the factors influencing ED presentations, and proposes a novel conceptual map of their interrelationship.

CONCLUSION: This review has explored the factors contributing to the growing demand for ED care, the influence these factors have on ED demand, and their interrelationships depicted in the conceptual model.

KEY WORDS: Emergency department; Demand; Crowding; Risk factors; Emergency services; Emergency medicine; Emergency room

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INTRODUCTION

Hospital emergency departments (EDs) play a vital role in the acute health care system, providing care for patients with acute illness and injury, and access to the health system. Over the last 15 years,^[1-4] EDs in Australia have become progressively more congested due to the combined effects of increasing demand for care,^[5-8] increased complexity of care, and access block.^[1-3,9] In the 10 years from September 1998 to October 2009, public hospital ED visits have increased from 5 010 000 (268 per 1000 population) to 7 390 000 (331 per thousand population).^[10] Figures for private EDs are not available. ED congestion has implications for patient outcomes,^[1] as well as for the efficiency and effectiveness of ED

operations as evidenced by staff and patient satisfaction.^[1]

Factors affecting demand for emergency care are complicated and multifaceted. This study aims to identify from the literature those factors influencing the growing demand for emergency medical care, and to describe their interrelationship. In particular this work is the basis for further research into patients attending private EDs, and therefore particular attention is paid to the factors influencing the demand for private hospital ED care.

METHODS

Multiple databases (PubMed, ProQuest, Academic Search Elite and Science Direct) were searched

using the following terms: emergency services/care/visits, emergency medicine, emergencies, emergency department use/utilization/visits, accidents, crowding/crowds, healthcare surveys, health service needs and demand, access block, ambulatory care/utilization, emergency room, frequent ED utilization/users, heat wave, influenza, homelessness, non-urgent visits, perception, regular source of care, predictors, emergency health-care system, health care reform, medicare, Australia, health insurance, insurance policies, and national health insurance.

In addition, seven leading international emergency medicine journals were searched for relevant articles. Annual reports from the Australian Bureau of Statistics, the Australasian College for Emergency Medicine, the Australian Institute of Health and Welfare, the Private Health Insurance Administration Council, the Productivity Commission, and the Queensland Ambulance Service were retrieved via Google. All titles and abstracts were screened by the research team for relevance to the question, and those that addressed the particular issue were examined in detail.

The search yielded 602 articles. Studies were excluded if they were for pediatric patients' ED utilization; ambulance utilization; health services not directly related to ED utilization; and psychiatric emergency services utilization. Studies published earlier than 1990 (except Andersen & Newman's seminal work from 1973) or written in languages other than English were also excluded. This review was based on the remaining 100 articles. The vast majority of these derived from the USA, and therefore tended to reflect the particular environment of the US health system. All were examined for evidence of factors that influence demand or that explain the relationship between such factors. Particular attention was paid to those articles that may explain variances between private and public hospital utilization.

RESULTS

The Australian emergency health care system

The Australian health care system is complex, with community based care provided by both publically and privately funded health professionals, and public and private hospitals.^[10] Operational funding for public hospitals relies heavily on the Commonwealth government via Australian Health Care Agreements between the Commonwealth, and State or Territorial Governments. Private hospitals are largely funded by

individuals supported by private health insurance, which is in turn subsidised by taxpayers. Private hospitals include for-profit organisations, as well as those run by charitable (mostly religious) organisations.

Australia's health system is funded principally by government. Medicare^[11] is a compulsory universal health insurance scheme funded by general taxation supported by a special purpose Medicare Levy on taxable income. Medicare subsidises the cost of community medical care and provides free public hospital accommodation and treatment.

Private health insurance is a significant part of Australia's health funding system. According to the Australian Institute of Health and Welfare,^[12] private insurance was the main funding source for 37% of hospital separations (ie when a patient is discharged, dies in hospital, or is transferred to another hospital) during 2008-2009. It provides rebates for private treatment in both public and private hospitals, and funding for some ancillary services such as dentistry and physiotherapy.^[10] However, ED services provided by private hospitals are not covered by private health insurance.

Private EDs have been an important part of the emergency management system since 1988.^[13] They are located mainly in capital cities, with some in regional centers. In the period of 2006-2007, there were an estimated 24 private EDs and 47 private hospitals providing emergency care in Australia.^[14] Service quality of private EDs has been high because they meet international standards and a growing demand for emergency services.^[14] However, the number of emergency care services provided by private EDs has been lower than the number of people with private health insurance. It was estimated that private EDs provided 500 645 emergency services in the period of 2008-2009,^[15] while public EDs provided 7.2 million emergency services in the same period.^[16] Although approximately 44% of Australians held private health insurance,^[17] private EDs accounted for only 6.5% of total emergency services in that period.

Factors influencing emergency health care demand

The relationship between factors influencing hospital ED use is summarized in Figure 1, which uses a framework adapted and modified from the Anderson and Newman health utilization model.^[18] This well validated model specifies that 'health need factors' (defined as a perception by the individual that they have an illness requiring urgent care) are influenced by predisposing factors and policy factors into an action which is to seek

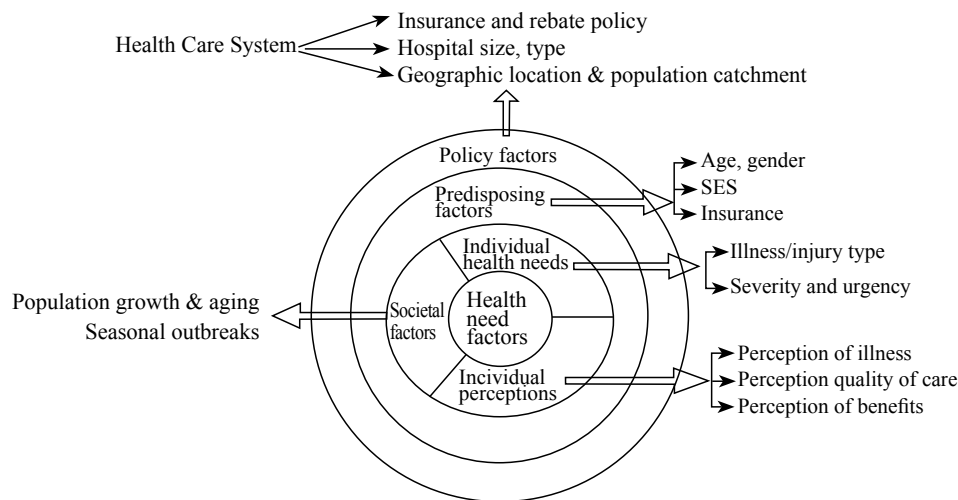


Figure 1. ED utilization literature review model modified from Andersen and Newman health utilization model.

acute health care.

Health need factors include individual health needs, individual perceptions, and societal factors, and are at the centre of the figure, indicating their importance in driving action (Table 1). They are framed by the predisposing and policy factors.

Health need factors

Table 1. Health need related factors

Individual needs	Morbidity: chronic disease and acute illness Injury Other: drug/alcohol dependence
Individual perceptions	Perception of illness: perceived severity, drug abuse precluded regular medical care Perception that health status is beyond self control Benefits: quality of care, cost effective, convenient
Societal factors	Population growth Population ageing Seasonal influences: heat waves, disease outbreaks, natural disasters

Individual health needs (morbidity, injury and health related factors)

Individual health need factors, including morbidity, injury, and other health related factors, appear to be the primary predictors of ED utilization.^[19-33] A large study of twenty-eight US hospitals concluded that 95% of presenting patients cited medical necessity as their reason for attending ED.^[34] Another study showed that poor health was associated with increased ED use among low-income elderly African Americans in New Orleans.^[33] Injury has been an indication for ED utilization among the homeless.^[26] Drug dependency,^[27] uncontrolled

asthma^[25] and alcohol abuse^[28,32] are also associated with increased ED use. A study of crack-cocaine smokers in the USA found that those treated most frequently for drug abuse also had increased ED use.^[22]

Individual perceptions (perception of illness, quality of care, and benefits)

Demand for ED service is associated with a variety of individual perceptions. Among these, perceived severity of illness^[35-40] is most frequent identified, followed by perceived quality of ED care,^[34,37,41] current perceived symptoms,^[42] and perceptions of convenience.^[34] Other patient beliefs play a role in demand. Some consider that their substance abuse interferes with them seeking care from a regular doctor.^[43] The patients who believed that their health status was determined by the "function of external forces" or the "power of the medical personnel" had an increased likelihood of ED use.^[33] Another study from the USA^[44] found that those who identified ED as their regular source of care were likely to consider ED treatment cost-effective.

Health professionals and patients differ in their beliefs as to why people use ED for non-urgent conditions. A study across five Australian EDs^[45] found that clinicians were more likely to emphasize cost and access issues, whereas patients emphasized medical acuity and complexity. However it is patients' perception, not professionals' that drive them toward ED for treatment.

Societal factors (growth and ageing, seasonal influences)

As the population grows and ages, ED demand increases. A 1999 study^[46] found that ED service demand

growth was faster than population growth, and the proportion of ED patients requiring hospital admission was significantly increased, as was patient acuity and length of stay. Between 1988 and 1997, the population in the catchment area of the study hospital rose by 18.6%, and ED visits rose by 27%. Population ageing and economic changes were beyond the scope of this study. A similar result was found in a recent study from the USA,^[47] where ED utilization increased by 28.6% while the population increased by 16.1%. This study attributed the increase, in part, to an ageing population.

Seasonal influences such as heat waves, natural disasters and disease outbreaks have demonstrated impact on ED demand. Influenza outbreaks are associated with increased presentations among elders and with ED overcrowding and ambulance diversion.^[48,49] In 2006, a Californian heat wave resulted in increased ED presentations among elders (≥ 65 years of age) and young children (0-4 years of age).^[50]

Predisposing factors

Predisposing factors are those that appear to influence the transition of a patient's health perception into a desire to access emergency health care (Table 2).

Table 2. Predisposing factors

Age	Older people: more frequent attendance for medical conditions, urgent illness Younger people: injury, homelessness
Gender	Males more frequent for non-urgent illness Female more likely if homeless, HIV infected, for non-urgent illness
Health insurance status	In USA, not privately insured, but Medicare or Medicaid insured Uninsured increased rates for ambulatory care or regular care
Socio-economic status	Socio-economic disadvantage associated with homelessness, divorce/separated/widowed, low income In Hong Kong used out of hours by more affluent
Others	Lack of primary care or other more appropriate care Poor social support Higher levels of education among older people in a rural area

Age

ED utilization varies among different age groups. Very young children^[51] (0-2 year of age) have been found to have a higher rate of ED use for non-urgent illness. A USA study of adolescents in 1998^[52] found that those of 18-21 years old were overrepresented in ED visits in proportion to their percentage in the general population. In 2004 a study^[53] reviewing the risk factors for returns

to ED within 72 hours of initial visit found that older age (>65 years) was associated with increased risk of return. Another study^[54] found that those who had 35 or more ED visits over 3 years were significantly older than those with fewer visits.

In general, older people were more likely to use EDs frequently^[55] and for urgent illness,^[19] while younger people were more likely to use EDs for non-urgent illness^[39,51,56-57] and to identify EDs as their usual source of care.^[58-59] Younger people tend to present to EDs more frequently for injury,^[52,60] while older people are more likely to attend for medical conditions.^[60] A study examining the factors associated with ED use among the homeless found that younger age was associated with frequent ED use.^[57] However this higher rate of use is likely to reflect particular characteristics of the homeless.

Gender

Being male appears to be an independent predictor of both frequent^[61] and repeated ED use among people of 75 years old or over.^[62] Males are more likely to use ED for non-urgent illness,^[35,63] and more often identify ED as their usual source of care.^[58] Inconsistent results were found in some studies. Higher rates of female use were seen amongst the homeless^[57] and HIV-infected adults.^[64] One Italian study^[39] found that females were associated with non-urgent ED use.

Health insurance status

Insurance status influences patterns of ED utilization. A common feature in American studies was that having Medicaid^[55,57,65-68] or Medicare^[55,57,67-68] was an independent predictor of frequent or any ED use.^[30,69] A 2004 study^[53] found that being USA Medicare insured was associated with an increased risk of ED early return within 72-hour of the index visit. Several studies^[55,65,68] found that being uninsured or lacking access to primary care (PC) did not predict frequent ED use. However, lack of private health insurance and having public insurance (USA Medicare or Medicaid) have been associated with the use of EDs for non-urgent illness.^[70] Uninsured people have been found to have an increased rate of using EDs for ambulatory care^[71] and to identify the ED as their regular source of care.^[58-59] A 1998 study^[52] of ED utilization by adolescents found that a lack of health insurance was common among adolescents aged 11 to 21 years who may rely heavily on EDs for their health care needs.

Socio-economic status

Most studies show that socio-economic disadvantage

(SED) significantly increases an individual's likelihood of using ED. Being homeless,^[72] divorced, separated or widowed,^[21] or having a low income^[23,64] is associated with an increased likelihood of ED use. Being homeless^[43,57,59,73-74] or having a low income^[44,67,69,75] is also directly related to frequent ED use and identifying ED as the regular source of care.

However, a study^[51] found the majority of non-urgent ED users (how so ever defined) were white, middle or high income earners, with a regular source of care other than the ED, and these people used EDs for convenience or preference. Another study from Hong Kong^[37] found that those with skilled jobs and those living in self-owned property were more likely to use ED for non-urgent illness. While most affluent people in Hong Kong rely on private general practitioners (GPs) for PC, they are not available out of hours, and working people may be reluctant to sacrifice work time to access GP services.

Others (appropriate care, social support, and level of education attainment)

Other factors, such as the availability of appropriate care, social support, and levels of education may affect ED utilization. A 2009 trial^[76] examined whether more comprehensive interventions would alter health care seeking behaviors among homeless people. Those to whom housing and case management were offered had fewer subsequent ED visits.

Social support can play a role in ED demand. A 1997 study^[59] suggested that lack of social support was a predictor identifying ED as the regular source of care. Another study the same year^[62] found that living alone was associated with repeated ED use in those aged 75 and over. A 2003 study^[77] found that a lower level of perceived social support could be related to frequent ED use. More recently,^[35] patients from smaller sized families were found to be more likely to use ED for non-urgent illness. The authors hypothesized that in the members of larger families may have been available to look after those at home while care-givers took the sick person to the outpatient department during the day.

The level of education may influence the process of decision-making. A study^[30] identifying factors associated with having any ED visit (vs. non-ED visits) among people at age of 65 years or older in a rural area found that people with an education standard higher than high school had a significantly greater likelihood of having at least one ED visit. More educated people in rural areas may be more conscious of their health care needs, and thus may seek immediate care when they are

unwell. People in rural areas have limited access to PC, so may seek care from EDs.

Policy factors

Table 3. Policy factors

How is health care delivered in society?	Location and number of hospitals Availability of alternative health care Outpatient capacity
Who is eligible for access to health services via public insurance	Public insurance Regulation of private insurance

Health policies affect an individual's health care utilization in two ways. Firstly, policy defines how health care is delivered in society, and dictates the location and number of hospitals, and the availability of alternative health care facilities. Secondly, policy dictates the eligibility of individuals to access health services via public insurance.

PC accessibility is strongly affected by health policy. Better access to PC^[21,29,78] and greater continuity of care^[78] are significantly associated with decreased ED use. When PC services are not available,^[38,40,63,70] or there is an inability to access PC in a timely manner,^[79] there is an association with ED use for non-urgent illness. Medicaid beneficiaries receiving outpatient care from Federal Qualified Health Centers^[80] have been found to be less likely to use ED services than other Medicaid beneficiaries. A 2006 study^[81] found that greater Community Health Centre (CHC) capacity reduced ED use for poor and low-income people, while greater CHC capacity appeared to increase ED use among high-income people. This finding may indicate interaction between variable CHC capacity and level of income in terms of ED utilization. Two other studies^[82-83] evaluating whether referring uninsured ED patients to the PC setting would reduce their future ED demand found only a short term increased use of PC, and limited effect on reducing future ED use. Continued use of PC services was not achieved in either study.

Hospital location may affect utilization. One study^[84] suggested that elderly people living in remote rural areas were less likely to visit the ED than their urban and adjacent rural counterparts. A 2010 study^[85] found that patients in large hospital EDs used the ED more inappropriately. Another study from the USA^[81] suggested that communities with high ED use tended to have less outpatient capacity than communities with lower ED use, and had more EDs relative to population than low-ED use communities.

Health policy changes may also affect ED demand. In the USA,^[86] more than 50 000 Medicaid beneficiaries were dis-enrolled on implementation of the Oregon Health Plan in March 2003. A sudden and continued increase of ED visits by uninsured people ensued.

DISCUSSION

In short, the factors described impact on demand for ED care. The literature does not identify the relative contribution made by these factors, nor their capacity to predict future growth.

Much of the political discussion of this issue relates to ED use for non-urgent illness by those labeled as "inappropriate ED users". However, this title is based on clinical definitions made by health professionals. Significant differences exist between health professionals and lay people regarding their perceptions of urgency of illness. Most ED patients perceive their problems as urgent,^[35,40,45,87] even though their conditions may be deemed non-urgent by health professionals. Those at SED, with public health insurance,^[47,51,50] or with limited access to PC,^[40,79] are generally considered more likely to use EDs for non-urgent conditions although two studies have identified the opposite.^[37,51]

A small number of frequent ED users account for a disproportionate number of total ED visits.^[67,74,88-89] People at SED are at high risk of frequent ED use,^[57,67,73-75,90] raising questions about the adequacy of other parts of the health care system. However, frequent ED users are generally sicker than infrequent ED users,^[57,65-69,75, 77,88-96] most have another regular source of care^[66-67, 92] and are heavy users of other parts of the health care system.^[65,77,89,91,93] Interventions^[97-99] addressing their non-medical needs have resulted in less frequent ED use, while those focusing on medical needs alone failed to achieve that objective.^[100] Frequent ED users are often from vulnerable groups, therefore comprehensive care must address medical needs, social needs, and psychological requirements.

While it is impossible to draw causal relationships between the above variables and ED utilization, some key factors have emerged. Individual ED use is driven by health care needs, perceptions of illness, and societal factors which influence these. Limited access to PC is significantly associated with ED use. Individual perceptions influence where people seek care, and many seek ED care for conditions they perceive as urgent, but which health care providers consider non-urgent. Both PC accessibility and individual perceptions influence ED

use for non-urgent illness.

Those at SED are high users of ED in all forms. Such people have disproportionate health care requirements and limited access to PC. The influence of SED and PC accessibility on ED utilization may be used to direct future policy.

In conclusion, this review has explored the factors contributing to the growing demand for ED care, the influence these factors have on ED demand, and their interrelationships depicted in the conceptual model. No evidence was found in the literature of the relative influence of these factors in choosing between public and private hospital ED care. Future research is needed to explore the role of private hospital EDs, and to inform policy development for their better use within the Australian system. This may help alleviate the burden on public hospital EDs and improve acute care for critically ill patients in Australia.

There were limitations in our study. Study designs, settings and outcome measures varied from study to study, making them difficult to compare. The studies that were reviewed suffered from a range of shortcomings, including retrospective design, and limited power to define causal relationships. Many were limited to one or two emergency departments, or had small sample sizes affecting generalizability. Most were conducted outside Australia so may have limited applicability to local conditions. There was a significant lack of any studies that addressed the particular issues of private EDs and their relative role within the emergency health system.

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