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Morbidity patterns of non-urgent patients attending accident and emergency departments in Hong Kong: cross-sectional study

在香港到急症室求診的非緊急病人的患病模式：橫面研究

Objectives. To study the morbidity patterns of non-urgent patients utilising accident and emergency services and compare these patients with 'true' accident and emergency cases. To analyse the morbidity pattern of non-urgent cases over different time periods, and across different age groups.

Design. A cross-sectional study completed over a 1-year period.

Setting. Four accident and emergency departments in Hong Kong.

Patients. Two thousand, four hundred and ten patients randomly selected from four accident and emergency departments.

Main outcome measures. The morbidity patterns by body system, according to the International Classification of Primary Care, were tabulated and analysed for 'true' accident and emergency cases versus non-urgent cases. The ten most frequent diagnoses for the 'true' accident and emergency and non-urgent cases were also compared. Further analysis of accident and emergency service utilisation was conducted comparing different age groups, and also different time periods.

Results. Significantly more cases presenting to the accident and emergency service with respiratory and digestive problems were found to be non-urgent, rather than appropriate accident and emergency cases. In contrast, significantly more cases presenting with circulatory and neurological problems were appropriate cases for accident and emergency department management. The morbidity pattern for the ten most frequent diagnoses seen in non-urgent cases, was noted to be similar to the Hong Kong general practice morbidity pattern for self-limiting conditions. Utilisation of accident and emergency services for acute self-limiting conditions was more marked in the late evening, and also among children and the younger population in general.

Conclusion. The utilisation of accident and emergency services by patients requiring a general practice service only, reflects problems in the primary health care delivery system. These may be solved by appropriate interfacing between general practitioners and other service providers, with the aim of providing seamless health care. Without revision of primary health care services, accident and emergency departments will continue to be used inappropriately by patients as an alternative to general practice care.

目的：研究到急症室求診的非緊急病人的患病模式，與「真正」有需要急症服務的病人比較。在不同時期和不同年齡組別分析這些非緊急病例的患病模式。

Key words:
Emergency service, hospital/ utilization;
Health services misuse;
Hong Kong;
Morbidity

關鍵詞：
急症服務，醫院／使用；
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設計：為期一年的橫面研究。
安排：香港的四個急症室。
參與者：從四個急症室隨機抽取的 2410 名病人。
主要結果測量：按照國際基層醫療分類系統(International Classification of Primary Care)，把人體不同部位的患病模式進行分類及列成表格，並分析「真正」緊急病例與相對的非緊急病例。此外，也比較了「真正」緊急和非緊急病例的 10 個最常見的診斷。還進一步分析比較不同年齡組別和不同時期對急症服務的使用。
結果：發現相當多因呼吸和消化問題到急症室求診的病人屬非緊急性，而不是緊急病例。相對來說，相當多因循環和神經問題而到急症室求診的病人是合適的緊急病例。在非緊急病例中所見的10種最常見的患病模式與香港全科醫生自限條件的患病模式類似。有自限定條件的病人大多於傍晚使用急症服務，而且他們普遍是兒童和年青人。
結論：只需全科醫生醫護服務的病人到急症室求診的現象反映了基層醫護服務系統中出現問題。這些問題可由全科醫生和其他醫療機構之間的適當涵接獲得解決，目的在於提供連貫的醫護服務。如果不加以改善基層醫護服務，急症室將會繼續被病人不適當地用作代替全科醫生的護理服務。

Introduction

Accident and Emergency (A&E) departments are becoming a venue for primary care in many developed countries, despite the availability of general practice services. The significant increase in inappropriate attendance at A&E clinics is considered a serious threat to the health care system, because it is an inefficient utilisation of resources and can deprive true emergency cases of quality care. Studies have shown that between one to two thirds of patients sampled attended A&E departments with problems that would be managed more appropriately by general practitioners (GPs).[1-12] In Hong Kong, a recent study by the authors similarly suggested that 57% of A&E attendees would have been better managed by GP care.[13]

The literature also indicates that A&E departments are used disproportionately by patients with a low socio-economic status, who very often do not have a family doctor, and are not covered by medical insurance.[14-18] In addition to these social factors, cultural and psychosocial factors also appear to play an important role in non-urgent utilisation of A&E departments.[15]

One study has reported that if patients have had no previous experience with their symptoms, they often perceive their condition as an emergency and believe that the care being offered by an A&E department is more appropriate.[19] A recent study conducted by the authors concluded that the most significant factor governing patients' use of emergency services as an alternative to primary health care, was the availability and accessibility of comprehensive primary health care services.[20] It is thus important to document the morbidity pattern of cases attending A&E departments, highlighting those conditions that could be effectively managed by GPs. Routine data collected by the triage system is inadequate for this purpose, as it primarily determines the urgency of individual cases, rather than discriminating cases for GP management from those requiring the A&E service.

This paper reports the morbidity pattern of non-urgent cases presenting to A&E departments, and compares this pattern with the Hong Kong general practice morbidity pattern. The paper also reports the level of non-urgent A&E department utilisation by different age groups, and over different time periods. The aim of data gathering is to assist in the development of a proactive approach to reducing high levels of non-urgent case utilisation of A&E services.

Methods

The study population was a cross-section of patients, attending hospitals in three different geographical locations in Hong Kong—Hong Kong Island, with a population of 1.3 million; Kowloon, with a population of 1.9 million; and the New Territories with a population of 2.9 million. The hospitals involved were the Pamela Youde Nethersole Eastern Hospital, serving the population on the eastern side of Hong Kong Island; the United Christian Hospital, serving the east Kowloon region; and the Tuen Mun Hospital and Yan Chai Hospital, serving the population of the New Territories.

Patients were selected randomly from these four hospitals' A&E departments. The detailed methodology has been described in previous publications.[13,20] The gold standard used to establish the true urgency rate (ie appropriate A&E cases or GP cases) was

based on a retrospective record review, conducted independently and blindly by a panel of senior emergency physicians. In addition to taking into account the skills expected of emergency physicians, the 'Handbook on Vocational Training in Family Medicine' prepared by the Hong Kong College of Family Physicians (HKCFP) was also utilised. This handbook contains a thorough description of the necessary knowledge and skills family physicians are required to have in order to complete vocational training in family medicine. 'True' A&E cases were defined as those attendees requiring emergency care. The GP cases/non-urgent cases were cases that could be managed by GPs. If the independent ratings by the panel of senior emergency physicians were in agreement, this classification of urgency status was taken as the gold standard. If agreement was not reached, the principal investigator (academic family physician, with experience in A&E) or trained research staff, classified cases according to the HKCFP Handbook.

In selecting the sample size, it was determined that 2410 patients were required to establish the level of acceptance error at ±0.02 in the total sample, given the assumption that 50% of A&E attendance would be for non-urgent conditions [$N=(z/e)^2$ (p) (1-p) = $(1.96/0.2)^2$ (0.5 x 0.5), using the unit normal deviate (z) of 1.96 corresponding to a 95% confidence interval and the most conservative rate (p) at 50%]. During each study time period of 1 hour, 10 patients were interviewed. A total of 240 hours was thus required for data collection. For patients with altered mental status or who were unconscious, the patient's relatives were approached to provide consent for inclusion in the study. Details of the methodology used in sampling patients across different time periods is described elsewhere.[13]

Of the 2410 patients studied, 1378 (57%) were classified as non-urgent/GP cases.[13] Diseases were coded according to the International Classification of Primary Care (ICPC).[21] The ICPC consists of seven components for each body system:

(1) Symptoms and complaints;
(2) Diagnostic and preventive procedures;
(3) Medication;
(4) Treatment and therapeutic procedures;
(5) Results;
(6) Administration; and
(7) Referrals; and other reasons for encounter and diagnosis of disease.

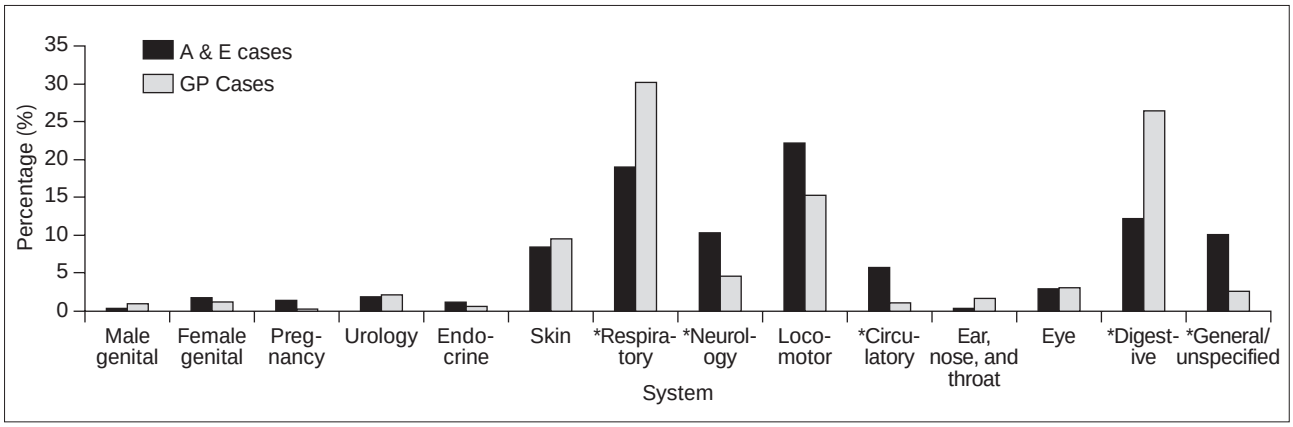
This coding method is designed to be appropriate for primary care, as clinical contact in this setting does not necessarily result in a definitive diagnosis. Patients were grouped according to age: children (0 to 9 years), adolescents (10 to 19 years), young adults (20 to 44 years), adults (45 to 64 years), and the elderly (over 65 years of age). The overall morbidity pattern according to body system involved was compared between the 'true' A&E cases and the GP cases. The most common diagnoses encountered in A&E were also compared for both 'true' A&E cases and GP cases. The 10 most common diagnoses for GP cases attending A&E departments were compared with the latest territory-wide general practice morbidity survey (1994).[22] The proportion of 'true' A&E and GP cases were compared across different age groups, and also across different time periods (7:31-13:30, 13:31-17:30, 17:31-22:30, and 22:31-7:30); reflecting morning, afternoon, evening, late night and early morning attendances, respectively. Variations in the proportion of cases utilising A&E for the most common non-urgent conditions was also analysed across different time periods and different age groups. The Chi squared test of independence between the proportion of non-urgent/GP cases in different age groups and different time periods was completed, using the 5% level of significance. The Statistical Package for Social Science software (Windows version 9.0; SPSS Inc., Chicago, US) was used for data processing.

Results

Level of utilisation of A&E departments by non-urgent cases

According to the study protocol, 2410 patients were recruited from the four study hospitals across the different utilisation periods. A total of 2892 patients were approached by research assistants at the four A&E departments to consent for the interview and telephone follow-up if required. The non-response rate was approximately 16.7%. Reasons for refusal given, included lack of time, not wanting to be disturbed, and personal reasons. The patients sampled for the study were very similar in sex and age distribution to the 1997 A&E attendees previously studied.[13] Overall, the level of inappropriate utilisation of A&E services by non-urgent cases was 57%.[13] The discrepancy between the two emergency physicians assessments of diagnosis was less than 5 %.

The Figure shows the comparison of morbidity pattern by body system (as defined by the ICPC) between the 'true' A&E and GP cases. Among attendees with respiratory and digestive problems, a higher proportion were found to be suitable for GP management than for A&E care (30.3% versus 19.1%, and 26.4%



*P<0.05

Fig. Comparison of morbidity pattern by system between 'true' accident and emergency cases and general practitioner cases

versus 12%, respectively, P<0.05). For problems related to the circulatory and neurological systems, and general/unspecified problems, there was a statistically higher proportion of 'true' A&E cases.

The most frequent 80 diagnoses for the cases suitable for GP management and the 'true' A&E cases seen were compared (Box). Approximately 26% of patients attending A&E for upper respiratory tract infection (URTI) could have been appropriately treated by GPs. Among the non-urgent/GP cases, gastroenteritis (10.3%), was ranked second to URTIs as the most common diagnoses, followed by abdominal pain (5.3%). This pattern was very similar to that of the most frequent diagnoses managed by GPs in the community, according to the 1994 GP morbidity survey in Hong Kong.[22] For the 'true' A&E cases, injuries and head injury were the two most frequent diagnoses, at 6% and 8.3% respectively. Other leading diagnoses were conditions that could deteriorate rapidly, requiring the closer monitoring offered in a hospital setting.

Table 1 compares the morbidity pattern of the non-urgent cases presenting to A&E departments, with the 1994 GP morbidity survey in Hong Kong.[22] The pattern seen is very similar for acute self-limiting conditions. Common chronic diseases, such as hypertension and diabetes mellitus, were however, more commonly seen in the community than in A&E departments.

Table 1. Comparison of morbidity pattern in general practice and non-urgent cases attending accident and emergency services

General practice morbidity survey[22]		Non-urgent cases presenting to accident and emergency departments	
Diagnosis	No. (%)	Diagnosis	No. (%)
Upper respiratory tract infection	19 342 (34.6)	Upper respiratory tract infection	364 (26.0)
Hypertension	3700 (6.6)	Gastroenteritis	162 (11.6)
Bronchitis	1820 (3.3)	Abdominal pain	74 (5.3)
Diabetes mellitus	1450 (2.6)	Other injuries	58 (4.1)
Gastroenteritis	1418 (2.5)	Urticaria	32 (2.3)
Allergic rhinitis	867 (1.6)	Epigastric pain	31 (2.2)
Eczema	849 (1.5)	Gastritis	30 (2.1)
Cough	826 (1.5)	Dizziness	29 (2.1)
Gastritis	696 (1.2)	Sprain, other joint problems	27 (1.9)
Low back pain	655 (1.2)	Back pain	24 (1.7)

Table 2. Urgent versus non-urgent utilisation of accident and emergency services of different age groups

	Age group (years)					
	0–9, n=560 No. (%)	10–19, n=258 No. (%)	20–44, n=858 No. (%)	45–64, n=394 No. (%)	≥65, n=340 No. (%)	Total, n=2410 No. (%)
Accident and emergency cases (urgent)	176 (31.4)	81 (31.4)	318 (37.1)	206 (52.3)	255 (75)	1036 (43)
General practice cases (non-urgent)	384 (68.6)	177 (68.6)	540 (62.9)	188 (47.7)	85 (25)	1374 (57)

Box. Most frequent diagnoses given for 'true' accident and emergency cases and general-practitioner–appropriate cases

Could be treated by general practitioners			Required accident and emergency service		
Diagnoses	Valid percentage (%)	Cumulative percentage (%)	Diagnoses	Valid percentage (%)	Cumulative percentage (%)
Upper respiratory tract infection	26.4	26.4	Head injury	8.3	8.3
Gastroenteritis	10.3	36.7	Asthma	6.4	14.7
Other injuries	7.2	43.9	Other injuries	6.0	20.7
Abdominal pain	5.3	49.2	Upper respiratory tract infection	3.4	24.1
Urticaria	3.3	52.5	Chronic obstructive airways disease	3.4	27.4
Gastritis	3.1	55.6	Acute bronchitis	3.0	30.5
Sprain injury	2.8	58.3	Laceration	3.0	33.5
Urinary tract infection	1.9	60.3	Stroke	2.6	36.1
Headache	1.7	61.9	Fracture	2.3	38.3
Dizziness	1.4	63.3	Dizziness	2.3	40.6
Acute bronchitis	1.4	64.7	Loss of consciousness	1.9	42.5
Fever	1.1	65.8	Fever	1.5	44.0
Knee symptoms	1.1	66.9	Gastritis	1.5	45.5
Infected finger / toe	1.1	68.1	Sprain	1.5	47.0
Contact dermatitis	1.1	69.2	Foreign body	1.5	48.5
Stye	0.8	70.0	Animal bite	1.5	50.0
Otitis externa	0.8	70.8	Other urinary system disease	1.5	51.5
Sprained ankle	0.8	71.7	Death	1.1	52.6
Tenderness of skin	0.8	72.5	Other generalised disease	1.1	53.8
Leg symptoms	0.8	73.3	Vomiting	1.1	54.9
Gout	0.8	74.2	Gastrointestinal bleeding	1.1	56.0
Generalised pain	0.6	74.7	Gastroenteritis	1.1	57.1
Chicken pox	0.6	75.3	Eye injury	1.1	58.3
Epigastric pain	0.6	75.8	Corneal ulcer	1.1	59.4
Diarrhoea	0.6	76.4	Heart failure	1.1	60.5
Constipation	0.6	76.9	Atrial fibrillation	1.1	61.7
Infectious diarrhoea	0.6	77.5	Cellulitis	1.1	62.8
Eye pain	0.6	78.1	Hypoglycaemia	1.1	63.9
Conjunctivitis	0.6	78.6	Vaginal bleeding	1.1	65.0
Low back symptoms	0.6	79.2	Other disease female genital system	1.1	66.2
Hand and finger symptoms	0.6	79.7	Other viral disease	0.8	66.9
Foot and toe symptoms	0.6	80.3	Abdominal pain	0.8	67.7
			Foreign body in larynx	0.8	68.4
			Vestibulitis	0.8	69.2
			Palpitation	0.8	69.9
			Fracture radius / ulna	0.8	70.7
			Epilepsy	0.8	71.4
			Other infectious respiratory system	0.8	72.2
			Pleural effusion	0.8	72.9
			Bruise	0.8	73.7
			Suture	0.8	74.4
			Gout	0.8	75.2
			Blood in urine	0.8	75.9
			Urinary calculus	0.8	76.7
			Excessive menstruation	0.8	77.4
			Coma	0.4	77.8
			Allergic reaction	0.4	78.2
			Excessive crying in infant	0.4	78.6
			Diagnostic	0.4	78.9
			Tuberculosis	0.4	79.3
			Carcinomatosis + poisoning by medical agent	0.4 + 0.4	80.1

Table 2 outlines the proportion of cases in different age groups considered urgent versus non-urgent. It can be seen that a higher proportion of young people (68.6% of children, 68.6% of adolescents, and 62.9% of young adults) attended A&E departments with non-urgent conditions, compared with older age

Table 3. Variation of urgent versus non-urgent utilisation of accident and emergency services across different time periods

	Time period				
	7:31–13:30, n=627 No. (%)	13:31–17:30, n=483 No. (%)	17:31–22:30, n=704 No. (%)	22:31–7:30, n=596 No. (%)	Total, n=2410 No. (%)
Accident and emergency cases (urgent)	267 (42.6)	220 (45.5)	307 (43.6)	242 (40.6)	1036 (43)
General practice cases (non-urgent)	360 (57.4)	263 (54.5)	397 (56.4)	354 (59.4)	1374 (57)

Table 4. Variation of non-urgent utilisation by different age groups across different time periods

Time period	Age group (years)					
	0–9, n=384 No. (%)	10–19, n=177 No. (%)	20–44, n=540 No. (%)	45-64, n=188 No. (%)	≥65, n=85 No. (%)	Total, n=1374 No. (%)
7:31 – 13:30	71 (18.5)	40 (22.6)	150 (27.8)	58 (30.9)	41 (48.2)	360 (26.2)
13:31 – 17:30	68 (17.7)	29 (16.4)	116 (21.5)	41 (21.8)	9 (10.6)	263 (19.1)
17:31 – 22:30	135 (35.2)	70 (39.5)	137 (25.4)	42 (22.3)	13 (15.3)	397 (28.9)
22:31 – 7:30	110 (28.6)	38 (21.5)	137 (25.4)	47 (25)	22 (25.9)	354 (25.8)

groups (47.7% of adults and 25% of the elderly). This finding was statistically significant (P<0.001). For non-urgent attendees, presenting problems were most often URTI or gastroenteritis, especially between the evening hours and early morning. The proportion of non-urgent cases with URTI was highest among children (54.9%), followed by adolescents (24.9%), then young adults (14.3%), adults (10.1%) and was lowest among the elderly (9.4%). This difference was shown to be statistically significant (P<0.001). True emergency cases were mostly injuries, or symptoms related to the musculoskeletal system occurring during the day and evening, and asthmatic attacks at night for the younger age groups. In the elderly age group, emergency cases were mostly related to life-threatening conditions, such as loss of consciousness, chronic obstructive pulmonary disease, heart failure, and fracture.

Table 3 details the variation in distribution of urgent versus non-urgent cases according to time period. The proportion of non-urgent cases was highest during the time period 22:31 to 7:30, although this difference was not statistically significant. Further analysis revealed a significant difference (P<0.001) in the proportion of non-urgent cases presenting with URTI at different time periods. The number of non-urgent cases was highest between the time periods 17:31 to 22:30 (33.5%), and 22:31 to 7:30 (26.3%), and lower during the time period 7:31 to 13:30 (20.6%) and 13:31 to 17:30 (22.1%).

Table 4 shows variations in non-urgent utilisation of A&E services by different age groups over differing time periods. A high proportion of children (35.2%) and adolescents (39.5%) utilised A&E services for non-urgent conditions during the time period 17:31 to 22:30 despite the fact that some GP clinics and evening general outpatient clinics were still open during these hours.

Discussion

The selection of hospitals in this study was not random. The study population sampled, however, was representative of the A&E attendee population of the territory as a whole, in terms of age and sex distribution. The sampling method used, although complex and time consuming, allowed a more comprehensive overview of patients attending A&E services. Disagreement among reviewers was less than 5%, indicating an accurate assessment of diagnosis was obtained. The non-response rate was approximately 16.7%. Patients unaccompanied by relatives, with altered mental status or who were unconscious, were excluded. There were only a few such patients seen during the study period overall.

The most accurate assessment of urgency status would be achieved by having experienced emergency physicians screen patients on site. In daily practice, however, it is not possible and also too costly to have experienced emergency physicians conducting the triage of patients. The purpose of this study was to tabulate the utilisation rate of non-urgent conditions, using the existing triage system, which has not been designed to screen out cases more appropriate for GP management. The high utilisation rate seen, however, suggests that patients should be encouraged to first approach primary care physicians for assessment, in order to have less non-urgent cases attending A&E services.

Among the non-urgent cases attending A&E services, most were for self-limiting conditions, similar to the pattern seen in Hong Kong general practice morbidity. Very few non-urgent patients attended A&E departments for chronic illnesses, such as diabetes mellitus and hypertension, which are common presenting conditions in the general practice setting. These conditions may present as other diagnoses when they become unstable, however. Accident and emergency departments appear a popular treatment avenue for patients with self-limiting conditions which could be effectively managed by GPs.

The majority of GP cases were problems related to URTIs, gastroenteritis and other gastrointestinal disturbances. Children and adolescents had the highest proportion of non-urgent problems especially self-limiting conditions, followed by young adults, then adults, whereas the non-urgent utilisation of A&E by the elderly was comparatively low. High rates of non-urgent case attendance among children and adolescents may reflect parents' perceptions of symptoms as an emergency. This may also explain why utilisation of A&E services for non-urgent conditions by children and adolescents was high in the evening, and also why such a high proportion of children attended A&E departments for URTI.

Regarding previously cited factors associated with non-urgent use of A&E services,[20] patients utilising the A&E services in this study were in a higher socioeconomic group, younger in age, and perceived an emergent status of their conditions, as well as a better quality of care at A&E departments. The utilisation pattern of the younger age group further suggests that A&E services are accessed by non-urgent cases due to convenience. This is particularly shown by the high utilisation rates for conditions such as URTI among children and adolescents. In the absence of an alternate source of health care, the A&E department becomes a safe option.

One major study in the UK has shown a different case mix between non-urgent cases seen in A&E services and in general practice.[23] This study reported that approximately 46% of cases attending A&E services were injury-related problems, compared with 6% seen in GP clinics. In Hong Kong, the proportion of injury-related problems among the non-urgent cases was very low.

General practitioners tend to use time as a diagnostic tool and are more experienced in diagnosing 'non-disease', as well as diagnosing common problems in the early stages without obvious symptoms and signs. Dale et al[24] have shown that employing GPs in A&E to manage patients' primary care needs, resulted in a reduced rate of investigations, prescriptions, and referrals. A related study showed that primary care patients could be managed in this way at reduced cost and with no detrimental effect on outcomes.[25] It has also been shown that referral to primary care providers is acceptable to patients.[26] Although employing GPs in the A&E setting appears a cost-effective approach to treating non-urgent patients presenting, a preferable aim is to discourage patients from attending A&E departments for primary care.

Conclusion

This study has shown high levels of inappropriate A&E service utilisation, particularly in the evening and early morning. This high utilisation rate of A&E services by patients with common self-limiting conditions, may reflect the current organisation of the health care delivery system, with limited availability and accessibility of comprehensive primary health care services. Although it is desirable that A&E services are convenient for patients, they should be reserved for those with true emergency conditions, rather than self-determined emergencies, or patients desperate for help because of the unavailability of GP services. The private general practice service, as the major provider of primary medical care, should be better coordinated, with an integrated infrastructure established to provide an appropriate interface between primary and secondary care, public and private sectors, and medical and allied health professionals. The future aim should be to facilitate the management of non-urgent cases by GP services in the community setting.

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