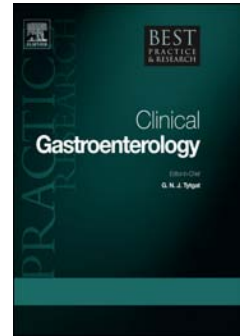


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Abstract

The increasing number of acute and severe digestive diseases presenting to hospital emergency departments, mainly related with an ageing population, demands an appropriate answer from health systems organization, taking into account the escalating pressure on cost reduction. However, patients expect and deserve a response that is appropriate, effective, efficient and safe. The huge variety of variables which can influence the evolution of such cases warranting intensive monitoring, and the coordination and optimization of a range of human and technical resources involved in the care of these high-risk patients, requires their admission in hospital units with conveniently equipped facilities, as is done for heart attack and stroke patients. Little information of gastroenterology emergencies as a function of structure, processes and outcome is available at the organizational level. Surveys that have been conducted in different countries just assess local treatment outcome and question the organizational structure and existing resources but its impact on the outcome is not clear. Most studies address the problem of upper gastrointestinal bleeding and the out-of-hours endoscopy services in the hospital setting. The demands placed on emergency (part of the overall continuum of care) are obvious, as are the needs for the efficient use of resources and processes to improve the quality of care, meaning data must cover the full care cycle. Gastrointestinal emergencies, namely gastrointestinal bleeding, must be incorporated into the overall emergency response as is done for heart attack and stroke. This chapter aims to provide a review of current literature/evidence on organizational health system models towards a better management of gastroenterology emergencies and proposes a research agenda.

Key Words: Survey of emergency gastroenterology; Health Services; Delivery of Health Care; Health Care Reform; Health Policy; Gastrointestinal emergency; models of care in emergency; endoscopy; emergency department; gastrointestinal bleeding; provision of endoscopy services; integrated care

The Emergency Health Service:

In Europe, unlike in the U.S.A., healthcare is viewed as a utility with equal access to the whole population, as opposed to a free-market commodity with supply and demand influencing access to care. All European countries have a legal framework of healthcare delivery for the general population. It is planned and administered centrally by the respective government ministries with a variety of delivery systems. For example, in France and the UK the system is centrally controlled with management directly responsible to the Ministry of Health. In Germany, Italy and Spain the healthcare delivery system is decentralized and local government bodies have autonomy [1,2]. So, in Europe, because healthcare is planned and administered by a central body, policies can be implemented universally.

The second edition of *Health at a Glance* as published by OECD [3] presents the most recent key indicators of health and health systems across 35 countries in Europe. Together, ischemic heart disease and stroke comprise 60% of all cardiovascular deaths, and caused more than one-fifth of all deaths in EU member states in 2010. There has been progress in the treatment of life-threatening conditions such as heart attack and stroke in all reporting European countries. Mortality rates following hospital admissions for heart attack (acute myocardial infarction, AMI) have fallen by nearly 50% between 2000 and 2009 and for stroke by over 20%. These improvements reflect better acute care and greater access to dedicated stroke units in countries like Denmark and Sweden. Care for AMI has changed dramatically in recent decades [4,5]. Clinical practice guidelines, such as those developed by the European Society of Cardiology, provide clinicians with the best available evidence on how to optimize care. Numerous studies have shown that greater compliance with guidelines improves health outcomes [6,7]. AMI case-fatality rates refer to the percentage of patients who die within 30 days of a hospital admission for AMI. This indicator is influenced by not only the quality of care provided by hospitals but also by differences in hospital transfers, average length of stay, emergency retrieval times and average severity of AMI. Patient-based data, which follow patients in and out of hospitals and across hospitals, are predicted to be a more robust indicator for international comparison than admission-based data, as the latter may bias case-fatality rates downwards if unstable cardiac patients are commonly transferred to tertiary care centers. The AMI case-fatality rate for the ten EU

member states reporting data over this period fell by nearly 50% between 2000 and 2009. These substantial improvements also reflect better and more reliable processes of care. Also, the treatment for ischemic stroke has advanced dramatically over the last decades. Dedicated stroke units were introduced in many countries to facilitate timely and aggressive diagnosis and therapy achieving better survival than usual care [8], although there was a six-fold cross-country difference between the highest and lowest percentage of in-hospital case-fatality for hemorrhagic stroke. In Finland, 6.5% of hemorrhagic stroke admissions lead to death within 30 days, whereas in Belgium the corresponding figure was 38.6%. One potential reason for this is that patients were not systematically transported to hospitals with dedicated stroke units in Belgium so that some patients miss out on optimal care.

In fact, the nature of Emergency Medicine (EM) has changed significantly in recent years with the advent of new treatment options and the availability of more medical technology, such as specialized intravenous thrombolysis in stroke and stent placement in AMI. Many of these are time-critical procedures, leading to greater emphasis on resuscitation, stabilization, investigation and initial management in the Emergency Department (ED). Conditions for which patients were previously admitted and observed are now managed in the ED, allowing for direct discharge without the added cost of inpatient hospitalization. In Europe, in-hospital emergency medical services (IN-H-EMS) refer to all those subsets of medical institutions and hospitals that have the capacity to deliver uninterrupted emergency care on a 24-hours-a-day, 7-days-a-week basis. All units, departments, wards, etc. that provide continuous care should be considered part of an IN-H-EMS. For instance, a gastroenterology unit staffed by professionals (gastroenterologists and nurses) and providing full-time (24-hours-a-day, 7-days-a-week) specialized care (diagnostics, endoscopy, etc.) should be considered a component of IN-H-EMS. On the other hand, ED crowding is a global problem that has drawn increasing international attention. One of the most significant reported causes of ED crowding is the ageing population and changes in the type of patients presenting to the ED [9]. One study conducted in the UK showed that between 1990 and 2004 the median age of the population increased by 10 years [10]. It also showed that in 2004 the proportion of patients presenting to EDs who were 70 years or older was 198% higher than in 1990, and the proportion of patients 90 years or older was 671% higher. In countries such as Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Switzerland and the UK, the general practitioner (GP) acts as a gatekeeper to health services whose

role is primary health care provider. Increasing numbers of patients across Europe are bypassing the GP and primary healthcare system to present to EDs [11].

Practice Points

- Emergency health services must ensure that all patients receive an initial high-quality acute care.
- Emergency activities should seek to build on and not duplicate or replace existing work.
- Interventions must establish coordination and each organization must know what to do.
- Local and national governments and institutions should be involved in planning, implementation and allocating human and financial resources.
- With limited resources, emergency health services planning must be based on the best available information.

Gastroenterology as a component of the Emergency Health Service:

A review of the literature published between 1980 and 1998 found few high-quality studies that dealt with the effectiveness of specialized care in general hospitals. However, there is some evidence that patients admitted with gastrointestinal bleeding, acute pancreatitis and acute liver disorders fare better when care is provided by appropriate specialists. The authors found a substantial amount of work detailing guidelines for care, but a distinct paucity of rigorous, evidence-based studies dealing with service provision [12]. The most common medical emergency which has been the subject of recommendations and discussion, both in the clinical context and organizational level, is acute upper gastrointestinal bleeding and emergency endoscopy units. Upper gastrointestinal bleeding, a time-critical event (similar to AMI or stroke) the care of which should be timely, patient-focused and consultant-based, 24-hours-a-day, 7 days a week, has the essential requirements for an emergency model of care. Nevertheless, little information is available on the clinical management of upper gastrointestinal bleeding in relation to the current organization of the emergency health services. The report on endoscopy services provision in District General Hospitals in the UK [13] dealt with the organization of healthcare in gastrointestinal bleeding. Most District General Hospital endoscopy budgets did not provide sufficient funding for a 7- day-a-week, 24-hour on-call service by endoscopy nurses. Rota restrictions tend to lead to medical and surgical Consultant Gastroenterologists being

called in to deal with these patients, often being required to use sub-standard equipment in operating theatre annexes. There were also difficulties in providing out-of-hours endoscopy nurse cover and an acceptable rota of experienced endoscopists, particularly in smaller District General Hospitals, where the number of patients requiring out-of-hours endoscopy may be as few as one or two per week. One possible solution to minimize this aspect would be to provide a short session at the start of the day (8am-9am) for patients admitted during the previous 24 hours. However, this system requires a robust referral procedure; this approach would lead to larger lists on a Monday morning to deal with weekend admissions and difficulties would arise for patients admitted in the early part of the weekend although some hospitals do have a routine Saturday morning endoscopy list to deal with patients with gastrointestinal hemorrhage admitted on a Friday evening. The authors suggested that GI Endoscopy Units must prospectively audit the true requirement for emergency endoscopy on Saturdays and Sundays, before making formal provision for weekend endoscopy lists. In 2007 the British Society of Gastroenterology published a document [14] on out-of-hours care calling for a reorganization of services to provide for safe care of all gastroenterological emergencies and advising that time should be allocated for emergency out-of-hours endoscopy work – predominantly the management of gastrointestinal hemorrhage; in larger units with skilled endoscopists, emergency cover that is available 24 hours a day, 7 days a week should be the aim. This could be achieved in smaller units only by the continuing dedication of staff working long hours or by units merging in order to provide such 24-hour care. As far as possible, the aim should be to schedule sessions during the week and at weekends to manage patients admitted with acute GI hemorrhage. Such rotas should include all of those with appropriate skills, particularly members of the medical and surgical GI teams.

In fact, the majority of studies looking at delivery of care in acute upper gastrointestinal bleeding have emerged from the UK. The main objectives of the study from Button et al. [15] were to establish the incidence of hospital admissions for upper GI bleeding in Wales and case fatality at 30 days following admission, and to investigate whether case fatality was higher for admissions on weekends and public holidays and whether there was an association with factors such as social deprivation, distance from hospital and hospital size. Hospital in-patient and mortality data for 24 421 admissions for upper GI bleeding among 22 299 people in Wales from 1999 to 2007 were included. Rates of endoscopy on the day of admission were lower ($p < 0.001$) for admissions on Saturdays

(8.5%) and Sundays (7.4%) than on weekdays (17.5% to 20.9%). The median time to endoscopy was higher at weekends. Compared with weekday admissions, case fatality was 13% higher for weekend admissions and 41% higher for admissions on public holidays. Mortality was slightly worse among people resident in the most urban compared with the most rural residences. The distance travelled to hospital affected prognosis adversely. There were large differences in both incidence and case fatality across local authorities. The authors possible explanations for the increased mortality at weekends and on public holidays were: reduced staffing levels; lack of specialist or senior consultant cover; less application of multidisciplinary team care; poor communication; possible delays to endoscopy in some hospitals without out-of-hours services. In fact, even with 24 421 admissions we cannot understand how the full cycle of care is provided and how the services and hospitals are organized but simply raise questions about the processes and structure. The same applies to the findings of North American studies that have also reported increased mortality for admissions at weekends for upper GI bleeding [16].

Data from the Canadian Registry of patients with Upper Gastrointestinal Bleeding and Endoscopy (RUGBE) determined clinical outcomes and explored the roles of endoscopic and pharmacologic therapies in a contemporary real-life setting of patients presenting to community and tertiary care institutions between 1999 and 2002 and established guidelines [17]. According to the Canadian Association of Gastroenterology, almost all gastroenterologists (97%) provide on-call for hospital in-patients, but many (79%) also provide emergency room on-call. Less than half (44%) make themselves available to non-hospitalized patients either by telephone or seeing the patient if required. Of those on-call, the majority (61%) tend to spend up to 120 hours per month on-call, 20% between 121 and 180 hours per month and another 20% spend more than 180 hours per month. The policy in Northern Ireland is to include gastroenterologists, intensive care physicians, surgeons, and radiologists at an early stage of the admission and decision-making process to optimize care of potentially ill patients [18].

In June 2012, the guideline released by the National Institute of Clinical Excellence (NICE) [19] aimed to identify which diagnostic and therapeutic steps are useful in managing acute upper gastrointestinal bleeding that should enable hospitals to develop a structure in which clinical teams can deliver an optimum service for people who develop this condition. They recommend offering

endoscopy to unstable patients with severe acute upper gastrointestinal bleeding immediately after resuscitation and within 24 hours of admission to all other patients. They add that units seeing more than 330 cases a year should offer daily endoscopy lists. Units seeing fewer than 330 cases a year should arrange their service according to local circumstances. These recommendations are the result of a nationwide audit [20] that demonstrated that service provisions for out-of-hours endoscopy in UK was highly variable and many patients presenting with acute upper gastrointestinal bleed receive an endoscopy more than 24 hours after presentation because endoscopy staff are typically available during the working week (9am-5pm) with on-call services at night and the weekend variable. For the NICE recommendation of early endoscopy to be implemented, it would involve substantial service reorganization and these costs of implementing and sustaining an earlier access to endoscopy could be significant. The Guideline Development Group, based on this information, proposed an economic model to assess the cost-effectiveness of four different endoscopy services assumed to facilitate endoscopy within different time limits after presentation of a patient with an acute upper gastrointestinal bleed: 1) weekday access to endoscopy: endoscopy staff are on-site on weekdays 8am-5pm; 2) everyday access to endoscopy: endoscopy staff are on-site on weekdays 8am-5pm and weekends 8am-12pm. This is assumed to allow endoscopy to occur within 24 hours of admission or start of in-patient bleed; 3) extended everyday access to endoscopy: endoscopy staff are on-site everyday 8am-5pm, and are on call everyday 5pm-12pm. This is assumed to allow endoscopy to occur within 12 hours of admission or start of an inpatient bleed; 4) continuous access to endoscopy: endoscopy staff are on-site everyday 8am-5pm, and are on call everyday 5pm-8am. This is assumed to allow endoscopy to occur within 4 hours of admission or start of an inpatient bleed. Costs were associated with the health states (in hospital pre-endoscopy, in hospital post-endoscopy), transitional events (endoscopy) and with the strategy employed (staff required to implement the strategy). The base case analysis assumed 300 patients would present with acute upper gastrointestinal bleeding per year, which equates to a mean of 23 patients presenting in any 28-day period. The total costs and QALYs (Quality Adjusted Life Years) for a strategy were divided by the number of patients in the model, allowing an average cost and QALY per patient to be calculated. The strategy that provided the most QALYs was the everyday strategy, where endoscopy was assumed to occur within 24 hours. However, this came at additional cost to the weekday strategy. Using the mean costs and QALYs

generated over the probabilistic sensitivity analysis, the ICER (incremental cost-effectiveness ratio) of the everyday strategy when compared to the weekday strategy is £36,590, which is above the NICE threshold of £20,000 per QALY. This analysis that compared four service models found results to be highly sensitive to the number of presentations a provider would expect per year. For providers expecting fewer than 330 presentations per year, the weekday strategy was most likely to be cost effective; otherwise the everyday strategy was most likely to be cost effective. This means we have to consider different operational models to achieve appropriate skilled cover.

This is the case of appropriate utilization of Gastroenterology Intensive Care Units (GICU) resources, also an important issue as all countries struggle to contain health care expenditures. The performance evaluation and review of a GICU should include its admission/discharge/triage policy. However, the activity of these GICU should not be limited to the provision of effective clinical assistance to severe gastroenterological patients. Indeed, teaching and research are also crucial goals in such intensive care units. As regards teaching, the rationale behind GICU activity is based on the concept that gastroenterology, like other medical specialties, should offer an integral assistance to its patients, from the first slightest symptoms at the ambulatory outpatient department to the most severe complication. In fact, no one is better qualified than a gastroenterologist to make clinical decisions and apply the full range of non-surgical techniques that the diagnosis and treatment of acute severe digestive diseases frequently requires. Consequently, postgraduate professional training and education of gastroenterologists, as well as internists, surgeons and nurses, is one of the fundamental aims of the GICU. This aim is achieved both directly and indirectly. In the first instance, it covers health professionals undergoing traineeships at the GICU to acquire and/or update their skills and further their knowledge. In the second case, the high standards of performance of the GICU have a pedagogical effect on the rest of the hospital. Finally, the development of research activities at the GICU is encouraged both by the rigorous protocol-based clinical care provided and by the multidisciplinary approach to case analysis and procedure assessment. In this context, clinical investigation at the GICU should be perceived not as a mere consequence of the patient care activity but rather as a goal in itself [21]. This integrated approach is aligned with the concepts of economies of scope and economies of scale which are at the heart of healthcare. At a simple level, economies of scope arise where it is less costly to produce two or more products (or services) in one organization

than to produce each separately so that as the scope or variety of services offered increases, unit costs are reduced. Economies of scale generally are found where fixed costs of production are high in relation to variable costs such that long-run average costs fall as the scale of production increases. Such economies may exist across all lines of production or just within one product or service area and are often attributable to technological factors or to the potential for division of labour and specialization. It is clear that it will not always be feasible to have all services thought to be desirable to support ED on a single site. The use of network arrangements is an alternative. However, these include potential increased risks to health from transferring or directing patients elsewhere, balanced against the gains from specialist treatment; the financial costs of establishing and maintaining network arrangements and clear protocols for patient pathways; and the costs of establishing and maintaining adequate training opportunities for those working within and outside of the main services to fulfill the requirements of professional standards (i.e. ensuring that staff see the required volume and mix of cases). The relative financial and non-financial costs and gains from separation need to be weighed up against the costs and gains associated with having one or more services provided in a single location. In northern Portugal, none of the institutions had sufficient resources to ensure a 24-hour gastroenterology emergency service. In October 2006, an out-of-hours endoscopy regional center was set up (Regional Gastroenterology Emergency-URGE) in one tertiary trust in Oporto covering a population of 3 million [22]. This is the place where 25 consultant gastroenterologists from 6 hospitals and 8 nurses from the endoscopy unit are integrated as the emergency team, everyday from 8pm to 8am; they are responsible for handling gastroenterology emergencies, especially those requiring urgent endoscopy. Each institution is responsible for the remuneration for out-of-hours gastroenterology work, except for nurses that are the sole responsibility of the endoscopy unit. In this way, all are allocating human and financial resources, and future planning will be based on the information that is being recorded and audited in order to explain the additional expenditure. Patients are stabilized in the nearest hospital and transferred after agreement with the consultant gastroenterologist. The benefits of a selected transfer destination, an endoscopy nurse always scheduled and the emergency room (ER) staff prepared to receive the patient seem obvious. After the patient's arrival at the ER, they are taken care of firstly by ER staff; after the first-steps in the patient's care, the gastroenterology staff is called and the emergency GI endoscopy is performed by

gastroenterology staff, while the ER staff continuously monitors the patient's condition and intervenes when needed. When appropriate and safe, the procedure takes place in the endoscopy unit or, very rarely, in theatre. After the procedures, the patients are admitted or transferred back to their institution. Although there have been several negative reports for early endoscopy, the majority recommend performing an early endoscopy in critically ill patients. URGE also adopts this approach and aggressively promotes emergency endoscopy even in the ER. The absolute benefits of an inter-hospital transfer depend on the absolute risk of death, and the relative benefit of improved survival at each transferring hospital. Many studies suggest a benefit of transfer, on average, for patients with select conditions, being the most robust data in cardiology and trauma. But the pre-hospital phase is a critical period in determining the outcome, especially for severe acute patients. There are multiple time intervals to be considered that contribute to the total pre-hospital time [23]. The activation interval is the time from the emergency call to ambulance dispatch. The response interval is the time from ambulance dispatch to the ambulance arrival at the scene. The on-scene interval is the time from ambulance arrival at the scene to the time when the ambulance departs the scene for hospital. Finally, the transport interval is the time from ambulance departure from the scene to arrival at the hospital. These four time intervals combine to give the total pre-hospital time of a patient from the emergency call to hospital door. For most patients another interval time must be considered when additional, specialized care by a consultant gastroenterologist and transfer between hospitals is required. In URGE we have patient-based data, which follows patients in and out of hospitals and across hospitals and we are working the data in what concerns appropriateness, safety, timeliness of phone calls, travel time, etc. ; in other words, the full cycle of care. A similar model of care was proposed by Shokouhi et al. [24] after examining the records of patients transferred for endoscopy during weekends between two general hospitals.

Organization of the emergency referral system was also the subject of a retrospective survey conducted by the regional sections of the three main Italian gastroenterological societies, AIGO, SIED and SIGE, evaluating all consecutive episodes of non-variceal upper gastrointestinal bleeding referred to seven centers (four of which were Level-II Emergency Departments) in Rome, Italy, during a one-year period [25]. A total of 624 consecutive patients (64% males, mean age 67.6 ± 16.2 years) were included. In Italy, the Emergency Health Service is organized into Level-I Emergency Departments

(ED) and Level-II ED, the latter being more complex and having greater structural and human resources. In brief, Level-I EDs are those that do not cover all medical specialties, have fewer personnel and are usually located in smaller hospitals, while level-II EDs are located in larger hospitals, include all medical specialties and have a higher level of complexity. The authors investigated the impact of this type of organization on the management of non-variceal upper gastrointestinal bleeding and underlined that an emergency health system intended to offer multistep medical assistance according to patient severity would not be efficient if admission to hospital care is indiscriminate, and therefore not based on patient needs, but mainly influenced by geographical vicinity. They conclude that 30-day in-hospital mortality rate was lower when patients were admitted to EDs with greater resources (nearly two-thirds reduction). More seriously ill patients were less frequently referred to hospitals with the better-organized Level-II EDs. So, strategies to improve the referral of patients in relation to the severity of their clinical status are therefore needed in the Lazio region, although the cost-effectiveness ratio of this policy remains to be evaluated in order to justify the supplemental economic resources allocated to Level-II EDs as a function of increased survival.

Practice Points:

- For each emergency gastroenterological condition, definition of the level of health care that must be provided is essential.
- There is an urgent need to incorporate the gastrointestinal emergencies, namely gastrointestinal bleeding, into the overall emergency response as was done for heart attack and stroke.
- Evaluate geographic access to health services determining the patient travel time to a specified facility.
- Identify measurable performance indicators with information systems to monitor, analyze, and trend data. Ultimately, we want an emergency care delivered that is timely, consistent, appropriate, cost-effective and, most importantly, beneficial to patient outcomes.

A growing body of literature and reports from innovative practices and care systems from other specialties are beginning to clarify the elements associated with more effective care coordination and more successful referrals and transitions and these experiences can and should be extrapolated to

emergency gastroenterology. We realize that emergency endoscopy services need to be better organized; that gastroenterologists can no longer be drowned in general internal medicine in the ED but add their technical expertise in high-risk situations or, conversely, adding fluidity and discharge patients earlier. Despite the quantity of proposals (transfer the patient or call or transfer the gastroenterologist), there remains a distinct lack of reference to all service provision (structure+process+outcome) and models of care, which must be the driving force for organizing, evaluating and facilitating medical care across the full care cycle. In the light of these findings, and the general lack of a model of care for acute gastrointestinal service delivery, there is clearly a pressing need for more research and planning of how services should be delivered and the resources required to meet the patient and professional needs. Finally we conclude that gastrointestinal emergencies, especially gastrointestinal bleeding, have not been incorporated into the overall emergency response, despite extensive debate on the fact that it is a time-critical procedure as set out in the recently published CROMES report [26].

Research Agenda

- Research on the development of strategies and emergency models of care in gastroenterology is needed, not just on clinically-focused problems but also on logistical and managerial ones.
- This research should be coordinated, tied to real practice, and focused on both outcomes and processes across all six domains of healthcare quality.
- Research on appropriate care can only be understood over the full cycle of care (complete process of care); patient-based data, which follow patients in and out of hospitals and across hospitals, is the only robust quality and safety indicator and should be the focus of research.

Summary

The patient needs and expectations, the increased specialization, the availability of new treatments and technologies, the constant pressure from rising demand and limited resources and the challenging financial environment, mean that maintaining the 'status quo' may not be a safe option. So, there is an acute need to close the gap in gastrointestinal emergencies delivery, between what is known and what is actually available in most settings.

It is essential that gastroenterology is a 24-hours-a-day, 7-days-a-week specialty, and consequently the service should be organized around the patient's needs. New models of care should be beneficial to patients and staff, rather than just being considered for purely economic or administrative reasons. But, unlike other clinical areas, cardiac or stroke care, the field of emergency care in gastrointestinal emergencies, currently lacks a uniform set of metrics which informs providers, administrators, and consumers about the status of their care. All of this calls for a coordinated approach and organizational (national, regional or local) models of care. These must become the driving force for organizing, evaluating, and facilitating medical care across the full care cycle. We found no studies directly addressing the causal relationship between all three variables of care: structure, processes and outcomes, although in some, associations between outcomes and resources could be inferred. This review suggests that more research is needed to establish a robust and cost-effective model of gastroenterology emergency service delivery.

References:

- [1] Platz E, Bey T, Walter FG. International report: current state and development of health insurance and emergency medicine in Germany. The influence of health insurance laws on the practice of emergency medicine in a European country. J Emerg Med 2003; **25**: 203-210.
- [2] Jepson GMH. How do Primary Health Care systems compare across Western Europe? Pharm J 2001; **267**: 269-73.
- [3] OECD (2012), Health at a Glance: Europe 2012. OECD Publishing. <http://dx.doi.org/10.1787/9789264183896-en>.
- [4] Khush KK, Rapaport E, Waters D. The history of the coronary care unit. Can J Cardiol 2005; **21**: 1041-1045.
- [5] Gil M, Marrugat J, Sala J, Masiá R, Elosua R, Albert X, et al. Relationship of therapeutic improvements and 28-day case fatality in patients hospitalized with acute myocardial infarction between 1978 and 1993 in the REGICOR study, Gerona, Spain. Circulation 1999; **99**: 1767-1773.
- [6] Schiele F, Meneveau N, Seronde MF, Caulfield F, Fouche R, Lassabe G, et al. Compliance with guidelines and 1-year mortality in patients with acute myocardial infarction: a prospective study. Eur Heart J 2005; **26**: 873-880.
- [7] Eagle KA, Montoye CK, Riba AL, DeFranco AC, Parrish R, Skorcz S, et al. Guideline-based standardized care is associated with substantially lower mortality in medicare patients with acute myocardial infarction: The American College of Cardiology's Guidelines Applied in Practice (GAP) in Michigan. J Am Coll Cardiol 2005; **46**: 1242-1248.
- [8] Seenan P, Long M, Langhorne P. Stroke units in their natural habitat: systematic review of observational studies. Stroke 2007; **38**: 1886-1892.
- [9] Jayaprakash N, O'Sullivan R, Bey T, Ahmed SS, Lotfipour S. Crowding and delivery of healthcare in emergency departments: The European perspective. West J Emerg Med 2009; **10**: 233-239.

- [10] George G, Jell C, Todd BS. Effect of population ageing on emergency department speed and efficiency: a historical perspective from a district general hospital in the UK. Emerg Med J. 2006; **23**: 379-383.
- [11] Rieffe C, Oosterveld P, Wijkel D, Wiefferink C. Reasons why patients bypass their GP to visit a hospital emergency department. Accid Emerg Nurs 1999; 7: 217-225.
- [12] Williams JG, Roberts SE, Ali MF, Cheung WY, Cohen DR, Demery G, et al. Gastroenterology services in the UK. The burden of disease, and the organisation and delivery of services for gastrointestinal and liver disorders: a review of the evidence. Gut 2007; 56 (Suppl 1): 1-113.
- [13] Barrison IG, Bramble MG, Wilkinson M, Hodson R, Fairclough PD, Willoughby CP, et al. Provision of Endoscopy Related Services in District General Hospitals. The Report of a Working Party of the British Society of Gastroenterology Endoscopy Committee. http://www.bsg.org.uk/attachments/217_endo_related_services.pdf
- [14] British Society of Gastroenterology. Out of hours gastroenterology - a position paper (2007). <http://www.bsg.org.uk/clinical-guidance/endoscopy/out-of-hours-gastroenterology-a-position-paper-2007.html>
- [15] Button LA, Roberts SE, Evans PA, Goldacre MJ, Akbari A, Dsilva R, et al. Hospitalized incidence and case fatality for upper gastrointestinal bleeding from 1999 to 2007: a record linkage study. Aliment Pharmacol Ther 2011; **33**: 64–76.
- [16] Ananthakrishnan AN, McGinley EL, Saeian K. Outcomes of weekend admissions for upper gastrointestinal hemorrhage: a nationwide analysis. Clin Gastroenterol Hepatol 2009; **7**: 296–302.
- [17] Barkun A, Sabbah S, Enns R, Armstrong D, Gregor J, Fedorak RN, et al. The Canadian Registry on Nonvariceal Upper Gastrointestinal Bleeding and Endoscopy (RUGBE): endoscopic hemostasis and proton pump inhibition are associated with improved outcomes in a real-life setting. Am J Gastroenterol 2004; **99**: 1238–1246.
- [18] Ferguson CB, Mitchell, RM. Nonvariceal upper gastrointestinal bleeding: standard and new treatment. Gastroenterol Clin N Am 2005; **34**: 607–621.
- [19] National Institute for Health and Clinical Excellence. Gastrointestinal bleeding: the management of acute upper gastrointestinal bleeding. Clinical Guideline 141 - Issued: June 2012. <http://guidance.nice.org.uk/CG141>

- [20] Hearnshaw SA, Logan RF, Lowe D, Travis SP, Murphy MF, Palmer KR. Use of endoscopy for management of acute upper gastrointestinal bleeding in the UK: results of a nationwide audit. *Gut* 2010; **59**: 1022-1029.
- [21] Mas A, Bernuau J, Romãozinho JM, Ferreira M, Amaro P, Leitão MC. Organization, structure and function of intensive care in Gastroenterology. In Romãozinho JM (ed.). *Intensive Care in Gastroenterology*, pp 17-35. Coimbra, Portugal 2007.
- [22] Pedroto I, Magro F. Urgência Regional de Gastreenterologia (URGE): Gestão Clínica da Hemorragia Digestiva Alta: Normas Orientadoras Clínicas. <http://portal.arsnorte.min-saude.pt/portal/page/portal/ARSNorte/Conte%C3%BAdos/Documentos/HemorragiaDigestiva.pdf>
- [23] Spaitte DW, Valenzuela TD, Meislin HW, Criss EA, Hinsberg P. Prospective validation of a new model for evaluating emergency medical services systems by in-field observation of specific time intervals in prehospital care. *Ann Emerg Med* 1993; **22**: 638–645.
- [24] Shokouhi BN, Khan M, Carter MJ, Khan NQ, Mills P, Morris D, et al. The setting up and running of a cross-county out-of-hours gastrointestinal bleed service: a possible blueprint for the future. *Frontline Gastroenterol* 2012; **4**: 1–5.
- [25] Cesaro P, Kohn A, Petruziello L, Angelico M, Franceschi F, Gigliozzi A, et al. A survey on mortality from non-variceal upper gastrointestinal bleeding: Is the emergency referral system adequate? *Dig Liver Dis* 2013; (article in press).
- [26] Scope for Improvement: a toolkit for a safer Upper Gastrointestinal Bleeding (UGIB) service (CROMES project): <http://aomrc.org.uk/projects/item/upper-gastrointestinal-bleeding-toolkit.html>

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