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The Future of Emergency Medicine Public Health Research

Abstract

This chapter addresses past successes and challenges and then elaborates on the potential for further advances in three areas that bridge emergency medicine and the broader public health and health services research agenda: (1) monitoring health care access; (2) surveillance of diseases, injuries, and health risks; and (3) delivering clinical preventive services. This article also suggests ways to advance policy-relevant research on systems of health and social welfare that impact the health of the public.

Keywords

emergency medicine, population surveillance, public health

Comments

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The Future of Emergency Medicine Public Health Research

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The distinguishing feature of public health research is its focus on assessing, measuring, and monitoring the health of *populations*; in contrast, traditional biomedical research focuses on studying disease and treatment for *individual* patients [1]. Compared with most medical specialties, emergency medicine (EM) is well positioned to bridge biomedical and public health approaches for preventing disease and injury and promoting health through population-based strategies targeted at the community [2]. In its strategically vital position at the boundary between the hospital and the surrounding community, the emergency department (ED) is actually the linchpin for multiple systems of care. When all systems are functioning, EM offers access for all patients 24 hours a day, 7 days a week, regardless of their ability to pay. EM provides triage and care for both mental and physical health conditions, and links patients with the most appropriate providers and care settings for their presenting conditions. EM identifies unmet health needs and interfaces with primary care, specialty care, inpatient, outpatient, and community-based social services. The ED also collects data used for surveillance of infectious diseases (eg, sexually transmitted infections, tuberculosis,

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severe acute respiratory syndrome [SARS]) and environmental emergencies (eg, heat waves, toxic spills) and forwards patient-level data to public health departments. However, research advances and practical innovations are needed to enhance surveillance data by enabling “real-time” reporting of more cases and more complete data about each case. In addition, the ED is well positioned to recognize and call attention to major social problems that impact the health of the public (breaches in food safety, homelessness, lack of health insurance or care coordination, child abuse, interpersonal violence). EM has great potential as a public health partner capable of monitoring and providing input into policies affecting the health of populations along a number of dimensions.

Background: EM and public health

The specialty of EM was launched in the 1970s in response to patients’ needs for improved access to care. Indeed, the topic of access, particularly for vulnerable populations, pervades much of EM public health research. Before the 1980s, it was both traditionally and federally reinforced through Hill Burton funding that hospitals provided the majority of “charity care” [3]. The original emergency rooms were started in response to unattached patients. At that time, those individuals without primary care physicians who presented to the hospital in acute distress would be evaluated by the charge nurse and, if necessary, the on-call physician. Early EDs were primarily staffed by nurses, rotating residents from various specialties, and physicians trying to build practices [4]. The growth of the specialty of EM was very much consumer driven as the volume increased to the point that overwhelmed existing staff, who were all trying to do other jobs. Finally, small groups of physicians began providing full-time coverage of EDs as attending physicians dedicated to providing emergency care; the Pontiac Plan and the Alexandria Plan were examples. These informal groups soon united to define the scope of EM, develop curriculum and board certification, and lobby organized medicine for specialty status. The new specialty grew exponentially and was amazingly successful both for hospitals and EM physician groups [4]. However, major changes in the financing and delivery of health care in the 1980s resulted in increasing rates of uninsured patients [5]. Many private hospitals started to balk at absorbing this burden and developed policies of referring or transferring uninsured ED patients to publicly funded county hospitals. Emergency physicians and patients responded to these “patient dumping” policies with research and advocacy [6]. Understanding this close relationship between EM, the needs of health care consumers, and the development of current health care policies gives a framework for a discussion of the past challenges, successes, and potential for future EM public health research.

Monitoring health care access: negotiating emergency care during changes in health policy

Past challenges, research findings, and their Impact

Like EM itself, EM *research* has its roots in advocacy efforts by emergency physicians to provide access to care for vulnerable patient populations. Much of this work was composed of descriptive studies designed to document disparities in care for the poor and uninsured. Among these studies were descriptive analyses of “patient dumping,” a practice in which private hospitals transferred uninsured patients to public hospital EDs, regardless of medical condition [7]. This analytic work influenced landmark federal legislation, the Emergency Medical Treatment and Active Labor Act (EMTALA), which established a statutory duty for Medicare-participating hospitals with EDs to serve any person seeking emergency care [8].

In the early 1990s, governmental and free market cost-containment strategies, including the penetration of health maintenance organizations, accelerated. Many policy analysts questioned the opportunity costs of paying for the high cost of emergency care. Several researchers, however, reported that the marginal costs of ED care, especially for nonurgent problems, were actually much less than widely believed. Williams [9] provided evidence that the majority of ED costs were fixed because of the necessity of standby capacity for unexpected trauma and acute medical emergencies, and that the excess charges primarily reflected cost shifting to pay for the uninsured. Tyrance and colleagues [10] found that “ED use accounts for a small fraction of medical spending” and suggested that “Attempts to restrict ED use would disproportionately burden minorities and the poor who receive much of their out patient care in EDs.” They also recommended that “Strategies that reduce demand for ED services should be pursued to improve health, not because of anticipated cost savings.” Nonetheless, many health policy experts and politicians considered “inappropriate ED use” to be an important cause of high medical costs. This led to attempts by managed care organizations to constrain patient access to emergency services. One opinion of primary care specialists is summarized by Dowling [11] from the Department of Family Medicine at the University of California, Los Angeles. He referred to ED care as “fragmented, uncoordinated, incomplete, and inappropriate” and said the real cost of an ED visit was its “missed opportunity for prevention.” These criticisms may have had more validity if, at the same time, there hadn’t been a lack of access to primary care for a large portion of Americans based on inadequate or lack of health insurance [12–15].

In 1994, a group of emergency physicians formed the multisite Medicaid Access Study Group to study the problems that Medicaid recipients were experiencing when they tried to access primary care. In the nine cities, they trained research assistants to pose as patients seeking care for relatively

minor, but physically uncomfortable health problems [16]. Only 44% of Medicaid callers could secure an appointment at any point in time, and only 8% could get an appointment within 2 working days without agreeing to pay a substantial amount of cash at the time of the visit. When callers recontacted the same primary care practices and stated that they had private insurance, twice as many were granted a timely appointment. The authors concluded that Medicaid patients have few options outside of the ED.

Other studies in the mid-1990s focused on the impact of HMO-mediated ED access barriers [17–19].

These research studies and advocacy efforts on the part of organized emergency medicine and health care consumers eventually led to the Healthy People (HP) 2010 objective 1-10, to “reduce the proportion of persons who delay or have difficulty in getting emergency medical care” and the overarching goal to “improve access to high-quality health care services” [18]. Many state governments and the federal Medicare and Medicaid programs adopted the “prudent layperson standard” in defining a medical emergency for purposes of health insurance coverage. The prudent layperson standard also was incorporated into a federal legislative proposal that would make it applicable to emergency care reimbursement decisions by all health care plans nationwide [18]. This standard obligated managed care plans to provide coverage for ED services based on an enrollee’s presenting symptoms (including severe pain) rather than the final diagnosis. The test for triggering reimbursement under this standard was whether a prudent layperson (a person who possesses an average knowledge of health and medicine) would reasonably expect that the absence of immediate medical attention could result in harm [6].

Future research: access to care

New research insights into access problems and their solutions can be achieved through studies that focus on patient flow and care processes outside the ED. EM researchers are well positioned to study the most cost-effective and appropriate method of providing for the health care needs of vulnerable populations [19]. EM investigators have already taken the important step of moving from merely observing access problems to measuring and quantifying the factors that keep people from accessing needed care and linking these barriers to adverse patient outcomes [20–22]. Next steps include designing and evaluating interventions to reliably link patients to appropriate services. For some patients, the most efficient gateway to primary and specialty health care services may be through the ED, because of its 24-hour availability. One example might be a system where the ED provides initial triage for all acute ambulatory care and has the capacity to make urgent primary and specialty appointments for patients in an open access framework. On the other hand, it might turn out that other options such as open access systems or allowing patients to make their

own appointments on the Internet are more reliable or cost-effective [23,24]. Regardless, creative reengineering of the current health system will allow the ED to function as effectively as possible in delivering care directly and enabling patients to access other health care and social services that may be needed. Ideally, EM will not only be involved in the development of any new system changes but also their evaluation.

One important unresolved conceptual challenge will be for EM to help define the ideal “access” a term whose meaning has shifted over time along with differing policies and expectations of the American health care system. Consensus on the meaning of access is still lacking: many might consider access to be the provision of medical care that is adequate and timely enough to prevent adverse health outcomes. Others, including consumers, might believe that health care access is not adequate unless it can ensure safe, quality, timely, cost-effective, culturally competent, appropriate care that optimizes mental and physical health outcomes, including satisfaction with care. Keeping in mind that health services are only one of several means to the desired outcome of “health,” a public health approach to access would include a consideration of population-based health indicators and outcome measures. Moreover, we need to consider the opportunity costs of the proportion of the gross national product (GNP) and other resources going to health care services versus housing, education, recreation, environmental protection, and other social obligations that impact the health of the public.

Surveillance of diseases, injuries, and health risks

While health departments bear the responsibility for surveillance and monitoring the health of the public, emergency departments are at the front line of any emerging health hazard and, as such, have the potential to play a more immediate and sentinel role [25,26]. Public health surveillance was originally developed as part of local, state, and national efforts to control infectious diseases. Early detection and response are longstanding priorities, and the premium placed on rapid reporting has only increased in recent years. New emerging infectious diseases, which are rapidly spread in our global economy (eg, SARS) [27], and recent acts of bioterrorism [28] have focused attention on the need for real-time reporting from EDs to public health agencies.

More rapid public health reporting from EDs is part of a larger vision of EM’s role in public health [29,30]. Previous usage of ED-based data had been largely retrospective and seldom population-based. An early exception was the northeastern Ohio trauma study in the early 1980s [31]. Usage of ED data to describe the scope and nature of specific problems has been limited because of selection biases, retrospective information, and inability to acquire timely data. ED-based surveillance began to receive serious attention and discussion in the 1990s, most notably in the areas of infectious

diseases and violence. The Weapon Reporting Injury Surveillance System (WRISS) of Massachusetts collected information on all weapon-related injuries treated in all of the EDs within Massachusetts and proved very useful for the development and evaluation of prevention strategies [32]. EMERGENCY Net ID was established in 1995 to sample ED-based infectious diseases. The network is not population-based and is significantly retrospective in its timeliness, but it provides an important demonstration of the value of ED data for surveillance purposes [33].

Other subjects for ED-based surveillance included intimate partner violence [34] and firearms [35]. As an example of the latter, Atlanta-based EDs were among the first to enroll in a firearm surveillance project with Emory's Injury Control Center that provided timely information to law enforcement and public health officials on the scope and nature of firearm injuries in the metro-Atlanta area [35]. These state and local efforts complement national-level surveillance of ED-treated injuries by the National Electronic Injury Surveillance System (NEISS) of the US Consumer Product Safety Commission. National estimates of nonfatal firearm-related injuries are derived using weighted data for patients treated in a nationally representative, stratified probability sample of US hospital emergency departments [36].

ED encounter databases in which external cause of injury codes are assigned for each injury-related visit are another resource for injury surveillance. Paramedic and emergency medical systems (EMS) can provide additional data for surveillance purposes. However, not all public health departments currently have data in electronic format and there is a noted lack of uniformity among regional and state-based surveillance systems.

Future ED-based surveillance

Currently, most health departments conduct surveillance on a limited set of diseases and injuries. Additional investments are needed to close gaps in existing surveillance capacity and extend surveillance to other conditions. A start in this direction would be the dissemination of uniform data elements for use by ED systems (DEEDS). This was developed by the CDC in collaboration with emergency physicians and other stakeholders with the hope of creating regional linkages between public health departments and EDs. It uses electronic tools to enable the emergence of real-time ED-based surveillance [37]. These efforts will be greatly strengthened by the application of new information technology. Currently, work on uniform data collection systems [38] and ED-based research networks [39,40] is still in its infancy. Real time ED-based surveillance has become an increasingly important concept but is currently limited to sampling EDs in the United States for specific problems: product-related injuries NEISS for the Consumer Product Safety Commission, and The Drug Abuse Working Network (DAWN), an ED-based system for surveillance of drug abuse.

EM researchers have opportunities to help develop more efficient and real-time public health surveillance systems as part of an overall public health strategy [41]. Inherent in this effort is the possibility of EM serving as a coordinator and catalyst of links between hospitals, local governing bodies, public health agencies, and other community organizations whose policies impact the health of the public. Advances in information technology are likely to enable automatic reporting of a variety of health problems from ED electronic health record system to public health agencies. These efforts will require careful attention to the quality of ED data and safeguards for privacy and confidentiality [37,41].

Preventive services in the ED

Historically, in most Western societies, advances in antimicrobials and vaccines and improvements in sanitation have shifted much of the burden of disease morbidity and mortality from infections to injuries and chronic diseases [42]. Clinical preventive services aimed at reducing behavioral antecedents of injuries and chronic diseases (such as excessive use of alcohol, obesity, tobacco use) provide an important way to further reduce morbidity and mortality. Yet risky behaviors have only recently been viewed as potential public health threats that should be monitored and addressed. Initially, chronic diseases such as cancer and heart disease were viewed as hereditary and incurable. It was not until 1957 that the Surgeon General issued a warning against “excessive cigarette smoking” [42]. It still took a tremendous effort on the part of physicians and public health professionals to change the public’s perception that smoking cessation, control of blood pressure, improved diet, decreased stress, and greater exercise could increase life expectancy and lead to more quality years of healthy living. However, the success of these efforts on the part of the American Heart Association, American Cancer Society, and the US Preventive Services Task Force is evidenced in the declining age-adjusted mortality rates for several cardiovascular diseases. Likewise, both passive (seatbelts) and active (speed limits, helmets) injury-prevention strategies have been associated with a decline in death rates from motor vehicle crashes. The *Healthy People* initiative began in the late 1970s to increase health promotion and prevent disease [42]. Gradually, prevention became widely regarded as the answer for preventing premature death and prolonging years of healthy life. However, to date, it is recognized that the patients who most need preventive services are those least likely to receive them [43].

The US Preventive Services Task Force (USPSTF) recommended that all physicians take advantage of acute care visits to provide preventive services. However, nearly all the preventive services identified by the USPSTF as efficacious and cost-effective are provided at unacceptably low rates, even to patients who regularly visit traditional primary care settings [44]. Many

patients only receive acute episodic care in EDs. Thus, EDs may be in a position to treat those patients with the greatest potential to benefit from preventive services. Nevertheless, there are some concrete and controversial questions about whether the USPSTF recommendations apply to EDs, and if so, which preventive services should be provided. It is perhaps important to clarify that classical primary preventive services are those delivered before onset of a condition, such as education and immunization. Secondary prevention is targeted at high-risk individuals before they suffer the adverse consequences of their behaviors, such as counseling problem drinkers to cut down or those with risky sexual behaviors to use condoms to prevent HIV infection. Tertiary preventive care is targeted at halting progression of clinically apparent conditions, eg, advising individuals with heart disease to quit smoking or referring substance abusers for treatment. While these preventive interventions are provided to individuals, they are generally considered part of an overall public health strategy.

EM's role in delivering clinical preventive services has been a source of controversy [2]. A relatively young specialty, EM has been defined by unscheduled acute care and crisis management, an emphasis that is reflected in the scope of residency curriculum. Emergency physicians in training have little exposure to the assessment of patient psychosocial or behavioral health risks or skills in motivational interviewing. Other impediments to delivering clinical preventive services in the ED involve competing clinical priorities and constraints on time, resources, and reimbursement for prevention. While recognizing the health burden of unhealthy behaviors, even strong advocates for ED prevention recognize that screening and intervention of any kind has been difficult in the ED. Moreover, the EDs that treat the most vulnerable patients are the most stressed. High-volume public hospital EDs with long waits, limited budgets, and insufficient staff, do not have the resources to add to their scope of practice.

As emergency medicine has matured, there has been more focus on the public health implications of being a "safety net" provider for more than 40 million uninsured Americans. In the past 10 years, there has been increasing recognition of the potential role of EDs in injury surveillance and population-based public health strategies [2], including the need to address the behavioral health risks that put individuals and their communities at risk of adverse health outcomes.

In 1998, the Society of Academic Emergency Medicine's (SAEM) Board of Directors directed the SAEM Public Health Task Force (PHTF) to develop recommendations for prevention, screening, and counseling activities to be conducted in emergency departments. This action followed several initiatives to increase EM's involvement in national public health planning and in helping to define the national health priorities of "increasing quality and years of healthy life" and "eliminating health disparities," as a participating organization in the Healthy People 2010 Consortium. Following the lead of the USPSTF, the SAEM PHTF developed a list of candidate

prevention services recommended by the USPSTF for traditional primary care settings that appeared to be effective, inexpensive, and potentially feasible and in the ED. They used a systematic approach to collect evidence from published clinical research and to judge the quality of individual studies. Given the very few high-quality studies of preventive services in the ED setting, they also accepted high-quality studies from primary care, where there was evidence for feasibility of the intervention in the ED setting. Using this criterion, the PHTF identified only five preventive services with sufficient evidence of effectiveness to support a recommendation in the ED setting: alcohol screening and intervention, HIV screening and referral (in high-risk populations), hypertension screening and referral, pneumococcal vaccinations (age > 65), and smoking cessation counseling [45].

While not fully addressed by the PHTF, episodes of trauma care are widely recognized as unique opportunities to identify injury risk factors and initiate interventions aimed at breaking the cycle of injury recidivism [46,47]. Although emergency physicians and nurses have been increasingly involved in injury control and prevention efforts, the ED remains a clinical setting where the primary focus is treatment of the physical manifestations of emergency medical conditions. Screening for underlying injury risk factors and counseling and other forms of risk reduction are not consistently performed and often neglected [25]. To reduce injury morbidity and mortality, it may be imperative to capitalize on the opportunities that the ED presents for injury prevention [48]. Moreover, attention to injury epidemiology will help in the development and evaluation of intervention programs. ED-based injury surveillance will need to be strengthened and integrated into local, state, and national prevention strategies.

Some have advocated that screening all ED patients for injury risk behaviors, such as intoxicated driving and seatbelt use, should become the routine practice [47,49,50]. One of the most controversial questions is whether emergency physicians should screen all women for intimate partner violence (IPV). Recognizing that intimate partner violence is a major cause of morbidity and mortality, medical organizations [51,52] and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) recommended that all EDs implement protocols for screening and intervention of this high-risk group [53]. However, most articles from the ED setting have reported on the system's failure to identify IPV and the barriers involved in universal screening [54,55]. The feasibility issues combined with a lack of an evidence-basis that IPV screening in a health care setting leads to a reduction in morbidity and mortality [56] have resulted in general discouragement regarding universal screening for IPV [57]. Currently, the USPSTF and others suggest that we should not engage in any screening or intervention that lacks an evidence basis [58]. While IPV screening is a low-risk, low-cost procedure with reliable screening tools [59], time spent on screening or counseling for non-evidence-based conditions is costly and infringes on other physician tasks of proven benefit [60]. Indeed,

reimbursement for such activities will need to be prefaced by studies showing improvement in outcomes [46]. Studying the effectiveness of ED-based interventions will require careful consideration of particular outcomes and valid measurements of these outcomes.

Clearly there are knowledge gaps that need to be addressed before evidence-based recommendations can be made in favor of screening for health risks in the ED setting. One of these gaps is a lack of well-defined, desirable, and measurable outcomes related to the screening process itself. For example, any understanding of the value of identifying IPV in a health care setting is confounded by the psychosocial and biological complexity of violence. Using “incidence of violence” as an outcome measure for the effect of a brief intervention in health care setting involves measuring the behavioral outcomes of a third party, something that is not necessarily under the control of either the physician or the patient. Establishing a direct link between physician screening and incidence of violence is not feasible under that condition.

The most appropriate outcomes for evaluating screening interventions in a health care setting may involve measuring the direct effect of screening on the outcomes of care. For example, information about abuse histories may influence assessment and treatment of other health problems. Nonetheless, it is time to expand the vision of potential outcomes to be measured from screening and counseling interventions in a health care setting, including identification of patient-desired outcomes. One example from the substance abuse literature might be to measure the impact of an ED intervention on a patient’s stage of readiness to change the risky health behavior [61]. Another way to conceptualize ED screening for adverse health behaviors would be to think of ED screening as just one component of an overall public health strategy to influence health behaviors. Acknowledging that this is the case means that we must also evaluate the value of ED interventions in proportion to other population-based strategies such as public service announcements and other educational interventions.

Future research on providing preventative care in the ED

There are several arguments to support expanding our research in the area of prevention. First, EDs are already doing a significant amount of prevention, screening, and counseling. Most emergency physicians order tetanus immunizations for patients with lacerations. We should know if this is a good use of ED provider time. Perhaps it would make more sense to immunize the large numbers of patients at risk for more common infections such as pneumococcal pneumonia and influenza, as both of these immunizations have been shown to be effective and feasible in the ED setting [62]. Many ED physicians write, “Stop drinking” or “Stop smoking” on discharge instructions. A fruitful area of research would be to identify effective, efficient methods of how the ED staff might provide such advice and to identify if it is indeed helpful and linked to desired outcomes [63].

Second, to the extent that EDs serve as “safety nets” treating patients without other sources of care, we are the only potential source of prevention services for a highly vulnerable portion of the US population. Over 40 million uninsured Americans have limited access to medical care outside of the ED. These Americans are particularly likely to have unmet needs for prevention services. Smokers, drinkers, drug users, and motor vehicle crash victims presenting to the ED could benefit the most from behavioral interventions. Homeless people at risk for tuberculosis and patients with sexually transmitted diseases in need of HIV counseling and testing commonly use the ED for health care. ED physicians are frequently the only health care providers for these patients. ED use has been found to be a marker for under-vaccination [64,65] as well as lack of other preventive services. Many of our patients may not receive prevention services at all if they do not receive them in the ED [66].

Third, it is likely that unmet preventive health needs will result in ED visits for more serious problems. A retrospective review by Stack and colleagues [67] found that 55% of their patients admitted with pneumococcal bacteremia had been seen in the ED an average of 3.4 times during the 72 months before their bacteremic episode; 88% of those patients were at high risk for pneumococcal disease by CDC criteria and 10% of them died during their admission. A large multisite study of ED patients by Lowenstein and colleagues [68] found very high prevalence rates of injury-prone behaviors as well as risk factors for chronic disease. High proportions of these patients were deficient in recommended preventive services. This was true even among the patients with access to primary care. It has long been acknowledged that ED visits are frequently the result of a failure of prevention and that public health problems such as substance abuse, sexually transmitted disease (STD) treatment, and violence have placed a major burden on EDs. One area of future research is to document the extent and costs of these patients recycling back to the ED if there is no attempt at intervention.

Last, patients in the ED may experience a “teachable moment.” The ED patient treated for an injury following a motor vehicle collision may be more receptive to advice about seatbelts than he was a month earlier in his internist’s office. The teenager with an STD may be more receptive to safe-sex counseling than she was in a high school lecture the week before. There is evidence that ED patients have both a need and a desire for preventive services to be initiated in the ED setting [69]. There is some evidence that ED interventions targeted at high-risk populations can be very effective [63,70]. Parents trained about adolescent suicide risks during an ED visit for an adolescent behavior problem were four times more likely to take steps to limit their child’s access to guns and prescription drugs than parents without the training [71]. However, the hypothesis that the ED visit is a “teachable moment” has yet to be rigorously tested.

There are also reasons *not* to provide preventive services in the ED. What most constrains us from instituting preventive programs in the ED is

a concern about lack of time and resources. The EDs that treat the most vulnerable patients (where prevention, screening, and counseling activities should be focused) are the most stressed. High-volume public hospital EDs with long waits, limited budgets, and insufficient staff do not have the resources to add to their scope of practice. In these settings, coordinating follow-up for screening lab test results, determining what immunizations a patient has had previously, and so forth, may render many preventive and screening services much more difficult and potentially less effective than in primary care settings. The worse scenario would be if the provision of preventive services detracted from our ability to provide critical care. So perhaps the appropriate research questions are not should we be doing prevention, but what prevention should we be doing, what resources do we need to do to perform these services, and how well does it work?

Policy-relevant research on health services systems, social welfare, and social determinants of health

Current and future EM public health researchers wishing to engage in policy-relevant research will need to take a broad “big picture” approach to studying health. In the process they can study not only the micro- and macro-factors related to quality in the health system but whether our current health system actually impacts health. They will need to reach outside the clinic walls and consider the opportunity costs of our current high-priced high-tech health system and finally study the social determinants of health itself.

Research on the quality of emergency medical care: addressing the quality chiasm

The Institute of Medicine (IOM) outlined six aims to improve the quality of care in the United States [72]. The implication of each of these for future EM research was presented at an SAEM 2002 consensus conference [73]. These suggestions are very applicable to EM public health research. They suggest identifying whether ED care is *effective* (“based on the use of systematically acquired evidence to determine whether an intervention, such as a preventive service, diagnostic test, or therapy, produces better outcomes than alternatives including the alternative of doing nothing”) [72,74], *efficient* (avoids the waste of equipment, supplies, money, ideas, or energy) [72], *timely* (able to avoid delays caused by patient, provider, or system factors), *safe* (“when patients [can] avoid injury from the care that is intended to help them”) [72,75], *patient-centered* (care that promotes patient involvement in medical decision making and helps care providers “in attending to their patients’ physical and emotional needs, and maintaining or improving their quality of life”) [72], and *equitable* (free of bias). To

identify opportunities for research within each of these six quality domains, the authors classify current research into four research steps that build upon each other: (1) evidence does not exist and there is a need to generate rigorous research studies, (2) evidence exists but there is a need for synthesis of existing evidence into guidelines and quality measures, (3) there are existing evidence-based clinical guidelines and measures and a need for assessment of the quality of clinical practice compared with evidence-based guidelines and quality measures, and (4) there is a need to design and evaluate new interventions to improve clinical quality of care.

EM public health research on health disparities

As an important part of the safety net for vulnerable populations, the ED is ideally positioned to conduct studies on health disparities [76]. ED physicians see the results of inadequate education, social services, and health care. Multiple studies have demonstrated inequities in the delivery of health services attributable to gender, race, and age [77–79]. There is a need, however, for investigation into the causes of these differences and interventions to correct the disparities. Moreover, inequities in health care do not only exist outside of emergency medicine: we also need to examine our own practice. While most emergency physicians agree that the same high quality of care should be available to all patients, prior research suggests that this may not always be the case [80]. For instance, African Americans and Hispanics are less likely to receive analgesics for painful conditions [81]. Research is needed to assess the degree to which such disparities exist for other emergency conditions. When inequities in care are documented, there is need for investigation into the patient and provider factors that may contribute to differences so that interventions to close these gaps can be designed and evaluated. As an example, we can explore the influence of time pressure and complex cognitive tasks on medical decision making to see if bias exists in the treatment of critical conditions (eg, chest pain, respiratory failure, end-of-life care, pain management) in need of immediate assessment and treatment. It has been suggested that these conditions increase the likelihood that providers will use stereotypes or prejudice as they provide clinical care [80]. When systematic health disparities are identified by race or socioeconomic status, there is a need to look at the broader educational, health, and social welfare systems to identify the sources and mechanisms of these disparities, not only to document these inequities but to help develop and assess new policies designed to ameliorate such disparities.

Future research on the functioning of the health system and the fraying safety net

The ED can be a unique resource for gaining knowledge that will strengthen the safety net. In its position as “a window on the safety net”

and as “the last hole that patients fall through in the fraying health care safety net,” EDs can monitor the performance of the entire system [82]. We see the patients who “fall through the cracks,” and can study where those patients come from, where they get resources, and who provides their primary care. We can learn what patients want, how they use the system, and how nonhealth factors affect their choices [82]. A broad system-level approach suggests that EM public health research will need to study how the social service, primary care, and referral systems are working and help identify how the entire system might improve. Gordon [83] suggested that one model for remediating health disparities would be to think of the ED as a vital component of the social welfare system and to begin to embrace and study that role.

Currently, EM sits at the hub of a number of governmental and market forces that both regulate and threaten our ability to provide quality care. Since the late 1990s, we have been living in an era of failed health care reform where cost containment strategies have created additional nonprice barriers to care. Americans are faced with an increasingly complex health care system and the barriers to care are more pervasive and subtle than previously identified barriers because of unfavorable insurance status. While earlier legislative initiatives such as EMTALA and the prudent layperson standard provided important safeguards for managed care plan enrollees and the larger community, many emergency providers eventually came to resent the legislation as an unfunded federal mandate for universal access to health care via emergency departments [14]. The resultant combination of regulatory and fiscal pressures on hospitals resulted in increasingly stressed and crowded conditions in many EDs [3]. Regulatory extensions of EMTALA have held health systems liable for providing not only emergency care, but also any needed care. With decreases in reimbursement for the care of publicly insured patients, the ED has become a medical-legal and financial liability for many hospital systems, as the primary portal of entrance for uninsured and publicly insured patients who compete with privately insured patients for scarce inpatient beds [15].

ED crowding

Several recent national reports find that this competition for inpatient beds has contributed to ED crowding and prolonged wait times to see an ED physician [84,85]. EM research began to focus on the implications and patient outcomes associated with the failing safety net [86–88]. A March 2003 report from the US General Accounting Office (GAO) found that measures of ED crowding varied widely across hospitals and communities, with hospitals in urban areas (with populations greater than 2.5 million) and cities with greater proportions of uninsured people experiencing the most severe crowding conditions [84]. The National Hospital and Ambulatory Medical Care Survey (NHAMCS) found average 2001 ED waiting times

for nonurgent conditions had increased 33% in a 3-year period [89]. The current widespread occurrence of long waiting times for hospital beds, ambulance diversion, and high percentages of patients leaving EDs without being seen calls into question the amount of progress being made toward the Healthy People 2010 objective 1-10, which is to “reduce the proportion of persons who delay or have difficulty in getting emergency medical care” [90]. In addition, an overburdened emergency care system cannot be expected to adequately serve the country’s need for emergent care, public health, or surveillance. The terrorist attack on September 11, 2001, further called attention to the need for coordinated community responses to disasters and the role of EM in mass casualty intervention. However, many emergency physicians point out that the current capacity of the emergency response system is already exceeded on a daily basis.

A recent analysis of the National Health Interview Survey (NHIS) found that a substantial number of adults report delay or difficulty in accessing needed emergency care. Moreover, there appear to be significant disparities in rates of problems encountered by adults seeking emergency medical care, with younger, lower income, uninsured patients, and those reporting poorer health being at greatest risk of experiencing delays or difficulty [91]. Future work is needed to examine whether the same groups that are experiencing lack of access to primary care are experiencing problems accessing emergency care as well. Work also needs to be done to explore whether the financing of the US health care system has contributed to current health care disparities. For public health research, it will be important to identify baseline population-based measures such as the NHIS for tracking access to both the primary care and emergency care system. The value of establishing baseline measures is that they can be used for tracking the effects of policies designed to remedy health disparities and ensure equal access to timely emergency care. Further work will be necessary to assess the impact of access barriers on actual health outcomes.

Future research on ED crowding

Although ED crowding as a concept has a lot of “face validity,” uniform definitions or valid measures of the problem are currently lacking. More importantly, the causal links between crowded conditions and adverse patient outcomes have not been well established. Asplin and colleagues [92] focused this discussion on the larger supply and demand mismatches in the health care system. They point out that ED crowding is the end result of a cascade of system characteristics that adversely affect the supply of and demand for emergency care. Thus, the problem cannot be solved by examining the ED in isolation. To find solutions, the entire delivery system must be examined using reliable methods to describe, measure, and monitor system capacity. Therefore, they have proposed a conceptual framework to explain ED crowding that includes input, throughput, and output factors [92]. Use of

such a conceptual model can highlight specific areas of study to identify the places where the system is failing.

The importance of methodological rigor in EM public health research

Future EM public health research requires a higher degree of methodological rigor. Quantitative research should focus on hard outcomes. For example, health promotion research should go beyond prevalence studies to design new interventions, follow morbidity and mortality, and document the health consequences of lack of access to preventive care. However, descriptive studies of previously undescribed phenomena will continue to be important. With its wealth of patient stories, EM lends itself well to rigorous qualitative research—a methodological approach that has yet to be adequately developed in this setting. Studies of interventions should ideally use randomized designs and minimize selection bias by using systematic rather than convenience samples. When experimental design and randomization are not feasible, the analysis for comorbidity and confounders should be controlled so that our nonexperimental studies have more validity. Increasingly, EM researchers are beginning to realize the value of exploring EM questions through the use of population-based databases. Collaborations with other disciplines can also bring new methods to bear on common EM problems. For example, the disciplines of economics, sociology, and anthropology can provide new perspectives on the culture of emergency medicine and the communities we serve. A greater depth of understanding of the problems we are seeing is needed. For example, we need to go beyond describing health disparities and try to identify the mechanisms and individual, provider, and system-level issues that are contributing to disparities in health and health outcomes. Geographic Information Systems analysis along with census measures of poverty and race can help identify and provide a picture of health disparities.

Last, the focus of EM public health research needs to reach out beyond the clinic walls to the surrounding neighborhoods and community members. Involvement in community-based participatory research will improve the understanding of patient barriers to healthy behavior and the role that family members, religion, social support, and neighborhood factors play in health.

Summary

With more than 110 million patient visits annually, EDs can provide information on the health care needs of a diverse population and serve as a unique research laboratory for studying the functioning of the health care system. As the only provider mandated by federal law to provide universal health care, the ED is uniquely qualified to work at the interface of

medicine, public health, social services, and the community. With the advent of uniform data collection systems and ED-based surveillance systems, EM has the potential to play a powerful role in measuring and improving the health of the population. Much of past EM public health research has focused on three large areas, all of which continue to have major relevance as topics of public health research: access to systems of care; the identification of the unmet medical and behavioral health needs of ED populations and the potential for meeting these needs during an ED visit; and the need for surveillance for infectious diseases, behavioral health risks, and injuries. The future potential for EM public health research will involve expanding into more policy-relevant work that takes into account larger system issues and the social determinants of health. In helping to ensure the health of the public, a multidisciplinary framework of population-based systems of care is needed. Fulfilling this function includes conducting rigorous research studies to monitor and ensure that the public's needs are met, as well as continuing to advocate for high-quality universal health care for all Americans.

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