Health Impact of Research in Emergency Medicine – Moving Forward in the Field

J Williams-Johnson[1], EW Williams[1], S Dasgupta[1], S French[1], R Hutson[1], N Hart[1], I Sammy[2], AH McDonald[3]

ABSTRACT

This article provides a brief description of the conceptual framework of some specific areas of research carried out either collaboratively or independently in the Emergency Department in an effort to positively impact on health issues in an era of evidence-based medicine. The paper focusses on epidemiological studies of infectious diseases, chronic non-communicable diseases, and a recent update on trauma patterns. Conduction of clinical trials is also highlighted. The role of collaboration in Emergency medicine is also discussed. Research must be developed deliberately to facilitate the primary goal of improved patient care and outcomes. Further recommendations are suggested.

Keywords: Emergency medicine, health impact, research

Impacto Sobre la Salud como Resultado de la Investigación en la Medicina de Emergencia – Progresos en este Campo

J Williams-Johnson[1], EW Williams[1], S Dasgupta[1], S French[1], R Hutson[1], N Hart[1], I Sammy[2], AH McDonald[3]

RESUMEN

Este artículo ofrece una descripción breve del marco conceptual de algunas áreas específicas de investigación llevada a cabo de forma colaborativa o independiente en el Departamento de Emergencias, en un esfuerzo por lograr un impacto positivo en los problemas de salud en una era de medicina basada en la evidencia. El trabajo se centra en los estudios epidemiológicos sobre enfermedades infecciosas, enfermedades crónicas no comunicables, y una actualización reciente de los patrones de trauma. También se subraya la conducción de ensayos clínicos, y se discute el papel de la colaboración en la medicina de la emergencia. Deben desarrollarse investigaciones con el propósito deliberado de facilitar el objetivo primario de mejorar la atención y los resultados clínicos del paciente. Se hacen algunas recomendaciones.

Palabras claves: medicina de emergencia, salud de impacto, investigación

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INTRODUCTION

The use of evidence-based medicine to improve clinical care has grown significantly in the last two decades and has created a positive environment within the medical field to do research (1). Emergency services, on the whole, have been the target of close examination and change in recent years, emphasizing the need for higher quality care and the development of improved services to patients (2, 3). Because of this, research interest and activities in the discipline of Emergency Medicine have increased tremendously in the last decade. This pull towards practising evidence-based medicine and academic research is in keeping with one of the four roles of health research systems that have been identified by the World Health Organization: stewardship, financing, creating and sustaining resources, and producing and using research (4).

There are many challenges to conducting research in an emergency setting. Some of these are that the surrounding is a "high pressured, immediate, emotional and often over-

From: [1]Emergency Medicine Division, Department of Surgery, Radiology, Anaesthesia and Intensive Care, The University of the West Indies, Kingston7, Jamaica, [2]Emergency Medicine Division, The University of the West Indies, St Augustine, Trinidad and Tobago and [3]Dean, Faculty of Medical Sciences, The University of the West Indies, Kingston 7, Jamaica.

Correspondence: Dr J Williams-Johnson, Emergency Medicine Division, Department of Surgery, Radiology, Anaesthesia and Intensive Care, The University of the West Indies, Kingston 7, Jamaica. E-mail: jeanjohnson@flowja.com

burdened" environment (5). Another study cited "limited funding, a lack of institutional support, and little experience or training in research methods as being significant barriers to emergency medicine research" (6).

Despite these barriers, the emergency room remains a superior area for research, as cases are a reflection of real time pathology. The patients arrive with first time presentations giving physicians the opportunity to assess, investigate and manage them using a multidisciplinary approach. There is always a wide range of pathologies, disease severity, trauma and chronic disorders available to pose research questions, allowing for improved treatment modalities as evidence-based medicine increases. The Centers for Disease Control reported that in the United States of America (USA), between 1994 and 2004, the Emergency Department (ED) usage rate increased by 6% (7). With the enormous increase in the number of patients using emergency rooms as their primary care facility worldwide, the sample size available to do research with also increases. In an effort to align with the global use of evidence-based medicine to improve clinical care of patients, the Accident and Emergency (A&E) Division of the University Hospital of the West Indies (UHWI) has tried to impact healthcare by being a leader in emergency medicine research. This paper provides a brief description of the conceptual framework of some specific areas of research carried out either collaboratively or independently in the ED at the UHWI, in an effort to positively impact on health and health issues in an era of evidence-based medicine.

Epidemiological Studies

Epidemiology is popularly defined as "the study of the distribution and patterns of health-events, health-characteristics and their causes or influences in well-defined populations" (8). It is regarded as the fundamental method of research in public health, and allows for both evidence-based medicine and the development of policy decisions, by clearly distinguishing the various risk factors for disease and the aims of preventative medicine (8). Research on epidemiology helps health planners to focus on the main problems of a region rather than the individual patient and so helps to identify measures for improving the health of the community as a whole. Descriptive data provide valuable information, enabling healthcare providers and administrators to allocate resources efficiently and plan effective prevention and educational programmes appropriate to the population. With regards to epidemiological studies in the ED, a number of relevant studies have been covered.

Chest pain is a common presentation to the ED with a broad spectrum of causes. A retrospective study done in 2001 looked at the varied causes of chest pain presentations in the local ED in Jamaica (9). Cardiac disease represented 24.6% of cases; pulmonary disease represented 25.4% of the population followed by musculoskeletal disorders in 9.2%. The study emphasized the importance of a protocol to rule out life-threatening causes of chest pain, impacting positively on the overall morbidity and mortality of these patients (9).

Epidemiology on infective diseases was also examined. One such study was the epidemiological profile of patients with tetanus admitted to the UHWI between June 1993 and June 2003. Thirteen patients, M:F ratio of 10:3, were clinically diagnosed with tetanus. The majority had grade 3 or 4 disease (Ablett Classification) and was admitted to the intensive care unit (ICU). The mortality rate was 15.4%. This study concluded that the elderly represent a high-risk group that requires special attention (10). More emphasis should be placed on elucidating immunization status as well as administering routine booster shots in this subset of patients (10).

Stroke is quite a common presentation to EDs worldwide. Thrombolytic therapy has been proven to be beneficial in selected patients with ischaemic strokes. Early diagnosis is paramount because there is a narrow therapeutic window for these patients to derive benefit from thrombolytic therapy. An important and valuable study was done in this area. The study sought to estimate the timing of stroke presentations at the A&E Department of the UHWI in order to evaluate the potential eligibility for definitive therapy (11). A retrospective audit of all consecutive patients who had emergent computed tomography (CT) scans for suspected ischaemic stroke at the UHWI was performed over a six-month period between February 2006 and July 2006 (11). There were 331 patients enrolled. One of the findings was that there was considerable pre-hospital delay with 63% of patients presenting more than 12 hours after the onset of symptoms (11). This epidemiological study indicated that sensitization of physicians and the general public in our setting to symptoms and signs of this disease is urgently needed to advance stroke management, so that definitive treatment may be considered (11).

In 2008, the World Health Organization estimated that asthma affected approximately 300 million people around the world. In 2005, it was reported that 255 000 people died of asthma complications (12). In 2007, an islandwide, cross-sectional, community based survey was done to estimate the prevalence of asthma and allergies in the Jamaican population (13−15). This survey looked at the paediatric, adult and elderly population separately. It reported that the prevalence of current asthma in children aged 2−17 years was 26.5%, in adults was 13.5%, and in the elderly, 65 years and older, was 12.5% (13−15). The Pan American Health Organization (PAHO) reported that in 1999, respiratory tract infections accounted for a total of 12% of all visits to the ED of hospitals in Jamaica and 49% of these visits were related to asthma (16). A study was done in 2010 (unpublished) to compare the guidelines in the UHWI acute asthma management protocol with the actual practice in the A&E Department, to determine if there was a break-down in the management protocol or other external factors resulting in the high prevalence of asthma seen in the ED (17). The study

concluded that there were in fact, significant discrepancies between the outlined management protocol, and actual clinical practice in the ED, as well as external factors such as the inability to buy medications that impacted on the prevalence of asthma presentations to the ED (17). This study allowed for strategies to be put in place to improve asthma care in the ED (17).

Trauma

Trauma is one of the top public health problems in the world, accounting for approximately 12% of the world's disease burden (18). It is present in both developed and developing countries alike (18−21). According to a report published in 2006 by the Caribbean Epidemiology Centre, 23% of emergency room visits were related to trauma (22). In 1999, it was reported that approximately 37% of cases presenting to the A&E Department at the UHWI were trauma-related (20). This study demonstrated that trauma-related cases represented one of the largest groups of conditions contributing to admissions to the hospital (20). In 2010, a trauma epidemiology study, the first of its kind, was conducted in the A&E Department at UHWI (unpublished) to gather information on the demographic profile of trauma patients, aetiology and characteristics of trauma-related events, the time of day that trauma cases presented, the relationship between trauma-related events and sociodemographic factors (education and employment status) and the emergency room outcome of the trauma cases (23). The percentage of cases that presented with trauma during the study period was approximately 10%, which was found to be much less than previously reported figures (23). Trauma was most commonly seen in males between the ages of 18 and 44 years, with blunt trauma being the most common cause of injury (23). Unintentional injuries were seen most commonly in the elderly and in children (23). It was the first local study done to report a positive association between the profile factors of lower educational level and unemployment with an increased propensity of intentional injuries (23).

In 2003, the Centers for Disease Control reported that unintentional injuries was the leading cause of death in children between the ages of 0 and 18 years (24). This statistic was regarded as a significant preventable public health problem (24). To outline the problem in Jamaica, data from nine hospitals across the island were combined from the Jamaica Injury Surveillance System (25). The data showed that approximately 23 000 patients presented with unintentional injuries in 2004, of which 57% were under the age of 19 years (25). However, these data did not include the UHWI, and so in 2011 an epidemiological study (unpublished), was done looking at the frequency and characteristics of unintentional injuries in children presenting to the A&E Department at UHWI (26). Both of these unpublished studies have begun to lay the foundation for further trauma research. When published, they will provide more current statistics for the region, impacting on public health and allowing for the development of interventions to help decrease this impending epidemic.

Injuries from sports participation are a significant cause of hospitalization and healthcare costs in children and adolescents (27). An epidemiological study profile of the spectrum of admissions for sports-related injuries was conducted in 2007 (28). This review showed that the majority of admissions were soccer-related and were predominantly injuries of the lower limbs (28). It resulted in specific recommendations in injury prevention as it relates to sports injuries being made (28). The study serves as a platform for further studies in sports related injuries, and future opportunities to more clearly define the patient demographics and injury profile.

In an effort to decrease the morbidity and mortality related to trauma, many hospitals around the world have established the use of the 'trauma team' (29). Studies have shown that even when a trauma team works in isolation outside a designated trauma system, it is still very effective in decreasing overall patient morbidity and mortality (30−33). Presently, a proposal to activate the first trauma team in the Caribbean region has been put forward by the A&E Department of the UHWI (34). The introduction of a trauma team service to the UHWI may improve the efficiency in management of a problem that has a high prevalence among young adults in the institution and the country, as was highlighted by the epidemiological studies mentioned earlier. Such a change will only impact positively on health outcomes and overall care for the trauma patient.

Clinical Trials

Clinical trials are conducted to collect data regarding the safety and efficacy of new drug and device development. The department was one of the many sites to conduct a large randomized placebo controlled trial among trauma patients with, or at risk of, significant haemorrhage. Haemorrhage is accountable for about a third of in-hospital trauma deaths and can also contribute to deaths from multi-organ failure (35). We assessed the effects of the early administration of a short course of intravenous tranexamic acid on death, vascular occlusive events, and the receipt of blood transfusion in trauma patients with, or at risk of, significant haemorrhage (36). This randomized controlled trial was undertaken in 274 hospitals in 40 countries enrolling 20 211 adult trauma patients with, or at risk of, significant bleeding (36). Adult trauma patients with significant haemorrhage (systolic blood pressure < 90 mm Hg or heart rate > 110 beats per minute, or both), or who were considered to be at risk of significant haemorrhage, and who were within eight hours of injury, were eligible for the trial (36). The trial concluded that intravenous tranexamic acid safely reduced the risk of death in bleeding trauma patients and on the basis of these results, tranexamic acid should be considered for use in this subset of patients (36). The local research arena at the A&E Department at UHWI looks forward to participating in

further clinical trials which impact on health in the region and beyond.

Research Collaboration

Grouping health research in the region exposes common trends and efficiently pools resources and knowledge. One such collaborative study was the "Utilization of the Emergency Departments by elderly patients in two major Emergency Departments in the Caribbean (Jamaica and Trinidad and Tobago): A comparison of visits by geriatric and younger patients". The Caribbean has been recognized as one of the most rapidly ageing regions of the developing world. Between 1960 and 1995, there was a 77% increase in the elderly populace (37). Older patients have distinct patterns of ED use, and use emergency services at a higher frequency than younger patients. Emergency Department staff should be knowledgeable about the unique and complex presentations of older patients. The aim of the study was to examine the pattern of ED utilization of the elderly in two major hospitals in the region, namely Jamaica and Trinidad and Tobago, and to compare this profile with their younger counterparts as controls. The objectives included, describing ED attendance by age and gender, describing and comparing reasons for presentation, the investigations and the diagnosis and final outcome from ED. This study is presently ongoing. In 2006, research became mandatory for all residents entering the Doctor of Medicine (DM) Emergency Medicine programme at the campus of the University of The West Indies, Mona. It has subsequently become compulsory for all the other three campuses (Trinidad and Tobago, Barbados, Bahamas). Initially this was a challenge for both staff and faculty but through the kindness of Dr Phillip Levy, associate professor of Emergency Medicine of the Wayne State University and Detroit Receiving Hospital, eleven residents spent one month each developing their research protocols at his facility. This has led to various abstract publications: Severe sepsis in the Emergency Department – An observational cohort study from the University Hospital of the West Indies (38); A pilot study: Predicting retaliatory intent and examining victimization at the University Hospital of the West Indies (39); A comparative evaluation of Savlon *versus* normal saline for irrigation of traumatic lacerations in Kingston Public Hospital (40); and Utility of free haemoglobin as an objective marker of acute vaso-occlusive episodes in patients who present with sickle cell pain crisis (41).

For the Mona campus, Faculty of Medical Sciences' Research Day in November 2011, several papers and posters were presented which represented the work the residents did as part of their training programme: Epidemiology of trauma at the University Hospital of the West Indies in Jamaica (23); A clinical audit of the management of acute asthmatic attacks in adults and children presenting to an emergency department (17); Role of routine chest radiographs in the evaluation of patients with stable blunt chest trauma − A prospective analysis (42).

Collaboration outside of the region has also been achieved. In 2010, one of the faculty members at the Mona campus was the recipient of the Fulbright Scholar Award for Latin America and the Caribbean; this was also facilitated by Dr Levy who accommodated the visit. This has lead to various research collaborations including work on hypertension comparing illness beliefs between Detroit, Kingston, Jamaica and Tanzania (43−44). These were three racially similar groups that were studied across the globe. In this racially similar but ethnically divergent cohort of hypertensive patients, cost and concern over side effects were important barriers to medication self-efficacy, particularly in those recruited at Detroit and UHWI (43−44). There is also an ongoing project looking at the epidemiology of high blood pressure and pressure mediated consequences at two major hospitals in Jamaica developed as part of the collaboration with Wayne State University. These research collaborations have allowed for a global impact on health, as they strengthen the opportunities for wider use of uniform educational interventions in the future.

Discussion and Recommendations

We believe that the development and promotion of a regional health research agenda is critical for improving healthcare in our nation and that previous studies may spur further research for both prospective and retrospective papers.

The use of PAVERS (patient advocacy volunteer in emergency research services) – a research methodology volunteer programme in which volunteers are taught about clinical research and medicine by observation can assist in research (45). Their major role is collection of data while the actual research work is created and directed by department faculty. To design an emergency research group within the department will ignite more enthusiasm as well as the setting-up for a data collection system. Efforts to seek funds for research are warranted as there is room to expand in other important areas.

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