Region 8 Hospital Emergency Response Network, Pediatric Grant Emergency Medical Services for Children (EMSC) Steering Committee.

Pediatric Quality Improvement Report Based on Region 8 Survey Responses from Hospitals And Emergency Medical Services 2007

Principal Investigator
Deborah S. McBane, NREMTP I/C
DS McBane Consultant
2784 S. Lang Drive
Brimley, MI 49715
906-322-4422
www.dsmcbane.com

Reviewer Comments from

Dr. Nadine Levick, MD, MPH, FACEM, MSAE

"An Outstanding and Comprehensive Document"

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INTRODUCTION

D. S. McBane Consultant has been commissioned to coordinate a Pediatric Quality Improvement project under the direction of Alyson Sundberg, MCMCA of Marquette General Hospital. Ms. McBane is a National Registry Emergency Medical Technician Paramedic and licensed Instructor Coordinator with over twenty years association in pre-hospital medicine, risk management, occupational safety and health, and quality improvement working with multiple emergency medical and preparedness programs.

This project has been undertaken at the request of **Region 8 Hospital Emergency Response Network,** Pediatric Grant Emergency Medical Services for Children (EMSC) Steering Committee. The focus group for this endeavor was identified as Emergency Medical Services and Hospital Emergency Departments within the Upper Peninsula of Michigan.

Evaluating Best Practices

To improve the healthcare quality for children it was necessary to evaluate current applications to identify best practices. Creative concepts should be considered for rural and more isolated areas to measure up to the quality of care that can be offered in larger urban areas. With this in mind consideration is given to options that will focus on quality without financial hardship.

To evaluate best practices the process began with research of programs that work within local, regional and national organizations. This was accomplished with interviews, article review from numerous organizations and a self assessment of current process in place via surveys to the collaborative hospitals and emergency medical services.

The Pediatric Survey was designed to meet contractual Objective 2a and a portion of the research focused on current issues facing pediatric patients in general.

SUMMARY

Children present a special challenge in emergency care. Children are not little adults; their anatomy and physiology are different. What normal vital signs are for an adult could be a sign of distress in a child. Communications, understanding, reasoning, and emotions present with a special set of circumstances when providing medical care to children.

Infrequency in providing emergency medical care to pediatric patients further intensifies the stress already placed on the medical provider. While evaluating quality of care consideration should also be given to the psychosocial and medical concerns facing children, parents and the medical providers attempting to address those anxieties.

A quality improvement process for children incorporates many elements and builds on each for total patient satisfaction. To better provide care for any age group we must first consider the aspects of the improvement process in its totality. The continuum of care

philosophy was adopted by the Emergency Medical Services for Children (EMSC)[1] for seriously ill or injured children. The components include: Prevention; Pre-Hospital; Hospital and Post-hospital. Quality improvement initiatives are set within each element creating a never-ending cycle, an approach to improve process, measure performance, setting and improving standards. The necessity of data collection, analysis and the development of performance indicators provide an analytical approach to the quality process.

Prevention- A critical element in keeping children safe, yet often overlooked.

Prevention of illness and injury to children is of vital importance. Utilization of immunization clinics, well child programs, preschool programs, and baby sitting workshops, CPR and first aid programs, prevention information included with discharge instructions from hospitals are just a few ways to reduce illness and injury to a vulnerable population. Data collection is a necessity to properly incorporate injury/illness prevention into quality improvement activities to evaluate and improve its effectiveness.

Variables that effect injury rates of children are age, race, sex and socioeconomic status.[2]

- Children aged 4 and under account for 49% of accidental injury-related deaths.
- Death due to suffocation/choking, drowning, falls and motor vehicle occupant injury occur to infants more frequently then older children.
- Native American and African American children have the highest accidental injury death rates in the United States in children 14 and under.
- Boys are at a greater risk of injury then girls.
- There are higher fatality rates of children from low income families then from families with higher income levels.
- Children living in rural areas are at greater risk from accidental injury related death then children in urban areas from drowning, motor vehicle accidents, unintentional firearm injury, residential fires and agricultural work-related injuries.

Statistics

The National Hospital Ambulatory Medical Care Survey: 2004 Emergency Department (ED) Summary produced by the Center for Disease Control[3] states that the annual number of ED visits was 110.2 million and 16.6 million (15.1%) of those patients arrived by ambulance. Additionally, of the 110.2 million 22.9 million (21%) were under the age of 15 and of the 22.9 million 5.9 million (26%) arrived by ambulance. Of particular interest of 110.2 million ED visits 3.9 million (4%) were infants under 12 months of age. Approximately 14.3 million (13%) of the ED encounters resulted in admission to the hospital.

The Injury and Violence Prevention Section of the Michigan Department of Community Health (MDCH)[4] published in 2005, represents the first analysis of statewide injury data

from emergency department records. The Michigan Emergency Department Community Injury Information Network (MEDCIIN) is a sample of twenty-three hospitals that voluntarily submit to MDCH data on patients treated for injury in the emergency department. The information focuses on 2001 data which represents the first year of complete annual data from each of the twenty-three hospitals that participated. In 2001, there were an estimated 1,029,666 visits to hospital emergency departments that participated in MEDCIIN and Michigan residents made up 97% of those emergencies. Approximately 27% of all ED visits were injury related. The injury rates were highest for patients between the ages of 1-4 and 15-19. Of the injuries sustained sprains/strains, open wounds, and contusions comprised 71% of diagnoses. There were nearly 12,000 visits for traumatic brain injury. The leading causes of injury were 1) falls; 2) struck by objects/persons; 3) sharp objects; 4) overexertion; and 5) motor vehicle crashes.

Prehospital

The EMSC continuum of care identifies prehospital as emergency medical services, communications consisting of 911 dispatch centers; medical control; consultation; family; and referral, together with transportation. It is recommended that healthcare quality improvement incorporate the entire team and integrate all aspects of the delivery of services provided.

Hospital -- Acute and Restorative Care

Once the child arrives in the emergency department the acute hospital care phase begins and as the child passes through the delivery of interventions, treatments etc. the need for acute care decreases and restorative care begins. Although quality improvement processes are well established within hospital departments, criteria specific to the ill or injured child may or may not be well established at all centers. Monitoring quality in all aspects of the delivery of care to children is important. Additional EMSC recommendations include the need for pediatric equipment, treatment protocols, access and/or consultation with pediatric specialties, and referrals to tertiary care.

Post-Hospital – Rehabilitation

The post-hospital elements for pediatric patients include physical rehabilitation services; patient discharge procedures; parental/family education both for management and prevention; reentry considerations for the home, schools or daycares; mental health; social services; community resources; medical centers and addressing children with special needs for chronic conditions. Parents are often unprepared for recuperative care in the home, and the child has just experienced a modification in his or her physical and/or emotional being. Prior to discharge there should be a plan for appropriate post hospital care and follow-up.

By utilizing the EMSC continuum of care for children, medical care is integrated achieve “continuous” quality improvement.

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The Institute of Medicine (IOM) of the National Academies (Advisers to the Nation on Science, Engineering and Medicine) recently released several reports concerning emergency health care within the Emergency Department (ED), Emergency Medical Services (EMS) and Emergency Medical Services for Children (EMSC). All three reports recommend Congress to increase funding, enhance emergency care research and create a lead agency at the federal level for oversight.

FOCUS GROUP

The focus group of Hospital and Emergency Medical Services (EMS) are a diverse group of medical professionals. Both groups are highly skilled and trained to deal with illness, injury and human tragedy 24 hours 7 days a week yet in completely different environments.

Emergency Department (ED)

Many EDs and trauma centers are overcrowded. [Drawn from *Hospital-Based Emergency Care, At the Breaking Point]* [5]

- Increase demand for emergency care has been growing fast.
- Between 1993 and 2003 425 emergency departments have closed and the number of beds declined by 198,000.
- The ED overcrowding is a hospital wide problem, backup occurs due to the lack of available beds.
- Patients are "boarded" held in the ED for 48 hours or more.
- Ambulance diversion is frequently required while the intent of diversion was only for extreme and rare cases.
- Critical specialists are often unavailable to provide emergency and trauma care.

Recommendations – Emergency Department

- Hospitals should reduce crowding by improving hospital efficiency and patient flow, and using operational management methods and information technology.
- The Joint Commission on the Accreditation of Healthcare Organizations should reinstate strong standards for ED boarding and diversion.
- The Centers for Medicare and Medicaid Services should develop payment and other incentives to discourage boarding and diversion.

From 1994 through 2004, the number of ED visits increased from 93.4 million to 110.2 million visits annually (up by 18 percent). An average increase of more than 1.5 million visits per year. During the same period the number of hospital EDs decreased by approximately 12.4 percent.[6] . Hospitals have become the new age medical outlet for populations that are increasing the demand for emergency health care. However, while the public is seeking the expertise of emergency departments, the numbers of available

EDs are declining causing a backlog of patients. Nursing and physician (particularly specialty) shortages can further complicate a system exceeding capacity.

Emergency Medical Service (EMS)

Emergency care is highly fragmented. [Drawn from *Emergency Medial Services at the* Crossroads][7]

- Regions are served by multiple 911 dispatch centers.
- Communication between EMS and emergency departments is inadequate leaving some EDs empty and others overcrowded.
- EMS, Public Health and other Public Safety Agencies do not communicate effectively and lack common procedures for emergencies.
- No nationwide standards for the training and certification of EMS personnel.
- Federal responsibility for oversight of emergency and trauma systems is spread across multiple agencies.

Recommendations – Emergency Medical Service

- The recommendation from the IOM is to "promote EMS workforce standards", by "requiring national accreditation of paramedic education programs, accepting national certification for state licensure, and adopting common EMS certification levels".

Emergency medical services (EMS) personnel provide emergency medical care to patients of all ages under extreme adverse conditions with minimal staffing or resources. EMS plays a critical role in the initial care and treatment of ill and injured children as well as the method for transferring children to other healthcare facilities. Many changes have occurred in EMS over the last several months in part due to the IOM report.

One attempt to unify EMS at the federal level was the creation of the Federal Interagency Committee (FICEMS) established in 2006 integrating the Department of Transportation, Department of Homeland Security, Health and Human Services and the Federal Communications Commission to address EMS issues. FICEMS is responsible for identifying the local, state, tribal and regional needs for new or expanded programs for EMS systems including 9-1-1 and reporting this to Congress. Furthermore they are charged with the coordination among federal agencies and identifying ways to streamline the process through those agencies to area systems. FICEMS is located in the Office of EMS under the National Highway Traffic Safety Administration (NHTSA).

In March of 2007 a National EMS Advisory Council (NEMSAC) was created. NEMSAC membership is comprised of representation from local, state, tribal and regional governments along with EMS volunteers and paid; hospital administration, nurses and physicians and surgeons; dispatchers, emergency management, researchers and public health; EMS educators, state medical directors and consumers among others

make up the Councils collaborative. Their role is to advise policymakers based on their knowledge and independent perspective to help assess the needs of EMS nationwide. NEMSAC carries no authority per say but a powerful voice for decision makers to hear the system issues from providers who work in the profession. The initial agenda includes: National EMS needs assessment and strategic planning; EMS standards, guidelines, benchmarks, and data collection; methods to improve community-based EMS; strategies for strengthening EMS systems; improving coordination and support for EMS at the federal level and other issues.

Also new this year is the National EMS Scope of Practice Model from NHTSA completed February of 2007, redefining EMS licensure levels, didactic and psychomotor skill requirements and clearly describes the interdependent relationship between education, certification, licensure, and credentialing process. This document can be found at http://www.nhtsa.gov.

Strengthening the workforce in the Upper Peninsula is a crucial issue. Dedicated volunteers provide the majority of staffing for EMS agencies however an aging workforce, increased professional requirements and societal pressure to focus more time on family make it difficult to recruit. To aid those agencies in recruitment efforts a sophisticated recruitment brochure entitled "Emergency Medical Services 24/7 Care - Everywhere" reinforces and promotes the interoperability of agencies instrumental in the access, care and transport of the sick and injured, published by NHTSA in May 2007.

Furthermore, the work environment is often hazardous causing an increase in accidents and injuries to an already fragile workforce. The hazardous nature of the EMS profession is evident in one recent study by Bedford Research indicating that occupational injury and fatality rates in EMS exceed the national average in all industries. The study was performed for NHTSA, entitled "Feasibility for an EMS Workforce Safety and Health Surveillance System[8]", concluding that there is no single data collection repository for EMS occupational injury, and that integration of additional resources would be required to aggregate occupational injury/illness data.

The creation of the National EMS Information System (NEMSIS) that began in 2003 and has been piloted thorough out many states is a national effort to obtain and standardize EMS data collection. NEMSIS is the national repository to store EMS data that will potentially benefit EMS by providing information to: develop a nationwide EMS training curricula; appraise patient and EMS system outcomes; improve research efforts; assist in determining national fee schedules and reimbursement rates; support resources for disaster and domestic preparedness; and provide additional information on other areas of need related to EMS.

The number of ambulance crashes has brought to light the need for increased driver education and training and according to the Michigan Department of Public Health, effective June 2007, all new ambulance personnel are required to receive a State

approved drivers training course. In addition, the inadequate construction and lack of safety standards in ambulance assembly has inspired a remarkable advocate for EMS, Dr. Nadine Levick, MD, MPH, FACEM, MSAE. Dr. Levick has spent many years trying to convince policymakers, engineers and automobile manufacturers to design and manufacturer ambulances with safe and effective vehicle assembly standards, particularly within the patient compartment. Dr. Levick has dedicated many hours of volunteer time and finances to ensure safer transport for EMS providers and their patients. She engineered and produced the only ambulance crash testing to demonstrate the debilitating and deadly injuries that can and have occurred to ambulance crash occupants. She has spoken on behalf of EMS world wide and provides powerful presentations with statistics that persuade the participants to become more safety conscious particularly within the patient compartment. More information can be obtained from Dr. Levick's website "Objective Safety" at http://www.objectivesafety.net/.

Emergency Medical Services for Children (EMSC)

Emergency Medical Services and emergency departments are not well equipped to handle pediatric care. [Drawn from the IOM report *Emergency Care for Children: Growing Pains*] [9]

- Children are more likely to receive care outside of children hospitals, which are less likely to have pediatric expertise, equipment, and policies in place for the care of children.
- Children make up 27 percent of all ED visits, but only 6 percent of the EDs in the U.S. have all of the necessary supplies for pediatric emergencies.
- Many drugs and medical devices have not been adequately tested on, or dosed properly for, children.
- While children have increased vulnerability to disasters—for example, children have less fluid reserve, which leads to rapid dehydration—disaster planning has largely overlooked their needs.

Recommendations – Emergency Medical Services for Children

- EDs and EMS agencies should have pediatric coordinators to ensure appropriate equipment, training, and services for children.
- Pediatric concerns should be explicit in disaster planning.
- More research is needed to determine the appropriateness of many medical treatments, medications, and medical technologies for the care of children.

EMERGENCY MEDICAL SYSTEM

In addition to the continuum of care for children referenced above, acknowledging the recent assessment of the emergency medical system over all should not be overlooked. The current emergency medical system according to the "Growing Pains" report is described as fragmented. Emergency Medical Services, hospitals, trauma centers, and

public health have traditionally worked independent of one another. The report concludes with a vision of seamless delivery of care for both adult and pediatric patients that would include 911 dispatch, EMS, Emergency Department providers, public safety (defined as police, fire & EMS), and public health fully interconnected and united in an effort to ensure that each patient receive the most appropriate care, at the optimal location, with minimum delay. The elements of the vision include Coordination; Regionalization and Accountability.

Coordination

The current structure of the emergency medical system makes quality improvement very difficult. The emergency medical system has ties to so many local, regional and state agencies each with multiple requirements making coordination efforts extremely difficult. Due to this diversity no single agency can address the deficiencies within the system. Communication across boundaries is insufficient creating additional barriers. Coordination of this multifaceted system will require all agencies to collaborate.

Because emergency care does not start and stop with EMS and the Emergency Department (ED) respectively, the inclusion of other public safety and health professionals would provide cohesiveness to the emergency services system. The collaborative should include all stakeholders who have a hand in patient prevention, access, care and treatment including mental health, public health, 911 dispatch, Office of Emergency Services, EMS, emergency department, law enforcement, fire and medical center personnel. Additionally, local, county, state, and community representation should be included. The collaborative would provide unification in services provided to patients of all ages.

Regionalization

The report recommends evidence based categorization of emergency departments and emergency medical services reflecting both adult and pediatric capabilities. Pediatric care givers would then realize where and why their child was transported to that facility.

Accountability

The report states that without accountability there is no responsibility. The diversity of the emergency care system is so broad it's difficult to determine who is accountable for what at any level of the system. There is no single agency within the federal government to guide system development and organization. "One single entity is not to blame...it's a system failure".

The creation of an agency at the federal level to provide oversight to the emergency medical system is needed. Furthermore, development of performance indicators that include structure and process measurements, incorporate the evaluation of individual providers and the system as a whole. The measures must provide for the interdependency

of each agency. Performance data should be shared with the general public to encourage the needed changes to the system.

The vision includes:

- Strengthening the Workforce – Hospital and pre-hospital providers caring for children who seldom enter the emergency medical system and the retention of pediatric clinical skills can be problematic.
- Improving Patient Safety – Evidence Based methods in reducing medical errors.
- Exploiting Advances in Medical and Information Technology – Pediatric specific technologies verses attempts to modify adult products for children.
- Fostering Family Centered Care – involve the patient's needs, values and preferences into the care plan. Parents do this for children and making use of the families' presence, skills and knowledge of the child's condition will embrace the concept of patient centeredness.
- Enhancing Disaster Preparedness – incorporation of children's needs and requirements into disaster plans.
- Improving the Evidence Base – Increase the availability of data by creating research networks.

SURVEY COMPOSITION

A survey was produced for each of the focus groups as a self evaluation tool for both Emergency Medical Services (EMS) and Hospitals within the Upper Peninsula of Michigan for the purpose of assessing their needs and determining what quality improvement processes are in place for children within the organizations.

The surveys contained questions that were derived in part from special interest groups such as Michigan Department of Community Health (MDCH) EMS Division, Emergency Medical Services for Children (EMSC) objectives, National EMSC Data Analysis Resource Center (NEDARC), and Hospital Emergency Delivery Assessment for Pediatric (HEAP). Each survey contained some questions that were comparable for both organizations and some questions specifically designed for each type of healthcare agency, with forty three questions for hospitals and thirty six for EMS. Questions relating to rehabilitative services, discharge instructions etc. were excluded from the EMS survey and like wise questions that pertained to EMS protocols, agency licensing, or whether the agency carries medication etc. were excluded from the hospital questionnaire.

The survey focus was directed at pediatric patients from 0-8 years of age. The age determination for a pediatric patient was based on the American Heart Association (former) Guidelines. The on going debate of age specifications for pediatric patients is a national issue that won't be resolved with this survey.

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Additional questions were created to determine frequency of pediatric patient encounters, educational criteria, quality improvement processes; management; performance measures; pediatric medication issues; protocols; transfers; customer satisfaction; injury/illness prevention; information technology and medical control authority to evaluate working relationships between the two types of healthcare agencies. The hospital survey also contained pediatric coordination and equipment availability within the ED.

In preparation of submitting the survey, contact information was obtained from Alyson Sundberg, MCMCA of Marquette General Hospital, and MI-Health Alert Network for the emergency medical service agencies. A pre-survey notification was submitted to ensure the appropriate individuals were contacted, followed within two weeks with specific surveys created for the target audiences. An informational sheet was submitted with the surveys requesting a thirty day completion date. A follow up email was sent as a reminder approximately five days prior to the due date for those who had not submitted results.

Survey Results

The total number of participants within the geographical area of Region 8 included 15 Hospitals and 70 EMS agencies however contact information was obtainable for only 52 EMS agencies. Of the 15 hospitals a total of 6 (40%) responded. Of the 52 EMS agencies 20 (38%) responses were received.

Participants and Patient Encounters – The combined total of recipients of the survey was 67 organizations and 27 (40%) chose to respond. The total number of patient encounters by EMS was 11,422 and 524 (5%) were pediatric patients. The hospitals provided a total of 78,616 patients received in the ED with 6,028 (8%) of those were pediatric patients.

For those questions that were identical for both hospital and EMS this document reflects responses from both organizational types. Questions directed to “EMS Only” or “Hospital Only” are included in the appropriate survey subsection and comments are identified by “EMS or Hospital Comments” in italics. Complete survey information including two separate result documents, one for EMS and one for Hospitals can be found in the *file “Pediatric Survey Complete Documentation 2007”*.

General Information

The names of the organizations were collected for the sole purpose of determining collection responses. Assurance was given to the participants that their facility names would not be disclosed to allow for candid responses.

Of the twenty EMS responses received 4 (20%) were from Medical First Responder (MFR), 7 (35%) Basic Life Support (BLS), 1 (5%) is licensed at Basic Life Support/Non

Transporting, 2 (10%) are listed as Advanced Life Support (limited) and 6 (30%) are licensed as Advanced Life Support.

All seven hospitals that responded verified their facility maintained an emergency department within their facility.

Patient Encounters – ("approximate totals" were given if the information was not easily obtainable)

The total number of patient encounters by the twenty EMS respondents from 3/1/06 to 3/1/07 was 11,422 patients. The annual run volume entailed 9 (45%) of services saw <250 patients, 5 (25%) had <500 emergency patients and 6 (30%) of EMS services responded to a range of 500 to over 2,000 patients.

The combined total number of pediatric patient encounters from EMS agencies for the one year period was 524, (5%) of total run volume. Eleven agencies reported <10 (61%), 4 reported <20 (22%), 2 agencies <30 (11%), 1 agency <99 (6%) and 2 agencies reported >100 encounters.

The seven responding hospitals when asked the same question for the same period of time reported a ranged from 4,000 – 17,700 ED visits. The total of patients seen in the emergency department was 78,616 based on information from the six respondents.

When hospitals were asked specifically about the number of pediatric patient visits, 6 (84%) responded and 1 (14%) did not respond. The number of hospital pediatric patient encounters ranged from 284 – 2,000 visits. Total pediatric patient encounters of the six hospitals were 6,028, which is approximately 8% of the total ED volume.

When hospitals were asked the number of pediatric patients that were brought into the ED by ambulance the 6 (86%) hospitals that provided information reported a range from 3-42 pediatric patients presenting to the ED by ambulance. The combined total of children transported via EMS was 109 (1.8%) of the total pediatric patient ED visits.

Continuing Education

*When asked if the organization required all healthcare providers to participate in pediatric continuing education Hospitals responded with 6 (86%) yes, and 1 (14%) no. Based on the 20 EMS agencies, 12 (60%) required healthcare providers to participate in pediatric continuing education and 8 (40%) didn't.

**EMS Comment - We follow the state minimums of credit required every 3 years.*

**In response to the average number of pediatric continuing education hours required by the organization annually for a single staff member the Hospital responses included 6 (86%) range from 8-16 hrs, with 1 (14%) no response. Of the 20 EMS agencies, 19

responded with 12 (63%) requiring their staff to undertake one or more hours of pediatric continuing education and 7 (37%) have no requirements. Of the twelve EMS agencies the number of hours varied from a high of 8 hours to a low of 1hour the mean average was 3.5 hours. Six agencies, however, required 1-2 hours.

***EMS Comment - We hold at least one Pediatric class per year at our fire hall. This year will be PEPP.*

The frequency of pediatric continuing education (CE) varied from 6 (30%) EMS agencies require annual CE, 3 (15%) every other year, 5 (25%) what ever is required for re-licensing and 6 agencies (30%) reported no requirement. Of the seven Hospitals only 1 (14%) requires continuing education annually, 5 (72%) every 2 yrs. and 1 (14%) with no response.

Interesting results occurred from the question pertaining to the lack of pediatric encounters and the difficulty in maintaining clinical skills when dealing with children. Sixteen (80%) of the EMS services said yes, 4 (20%) disagreed and when hospitals were asked the same question the response from 6 (86%) agreed and 1 (14%) hospital disagreed.

Educational Programs

The educational programs that all organization personnel participate in are listed in the following table.

Educational Program	**# of EMS Agencies**	**# of Hospitals**
Pediatric Education for Prehospital Professional (PEPP)	9	9
Pediatric Advanced Life Support (PALS)	6	7
Pediatric Basic Life Support (PBLS)	1	0
Advanced Pediatric Life Support (APLS)	0	1
Other *EMS Comments* *We hired an I/C to provide a pediatric class for our agency. In-house trng. Required education for relicensure* *In-house pediatric training*	7	3 Emergency Nurse Pediatric Course

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Quality Improvement (QI) Process

Seventeen (85%) of the 20 responding EMS agencies and all seven of the hospitals said they had an "internal quality improvement process". Three (15%) EMS agencies said they do not.

*Fifteen (75%) of the EMS agencies has a process to make modifications to performance and/or procedures if issues arise, 1 (5%) does not and 4 (20%) did not respond. All seven hospitals said that their QI program had a process to make modifications to performance and/or procedures if issues arise.

**EMS Comment - We do not have a policy in place. Since our service is owned by the membership, we have the power to adjust our policies as needed without going through a Township board. Which is a benefit to us, as far as treatments most of these are outlined in our Medical Control policy and we can make recommendations to Med Control on issues that we may have found a better way to treat.*

<u>"EMS Only"</u>
The EMS respondents were asked if their agency had a "100% pediatric patient review process." Nine (45%) confirmed they did, 8 (40%) didn't and 3 (15%) chose not to respond.

Thirteen (65%) of the EMS agencies said their "internal quality improvement process" was integrated with that of their Medical Control Authority's process where 4 (20%) said no, and 3 (15%) no response.

*Again 13 (65%) of the agencies said their "internal quality improvement program" included a process to deal with a potential negative outcome due to treatment and/or medication errors. 3 (15%) answered no and 4 (20%) chose not to answer.

**EMS Comment - We review run sheets for errors in documentation. We do randomly discuss things that we think could have been done better or differently. We don't have a policy that outlines the process for this.*

<u>"Hospital Only"</u>
All seven respondents said their QI process <u>does not</u> review 100% of pediatric patients.

The hospitals were asked if <u>both</u> their ED staff and ambulance EMS personnel participate in the QI process for pediatrics, 4 (57%) said no and 3 (43%) said yes.

All seven of the respondents said that their QI program included a process to deal with adverse events.

Six (86%)of the seven hospitals said that their facility does have a process to ensure that proper written and verbal care instructions are provided to a caretaker of pediatric patients when discharged from emergency care. One (14%) did not.
Five of the seven respondents said that they provide rehabilitative services for pediatric patients. Two (29%) did not.

Quality Management

Fourteen (70%) EMS agencies said they have effective policies and procedures to support quality improvement and all seven hospitals agreed. The other 5 (25%) EMS services said no and 1 agency (5%) no response.

*All EMS agencies and hospitals were in agreement that they view quality improvement as a continuing search for ways to improve.

**EMS Comment - We have a basic policy about our Quality Assurance board and how they will review run sheets on a quarterly basis. It describes some of their other duties and that is about it. I think overall we could use some more policies to clarify some of the other information in this survey.*

Quality Results

*Eleven (55%) of the EMS agencies said their organization has shown steady, measurable improvement in the quality of care provided to pediatric patients. Five (25%) said their agency had not and 4 (20%) did not respond to the question. Hospitals responded with 4 (57%) showing steady measurable improvement and 3 (43%) who did not.

**EMS Comments - Have not had ped patients this year; Not recorded or measured; I would have to say this one is hard to answer due to our lack of Ped calls to determine if our care has improved. Our service has kept up with the new equipment that makes dealing with Peds easier and offers better care. Even tough we have a few calls a year we keep fully stocked with airways, Ped-boards, and other equipment geared towards ped care.*

**When the respondents were asked if their agency had shown steady, measurable cost reduction while maintaining or improving quality there was an interesting mix in the numbers, the Hospitals responded with 6 (86%) had not shown measurable cost reduction and 1 (14%) no response. When the same questions were asked of EMS 5 (25%) agencies said they had shown measurable cost reduction, while 10 (50%) of EMS agencies said no and 5 (25%) did not respond.

***EMS Comments - We have spent more money on education and equipment; No pediatric patients this year; Not recorded or measured; We don't understand this question.*

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Pediatric Medication/Equipment/Coordination

*All hospitals have a method in place for healthcare providers to easily identify medication dosage where 12 (60%) of the EMS agencies do also. Four (20%) EMS operations don't have a method and 4 (20%) agencies did not respond to the question.

**EMS Comment - We have one dosage that is in an auto injection. This is identified very well by the manufacturer.*

**When asked if the method in place to ensure identifiable medication dosage was based on a patient's weight, 10 (50%) EMS agencies said yes, while 4 (20%) said no, with 6 (30%) agencies that did not respond to the question. Responding to the same question the hospitals response was 6 (86%) yes, 1 (14%) no.

***EMS Comments - We look at weight and age of the patient.*

Five (71%) of the seven hospitals said their facilities required that the length-based, or pre-calculated drug systems, be used to avoid calculation errors of medication deliverance. Two (29%) said they did not have that requirement. EMS reported that 8 (40%) of the agencies require the length-based systems or pre-calculated drug systems 5 (25%) reported that it was not required. Seven (35%) did not respond to the question.

"EMS Only"
Sixteen (80%) of the EMS agencies said they carry medications that can be used on children, 4 (20%) agencies do not.

"Hospital Only"
All seven of the hospitals said that there was emergency equipment that is based on the patient's size and immediately available within the ED.

Also, all seven of the hospitals said that they did have pediatric resuscitation equipment available in the ED.

Six (86%) of the seven hospitals reported that there was not a designated Physician Coordinator or a Nurse Coordinator for Pediatric Emergency Care within their facility. One (14%) said they have both a designated Physician and Nurse Pediatric Emergency Care Coordinator.

Customer Satisfaction

When the hospitals were asked if their facility had an evaluation process in place that requests input from the parent and/or guardian of pediatric patients who have received care from them, 4 (57%) said they did. Three (43%) said they did not. Of the four that said they did solicit parent/guardian input, all four said the results are incorporated into their hospital's QI program.

The same question was asked of EMS with 16 (80%) of the agencies surveyed said they do not request input from the parent and/or guardian of pediatric patients who have received care from them. Four (20%) said they do request the input. Of the four that do request parent/guardian input, three reported that they incorporate the input into the EMS service Quality Improvement Program, the forth did not.

"Hospital Only"
When asked if their facilities had a family centered care process for pediatric patients presented in their ED 3 (43%) said yes and 4 (57%) said no.

Pediatric Transfers

*Of the 20 EMS agencies, 7 (35%) said that pediatric transfers were included in their QI review. The other 13 agencies (65%) did not respond to the question. Six (86%) of the seven hospitals said that pediatric transfers are included in their QI review, 1 (14%) said it was not.

**EMS Comment - Not all of them but most; We review a few random run reports from all of our transports.*

"EMS Only"
Eight (40%) of the EMS agencies said they offer pediatric transfers. Six (30%) said they do not and 6 (30%) agencies said the question was not applicable to them.

"Hospital Only"
All seven of the respondents said their hospital did transfer pediatric patients to other hospitals.

*When the hospitals were asked where critically ill or injured pediatric trauma patients (requiring hospitalization) are cared for, they responded as follows:
(Multiple responses)

- In your hospital? 0
- In another hospital, per written transfer agreement? 5
- In another hospital, but no transfer agreement exists? 3
- *Other? 1

**Hospital Comment - Higher level if NMH is unable to accept.*

Medical Control Authority

Of the 20 EMS agencies, 17 agencies (85%) said the Medical Control Authority does have a Quality Improvement process currently in place. One (5%) said it did not and 2 (10%) agencies did not respond to the question. All seven (100%) of the hospital respondents said the MCA does have a Quality Improvement process in place.

Region 8 Hospital Emergency Response Network
Pediatric Survey Report 2007

*When asked if the Medical Control Authority requires a 100% pediatric patient review, the EMS agencies responded with 9 (45%) were uncertain, 8 (40%) said no, 2 (10%) yes, one no response. All hospitals responded with no it is not required.

**EMS Comment -Our med control reviews every run, but as far as I know they don't make a special song and dance about pediatrics.*

The response to the composition of the Medical Control Authority was:

Composition	**EMS Response/%**	**Hospital Response/%**
Hospital Personnel & EMS Providers	17 (85%)	6 (86%)
Do Not Know	2 (10%)	
Did not respond to question	1 (5%)	1 (14%)

Protocols
"EMS Only"

The respondents were asked if their agency carried pediatric protocols, 17 (85%) carry pediatric protocols and 3 (15%) don't.

*Asked if the protocols were consistently utilized, 13 (65%) consistently utilize the protocols and 3 (15%) don't, 4 (20%) agencies decided not to respond.

**EMS Comment - No pediatric patients this year.*

"Hospital Only"
All seven (100%) hospitals said they were designated as, or affiliated with, an EMS Medical Control Authority.

Five (72%) out of the seven hospitals reported that their MCA does not require a 100% pediatric patient review. One (14%) did not respond to the question and 1 (14%) was not certain.

Injury Illness Prevention

The table that follows lists the organizations activity in educating the public on pediatric illness/injury prevention. Eighteen of the twenty EMS agencies responded to this question.

Region 8 Hospital Emergency Response Network
Pediatric Survey Report 2007

Event	EMS	Hosp.		EMS	Hosp.
CPR Training	13	7	Open Houses	11	2
First Aid Training	9	4	EMS Week	8	3
Health Fairs	7	7	Public Displays	6	1
Safety Programs	6	4	Blood Pressure Clinics	3	4
Blood Drives	2	5	Car Seat Safety	2	5
Other	2				

Information Technology

*A significant majority of the EMS agencies, 16 (80%), stated that they did not have a single integrated data base that contains all of their organization's quality improvement data elements. Three agencies (15%) reported they did and 1 agency (5%) did not respond to the question. Hospitals responded to the question with 4 (57%) do have integrated databases and 3 (43%) do not.

**EMS Comment – Not yet but in the process.*

One hundred percent of the hospitals and 15 (75%) emergency service agencies reported that their organization tries to improve how it uses data and information for quality improvement. The balance of EMS agencies 2 (10%) said they did not and 3 (15%) did not respond to the question.
When asked if their EMS agency continually tried to improve the accuracy and relevance of its data on the quality of care to pediatric patients, the agencies' responses were, 15 (75%) yes, 2 (10%) no and 3 (15%) no response. Hospitals were diverse in their responses with 5 (71%) yes and 2 (29%) said no.

"EMS Only"
*Eleven (55%) of the agencies said that if telemedicine was available it would be used. Three agencies (15%) said they would not. Five agencies (25%) reported the question was not applicable, and 1 agency (5%) did not respond to the question.

**EMS Comments - What would the cost be to us and can it be used for adults; If our MCA approved; Talking with a few of our members I think that they would utilize this resource. However, I can't be 100% sure without talking with the membership as a whole.*

"Hospital Only"
*When given the following statement, "A Robot (RoBo Doc) with a screen for a head is now being used in 21 Michigan hospitals allowing stroke specialists to communicate with local doctors and provide immediate 24/7 care to patients miles away instead of transferring the patients to other hospitals. If RoBo Doc were available within the ED do you believe the ED staff would utilize this tool for pediatric patients?"

The overwhelming response was 6 (90%) of the hospitals said YES and 1 (10%) said NO.

**Hospital Comment - Cost???*

CONCLUSION

Continuing Education

Current Requirements - Licensing renewal requirements of Michigan Department of Community Health (MDCH) for EMS providers is 1 hour of CE in pediatrics for all provider levels. In a meeting with Michigan Department of Community Health (MDCH) in April 2007, EMS providers were informed and encouraged to obtain 100% of their continuing education based on practical evaluation of skills. Where there are no pediatric patient specific criteria for physicians or nurses there are re-licensing continuing education (MDCH) requirements that include 25 hours every 2 years for nurses and 150 hours every 3 years for physicians through the Michigan Board of Medicine.

Does continuing education make a difference in the quality of care provided to the pediatric patient?

Most would respond with yes particularly due to the minimal encounters healthcare providers have with children. And some may argue that nothing can replace hands on care and treatment. One study[10] evaluated the performance of competent (continually educated) healthcare providers performing endotracheal intubations within a busy trauma unit who normally worked in non-emergent settings provided some interesting results. It was discovered that utilization of standard preparation intubation techniques in emergency situations were overlooked, additionally medical providers experienced more failed attempts in 40% less time due to the urgent nature and they experienced more technical difficulties. The difference, “urgency”, when the circumstances changed skill mastery changed. Key components of the process that normally would have been done were overlooked and patient outcome suffered.

How do we retain a skill that is infrequently used and when needed it is under intense pressure?

Increased exposure to emergencies during training and incorporating teamwork, communication and crisis resource management principles into existing critical care courses can improve performance. Assess personality factors in healthcare providers, assign roles and tasks in advance, explore differences in team member attitudes and beliefs concerning difficult scenarios, and ensure debriefing of the entire team following resuscitations. Suggestions from “Problems for clinical judgment...Thinking clearly in an emergency”, M.J. Schull, et al, JAMC 2001[11], this research paper looks into the heart of emergency healthcare providers and analyzes the “emergency situation” as a whole.

Opportunities to improve skill retention can come from a number of resources. The Skills Retention in Pediatric Emergency Medicine: A Compendium of Resources 2007, Committee on Pediatric Emergency Medicine[12], which provides numerous resource options, web sites, videos/CDs, Books, Journals, Patient Simulators, Medial Equipment, and Courses.

The U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, realized that with healthcare personnel shortages the use of apprenticeship programs could address two critical deficiencies; the healthcare human resources shortage and enhance clinical skill issues. Under the President's High Growth Jobs Training Initiative, with investments of more than $12 million to fund apprentice-ship programs in new industries, healthcare is on the top of the list. Rural areas could particularly see the benefit since the system is designed to provide flexible competency-based training that allows apprentices to obtain training at their own pace, attaining core competencies while building their portfolio of skills and credentials that validate acquired skill levels. The instruction is articulated with two and four year colleges allowing apprentices to obtain a degree. More information can be found at Office of Apprenticeship Training, Employer and Labor Services, Employment and Training Administration, U.S. Department of Labor, www.doleta.gov/ates_bat.

Simulation training has come a long way in improving continuing educational opportunities. "The Evidence-Base for Using Simulation in Medical Education: Selected Readings and Executive Summary[13]", Dr. Lina Spillane, MD writes that numerous benefits have been identified: immediate feedback to the student; continuous opportunities to fine tune skills; incorporation [*simulation*] into curriculum; increased difficulty based on learner experience are just a few of the advantages sited.
The use of virtual reality simulators is sited in one report[14] claiming that medical residents utilizing this new wave technology performed 6 times fewer operative errors verses their standard educated counterparts and performed some surgical procedures in less time.

In an interview with Dr. William Fales, M.D., Michigan State University, who is currently working on a Pediatric Quality Improvement project says, "The project is focused on pre-hospital healthcare provider education and skill retention". Dr. Fales study deals with five advanced life support agencies in Lower Michigan, to study the affects on paramedic skill retention, followed by a six month continuing education in critical pediatric interventions utilizing simulation trainers. He has found that the EMS systems that require recertification in pediatric skills annually have better overall performance when working with children. In addition we discussed the potential of a special "pediatric talk group" on 800 MHz radios.

In interviews with several EMS agencies and hospital respondents the need for more frequent education on pediatrics is needed some suggesting every six months to once annually to ensure skill retention.

For more information see **Resources.**

Quality Improvement (QI) Process/Management/Results

Quality Improvement Process

Healthcare improvement should maintain a focus on what is best for the patient and system improvement not individual healthcare provider errors. Clinician error must obviously be addressed, but often emphasis is placed on the provider when the process was the root cause.

Most of the surveyed organizations have an internal quality improvement process which deserves recognition. And of equal importance is a process to make modifications to performance and/or procedures if issues arise. The quality of patient care is cyclic and continuous. Improvement meaning to make things better, needs to be considered in each process or procedure when treating patients and the ability to implement changes needs to be a part of the process.

The quality improvement process needs to be integrated between EMS, medical control authority and emergency department staff at the very least and they need to participate in the QI progression. Utilization of a team approach will facilitate transitions.

Hospitals and EMS clearly indicate a lack of pediatric patient encounters yet both organizational types fail to review 100% of the patient care records for those patients treated. Determination of best practices and/or if improvement is needed is important based on infrequent patient interaction and can best be accomplished by evaluating the care given.[15]

For more information see **Resources.**

Adverse Incident

When evaluating adverse incidents or events a course of action should be in place to deal with unfavorable outcomes that occur while caring for patients with a systems engineering approach. Adverse events are untoward or an unintentional outcome that occurred during patient care. An example would be while placing a patient in a stair chair or wheel chair the patient's finger gets caught in the side rail, an unintentional mishap to the patient that occurred under your care.[16] The Patient Safety and Quality Improvement Act of 2005 (Public Law 109-41) was enacted in response to the growing concern for patient safety in the United States. The intent of the Act is to encourage healthcare providers to voluntarily report adverse incidents without fear of discovery or disciplinary actions. For healthcare organizations to take advantage of the Act, they must create a Patient Safety Organization (PSO) who is responsible for collecting, developing, analyzing, and maintaining documentation. The intent is to identify the root cause and correct the process or procedure in a systems fashion.

For more information see **Resources.**

Rehabilitation

Those hospitals that provide rehabilitative services are directly in line with Emergency Medical Services for Children recommendations[17]. Post-Hospital care includes home care after discharge, rehabilitation, community resources, education for schools and family. This would also include addressing issues for children with special needs.

Those respondents whose hospitals do not provide discharge information can inexpensively modify this deficiency. The lack of discharge instructions provided to patients and/or care givers can cause negative patient outcomes such as: unnecessary returns to the ED and/or return calls for EMS; decreased hospital and provider confidence; and fewer compliant patients delaying healing time. Multiple internet resources are available: Meditech; Patient Education System; or Institute of Healthcare Improvement: Preliminary Discharge, offering generic discharge instructions which includes all important elements for patients with congestive heart failure for example. The tool is given to patients upon admission and used to document important general discharge instructions. Model discharge instructions can be found at www.ihi.org.

Quality Management

All surveyed respondent's value and agree that QI is a continuous search to improve. However, mixed results were received when asked about "support in the way of policy and procedures" for quality improvement. One positive step in the right direction was the support for this project through the **Region 8 Hospital Emergency Response Network,** Pediatric Grant Emergency Medical Services for Children (EMSC) Steering Committee. It is imperative that support for quality improvement be an organizational mission. It must be evident in the leadership as well as the staff.

Numerous resources are available from www.dsmcbane.com including the framework for a quality improvement system. Policies and procedures can be created from these materials but support will be needed to get them implemented.

For more information see **Resources.**

Quality Improvement Results

Typically quantifiable results are normally data driven. For those organizations that do not collect data it would be difficult to conclude whether measurable improvement occurs or not. Implementation of a data collection system will allow organizations to analyze and evaluate the results of patient care.

Two free software programs have been identified and may be used to begin the data collection process. Epi Info from the Center for Disease Control (can be used for both EMS and Hospitals) and Agency for Healthcare Research Quality – Quality Indicators Software (geared more towards Hospitals) provides a means to collect data and share results. Quality Improvement tools and aforementioned software can be downloaded from the www.dsmcbane.com website to assist in the performance improvement process.

For more information see **Resources.**

Measurable Cost Reduction

In reference to organizations showing steady measurable cost reduction while maintaining or improving quality the majority of organizations stated this does not occur. If organizations are not experiencing cost savings while improving quality, then the organization(s) should consider reevaluating the type of quality improvement system they have in place.

Some organizations may not realize the value of the quality procedures they already have within their organizations. Example, EMS and hospitals that have established a solitary location for pediatric equipment and medications categorized specifically by the developmental phase of the child i.e. infants, newborns etc. This system improves quality by potentially decreasing medication errors, reducing the length of time to retrieve critical equipment thereby decreasing the time to treatment. It reduces cost by creating a more efficient work environment. Employees paid or volunteer are not wasting time searching for equipment and medications, fewer steps in the process to accomplish the task means fewer possible distractions and/or mishaps in obtaining the resources and employees prefer to be proficient increasing moral.

This is part of the LEAN concept a system that evaluates processes and removes the bottlenecks within the system.[18] The lack of efficiency frustrated one surgeon who requested that a nurse turned medical researcher and working to implement Lean in a 135-bed rural hospital was asked to evaluate the hold up in a recovery room. So the Lean team did an observation concluding that although the staff worked very hard there were several system problems that were constantly being "worked around" without even thinking. The team found a few minute tasks that could be changed to make work flow smoother. One example was listing phone numbers in one easy to find location instead of staff making numerous calls to retrieve numbers causing one minor change in a busy system. Ultimately the cost savings reduced recovery room time from 90 to 62 minutes allowing room for one more patient plus it reduced frustration for nurses and the surgeons improved the wait time for patient anticipated surgeries by 20% and the total patient satisfaction along with the quality of care improved.

Another opportunity to reduce cost and improve quality is through information technology.[19] Two Physicians in a busy Washington D.C. emergency department did just that. They realized patient history, test results and other information were needed

immediately particularly in emergency settings. The manpower and time it took to just retrieve a paper based patient record was incredulous. Dr. Mark Smith, MD and Dr. Craig Feied, MD both having backgrounds in emergency medicine informatics were recruited by the Washington Hospital Center to fix a long standing problem still seen in many hospitals. Tons of data collected but no intraoperability. Dr. Smith is quoted as saying, "Emergency medicine is a specialty defined not by an organ of the body or by an age group but by time".[20] The physicians found by using Microsoft development tools to create a program known as "Insight" information systems could integrate.

They wanted to create a system that allowed instant access to patient data yet simplistic enough for staff to use without necessary training. Once they accomplished the system the next task at hand was to convince the other ED staff to take advantage of it. So they set a computer up in the ED with a piece of paper on the screen that said "Beta Test. Do Not Use". And as suspected, human curiosity got the best of coworkers and the ED staff started using the computer just to see what it was all about.

The system has proven its worthiness and also provides other advantages: better patient care; reduced medical errors; increased patient satisfaction; double ED volume without increasing staff or facility size; improved ED payer mix; increase billings and collections; boost morale; empower research and education; perform biosurveillance and attract federal project dollars. The data can also be seen on wireless handhelds and can be accessed from home or office.

Yet another cost saving opportunity is tracking and trending Adverse Events.[21] One hospital found by switching a medication to a different manufacturer they could save $5,000 annually. However, when they tracked the number of adverse events that occurred with the new medication they actually spent $50,000 annually caring for the patients who experienced the adverse reactions. So instead of saving $5,000 they spent $45,000.

For more information see **Resources.**

Pediatric Equipment/Coordination/Medication/Transfers

Pediatric Equipment

When the hospitals were asked if they had equipment for pediatric emergency resuscitation and based on patient's size immediately available within the emergency department all seven respondents said they do. However, one respondent interviewed indicated that their hospital was waiting for equipment promised under a grant.

In reference to equipment one EMS participant interviewed indicated that there is a need for appropriate pediatric transport devices. Ambulance patient compartments are designed primarily for adults and attempts to adapt adult utilities for children has not always proven successful and in some cases could cause potential harm to children. In the Emergency Care for Children: Growing Pains report[22] recommendation included that

additional research was needed to determine the suitability of medical devices, medications and evaluation of medical technologies for the care of children.

Pediatric Coordination

In reference to the question of a specific physician and/or nurse coordinator only one hospital indicated it was in place. In the Emergency Care for Children: Growing Pains[23] the recommendations include a designated pediatric coordinator for both emergency departments and emergency medical services. This concept would ensure the medical needs of children stay in the fore front and don't fall through the healthcare system cracks.

Pediatric Medication

Medication errors are a healthcare issue that affects millions of people, at the expense of billions of dollars annually according to a report from The National Academies[24]. The report encompasses mistakes involving multiple types of medications from prescription drugs, over the counter vitamins, minerals, or herbal supplements. The committee found errors at every stage from administration to monitoring patient reactions. Furthermore, most errors that do occur are not reported to the patient or guardian unless injury or death results. Most frequently medication errors have been discovered through adverse incident reporting systems. One of the main reasons that "The Patient Safety and Quality Improvement Act of 2005" was created is to improve patient safety and encourage voluntary and confidential reporting of adverse events that affect patients.

Numerous recommendations to improve medication errors for adults and children are available. Often sited suggestions include: incorporate patients and/or care givers in quality improvement programs; provide educational materials referencing medication precautions, contraindications and adverse effects; encourage patient or guardian to create lists of all medications including over the counter medicines and the purposes for their use; listing all medication allergies and encouraging care givers to ask questions and require printed medication information from the pharmacy and to consult reputable healthcare web sties for additional medication information such as the National Library of Medicine (NLM). Educate parents about medications using fact sheets like 20 Tips to Help Prevent Medical Errors in Children from the Agency on Healthcare Quality.[25]

Physicians ordinarily prescribe pediatric medications based on the weight of the patient. A primary shortfall in medication dispensing in emergency care is the often used "guess-timation" approach to determine the weight of the child for medication dosing. In non-critical environments the patient could simply be weighed, but in emergency medicine this is not practical. Literature review clearly indicates that our "best guess" is not always accurate when determining a patient's weight. The need for some type of scale or body mass measuring device for emergency settings would be a valuable tool in reducing medication errors. An interview with one EMS agency respondent suggested the concept of some sort of weight measurement device attached to ambulance cot. Discussion with

one hospital participant indicated that a device has been created for gurneys within the ED however not all EDs have it available.

A tool often used in emergency medicine for quick reference is the Broselow Tape, dividing children into weight categories based on length. Several problems have been identified with the Broselow tape as reported by the Institute for Safe Medication Practices[16] and the Broselow Tape: Measuring the Changes from 1998 to Today.[26] Although the Broselow Tape helps healthcare providers save lives it is not without its limits particularly the 1998 version. Problems that were described include: drug concentration discrepancies (the newer 2002 tape corrects this issue with the exception of epinephrine (1:10,000 and 1:1,000 dose in mg and dose in volume are listed); confusion between the 3-5 kg (not color coded) zone and the 15-18 kg (white color coded) zone. Some medication errors occurred from clinicians mistakenly using the white color zone for a child that met the no color code requirement (again corrected by the 2002 tape).

Several additional problems occurred while using the tape for mock codes. Using the tape upside down and measuring patients from the wrong end. Evaluators noticed it happened more frequently in instances where the tape was hanging upside down. The next critical observation was associated with the color coding zone that contains a listing of medications for different diagnoses. Many healthcare providers believed all the medications were to be used in sequence, like an algorithm. In the mock scenarios several medications were given for the wrong condition instead of looking at the condition and then reading the medication listing.

Additional considerations – Due to the increase in childhood obesity there could be a disproportionate ratio of weight to height using the Broselow tape[27]. This study concluded that the Broselow tape system inaccurately predicated actual weight in one third of children.

One pediatric emergency tool that has shown a great deal of promise are the CrashCards that allow quick and easy access to lifesaving information for children. These laminated 3X5 cards contain comprehensive information on pre-calculated drug dosages; conscious sedation; fluid resuscitation, blood transfusions, cardioversion, defibrillation and much more. Current reviews indicate the pocket guide serves a critical need in pediatric emergency medicine both hospital and pre-hospital. However, the use of this tool is based on the weight of the child requiring the need for some form of device to determine body mass.

Of critical importance is the accurate measurement of the child's weight. Continued research for an accurate weight measurement to determine body mass for pediatric patients in both emergent hospital and pre-hospital setting should be investigated.

Safe Practice Recommendations

- Use of the CrashCards as a medication and resuscitation guide.
- Update the Broselow tape to the 2002 edition.
- Standardize concentrations in pediatric code carts or bags.
- Organize code carts/bags to facilitate equipment retrieval according to the color coded weight class.
- Review the carts/bags contents regularly checking for expiration dates.
- Ensure proper measurement teach staff “Red to Head”. If the tape is laminated ensure the lamination does not exceed the tape length for proper measurement.
- Educate staff ensure competency. Create programs for clinicians to evaluate cognitive and psychomotor skills. Reeducate when making changes to carts/bags or tape. Visit http://dukehealth1.org/deps/clinical-ed.asp for helpful educational resources. Hold mock codes and perform a failure mode and effects analysis (information provided in the Region 8 Quality Improvement System).
- Alert ED and EMS staff to the potential for errors previously discovered.

For more information see **Resources.**

Pediatric Transfers

Forty percent of the EMS agencies that responded offer pediatric transfers. And all seven hospitals said they transfer critically ill or injured children to other facilities, some without written transfer agreements.

Those hospitals that transfer patients without written agreements are potentially putting undue hardship on the child and EMS. Critical delays can occur without agreements that could have a devastating impact on the outcome of the child. Those systems with agreements in place reduce the possibility of any holdup when the patient is received and allow EMS to return to service quicker.

In some cases it is not in the best interest of the child to be transferred.[28] Adverse events occur more frequently to critically ill children then to adults during transfers. One report states, “Importantly, this increased morbidity reflected an increased rate of "intensive care events" such as plugged endotracheal tubes and loss of intravenous access, not an increase in physiologic events. Patients experiencing such adverse events tended to have higher morbidity scores (on the PRISM scale) and lower therapy level (TISS) scores prior to transport.” And inter-facility transfers of critically ill children in a region where weather conditions particularly in the winter months are extremely hazardous and the extended distance between facilities can exacerbate an already stressful situation. An awareness of these transport hazards is important, and policies and procedures to optimize the safety of all practices during transport of pediatric patients is essential, with proper stabilization of the patient prior to transport.

The use of innovative technology could potentially provide solutions to some children who require emergency care and reduce the need for inter-facility transfers.

Telecommunications in both the ambulance and ED may offer opportunities to provide children with access to pediatric specialties that are not regionally affordable. Numerous grants are currently available for information technology particularly in healthcare. The use of such innovative concepts such as "RoBo Doc" being used in 21 Lower Michigan hospitals currently utilized for neurologists and stroke patients, the concept of using pediatricians for children should not be incomprehensible. Telecommunications within ambulances could allow EMS providers to converse directly with emergency department doctors or pediatricians in other areas. Further investigation into this concept or some other alternative to transfers should be considered. It would also allow children to be cared for and treated in local hospitals, making it easier on care givers, families and safer for the children.

Both organizations that request or provide transfers for ill or injured children should ensure 100% quality improvement review. With the knowledge of transfer complications, infrequent pediatric patient encounters and extenuating distance to receiving facilities it would best serve the child if each encounter were reviewed.[29]

For more information see **Resources.**

Customer Satisfaction

Customer satisfaction is what quality improvement is all about. A patient satisfaction evaluation process is an excellent way to open communications with your clientele, improve quality of care and increase moral for staff members. A patient satisfaction survey need not be lengthy, time consuming and/or even costly yet it can produce invaluable information about your organization and potentially be used for marketing strategies.

Some may not realize that the laws that govern EMS in Michigan require the provider to transport the emergent patient to the closest appropriate facility. And the patient and/or guardian have the right to request transport to any facility not necessarily the closest. This does not necessarily mean that EMS can or will comply with the request; it will depend on the agencies policy and patient condition. Dissatisfied customers make such requests. Furthermore, when patients choose to transport themselves while in crisis based on poor customer relations with EMS, this puts the patient, and others at risk during high anxiety transport.

Customer satisfaction plays a key role in consumer patronage of healthcare organizations and has a direct impact on the overall value of the organization.

For more information see **Resources.**

Family Centered Care
"Hospital Only"

In response to a Family Centered Care process within the emergency department 43% said they have a system in place and 57% indicated they don't.

The terms Family Centered or Patient Center Care are often used synonymously. The American Academy of Pediatrics[30] refers to Family/Patient Centered Care as an opportunity to collaborate with care givers and/or recipients in healthcare encouraging communications and mutual respect as well as acknowledging culture differences and expertise of patient guardians.

The literature implies that often patients and family members feel their concerns, questions or preferences are ignored or never sought. In addition research suggests that the lack of communications with parents or health guardians contributes to ineffective sometimes inappropriate care, or even fatal errors occur.[31]

When discussing healthcare issues with patient advocates the dialog must be clear, concise and with as little medical jargon as possible without demeaning the recipient.

To create a QI program built on the children we need to include the children and parents in the care. It makes sense that those that bore the child will have the most to gain and loss next to the child themselves when care is substandard. Healthcare organizations that incorporate patient guardians into committees focused on customer satisfaction have found that not only are the guardians enthusiastic about participating they have provided valuable improvement concepts that have enhanced care.

For more information see **Resources.**

Medical Control Authority

All of the hospitals surveyed said they have a Medical Control Authority (MCA) that has a quality improvement process. The majority of EMS agencies said their MCA has a quality improvement process however several said they did not.

The Michigan Public Health Code Act 368 of 1978 defines the legal requirements of a Medical Control Authority. One such requirement is to provide a quality improvement program for the region the authority governs. Some medical control authorities believe they are fulfilling the state requirement of a quality improvement program by merely having a Professional Service Organization yet the two are not synonymous. The peer review process is one component of the overall quality improvement program. This misconception has created a focus on individuals instead of system issues during the improvement process. As often indicated by the literature normally the deficiencies rest in the system more often then the individual.

The question of whether the MCA requires 100% pediatric patient review most organizations indicated either no or uncertain. The limited number of exposures to pediatric patients causes increased anxiety as proven by the survey responses. Reviewing 100% of those encounters could potentially reduce anxiety when evaluation concludes that appropriate patient care was received. Quality improvement should provide an organization with opportunities to improve patient care along with acknowledging and reinforcing best practices.

As far as the composition of the medical control authorities various answers were received. The majority of responses included EMS and hospital personnel and several entities didn't know or didn't respond.

Legally the medical control authority is required to be hospital based and comprised of hospital and when applicable, freestanding surgical outpatient facility staff and may also include life support agency personnel. The MCA is required to designate an Advisory Council that includes representation of each type of life support agency and each type of emergency medical service personnel functioning within the MCA region.

The State of Michigan has an impressive emergency medical system in comparison to some areas of the United States.[32] Medical oversight varies throughout the country. Some states require a medical director for each agency where other states require no medical direction at all for emergency medical services including the absence of state governance. The direction for medical care is provided in some regions of the country by physicians, physician assistant, family nurse practitioners, nurses or paramedics. IOM recommendations include: a federal mandate to establish statewide networks of EMS medical oversight at the local, regional and state level; require medical directors be physicians and compensated for time in that position; must actively participate in system planning and implementation and for Congress to provide federal and state funding to maintain statewide networks of medical oversight.

Emergency Medical Services – Protocols

In response to whether the EMS agencies carry Pediatric Protocols most of the agencies responded affirmatively and several do not. In reference to whether the protocols were consistently utilized 65% said they do while 35% said no or didn't respond.

The purpose of the establishment of protocols is to provide a detailed plan of treatment or procedure to care for sick or injured patients. The use of those protocols is to ensure consistent, appropriate and quality driven care to those patients. Utilization of quick reference sheets that include the MCA's state approved protocols for children stored with the pediatric equipment would allow for immediate access when needed.[33] Children are not little adults and attempts to adapt adult protocols to pediatric patients could put the child at risk. Model protocols can be found through the National Association of EMS Physicians or the Michigan Department of Community Health, EMS Division, which have template pediatric protocols available for medical control authorities. Also, the

American Academy of Pediatrics is currently working on updates to emergency protocols for children. In addition the National Guideline Clearinghouse provides evidence based pediatric treatment guidelines and is freely available.

For more information see **Resources.**

Injury Illness Prevention

An impressive response from hospitals and emergency medical services was received when asked the types of public education on injury/illness prevention for children.

Injury is the leading cause of death and disability in children. Injury is not the same as accident. "Unlike an accident, a childhood injury is an understandable, predictable, and preventable occurrence[34]." In 2002, unintentional injury resulted in the death of 20,000 children, adolescents, and young adults. This article describes the fundamental aspects of injury prevention science: Epidemiology – injury risk distribution among specific groups of children so targeted interventions can be identified and implemented. Biomechanics – refers to human vulnerability and flexibility to limit energy transfer of potential injury. Behavioral Science – the effective and ineffective ways of altering the risk by behavior modification. The article provides information on health statistics, web sites and specific injury data with associated causes and recommendations to reduce further injuries.

Additionally the introduction of the Haemophilus influenza type b (Hib) vaccine in 1990 has almost eradicated epiglottis in children and dramatically decreased the incidence of meningitis, sepsis, and septic shock.[35] "Back to the Back" programs have decreased the number of SIDS events and the numbers of children in cardiac arrest arriving in the ED. Bicycle helmet requirements and drowning prevention programs are working to reduce mortality and morbidity.

Other success stories can be found through the Indian Health Service (IHS) community-based Injury Prevention Committees[36] who have worked for the last 25 years with tribal EMS to offer prevention programs to communities. Examples of these activities include:

Playground safety evaluation
- Infant/child car-seat sizing and distribution
- "Prom night" and "shattered dreams" drunk driving consequences demonstrations for teens
- "Buckle up" teaching in schools and communities
- CPR and first aid training in schools
- Blood pressure clinics
- Home-safety evaluations
- Teen suicide gatekeeper programs
- Farm equipment safety for farm families and workers
- NHTSA "Safety Advice From EMS" injury prevention programs for the public
- Injury Prevention In A Bag" resource kit for EMS providers

NHTSA - Public Information, Education and Relations (PIER) training programs, have been a valuable resource to EMS providers for several years. It offers injury prevention curricula for use by EMS providers ("Safety Advice from EMS (SAFE): A Guide to Injury Prevention," bystander care ("First There First Care" — developed in cooperation with IHS) and public access ("Children: Make the Right Call") educational materials.[37]

For more information see **Resources.**

Information Technology

One hundred percent of the organizations said they try to improve how data and information for quality improvement are used. Yet a significant majority of all agencies does not have a single integrated data system and in response to trying to improve the accuracy and relevance of the data the response was equally diverse. A single integrated data base that contains all organizational data can facilitate quality improvement, reduce medical errors, provide faster billing and collections and decrease duplication expenses.

One example of integrated data advantages can be seen with "Insight" considered as an instant data everywhere system. Two physicians at Washington National Medical Center in DC, created the concept of the data system that ties all information across multiple programs into a central repository integrating and making accessible administrative and patient data instantly. No training required and the system has received an uncanny positive voluntary response from physicians, nurses and administrators. Microsoft development tools like Visual Studio .NET 2003, Microsoft .NET Framework, Microsoft SQL Server 2000 databases support 13 terabytes of data for just one hospital. Although this system focuses on hospital data adaptation for EMS may be possible.

According to the Agency for Healthcare Research and Quality (AHRQ), a major focus for the current Administration and Congress is on Health Information Technology (HIT).[38]

Many critical access hospitals in rural areas have not adopted technology such as electronic health records, computerized provider order entry, and electronic medication administration record systems but they are utilizing telehealth applications like teleradiology and telepharmacy. State and Federal agencies are providing grants and other funding mechanisms for communities to purchase and implement health IT systems. (See http://www.hhs.gov/healthit/initiatives for more funding opportunities).

Emergency Medical Services will be receiving new information technology tool available free from the State of Michigan's Department of Community Health confirmed by the meeting held in April 2007. The National EMS Information System (NEMSIS) is a set of data elements created for emergency medical services to address the lack of information available at the local, state and national level on patient care provided prehospital. Data is collected at the local level sent to the state and federal governments to aggregate and the

information collected will assist in identifying critical needs in emergency medical services.

The patient data from dispatch to termination of the call is captured using data elements beginning with information on dispatch, incident, patient, injury/trauma, cardiac arrest, financial, EMS system demographics, EMS personnel demographics, quality management indicators, outcome indicators, domestic terrorism and linkage data. "Not all data elements are required for every region. Although there are over 400 data elements for NEMSIS only about 70 are required from EMS for the federal government", says Clayton Mann, PhD, director of the NEMSIS program said in one interview.

Moreover real time video from the scene allows EMS providers and hospitals to anticipate patient needs. "New technologies promise to revolutionize medicine, especially rural medicine, saving both time and lives" according to an article from JEMS magazine.[39] Motorola testing in areas of Florida and Chicago is using wide-band mobile information systems utilizing 700 MHz spectrum band previously reserved for UHF television to share voice, video and data services between first responders and public safety officials. UHF frequencies are available in rural areas for public safety use.

Of the 20 EMS agencies surveyed, if telemedicine was available for EMS the majority of the agencies would put it to use. The usefulness of this form of modern communication technology in emergency care of patients can benefit not only the child but adult patients as well. Rural Frontier Emergency Medical Services Agenda[40] for the Future supports telecommunications in rural EMS. The report to the nation offers recommendations to policy makers on the needs of EMS and funding requirements. Rural EMS services can make use of this tool to enhance resources in current and future emergency medical service endeavors.

Ninety percent of the hospitals responded enthusiastically about the possible use of RoBo Doc for the potential use for children in the emergency department.

St. Joseph Mercy Oakland Hospital (SJMO) is leading the way in telemedicine for stroke patients and neurologists under the auspice of the Michigan Stroke Network.[41] Patients in areas without neurologist are able to communicate with patients and physicians in their care and treatment by using a 5 foot tall robot officially named RP-7 created by In-Touch Technologies of Santa Barbara CA. Available 24/7 at the patients' bedside or in the ED with use of a laptop and internet connection the specialist can work with patients who would otherwise be transferred to other facilities. Twenty one Michigan hospitals are using this technology. Estimates of less than 3% of the cases will require interfacility transfers. According to reports the robots are available to any hospital in Michigan at NO cost to the participating hospital. The mobility of RoBo Doc offers diversity creating interest from other healthcare specialties.

The use of RoBo Doc for pediatric patients could provide specialists in the ED or ambulance. The collaboration between the attending physician and specialist on the

computer screen could offer pediatric patients local treatment, less need for transfers that put patients and EMS providers at undue risk not to mention the financial burden placed on the families.

Not exactly RoBo Doc but along the same concept is the Dakota Telemedicine System (DTS) found that 77% of their patients were able to remain in their rural communities and only 23% of the patients required transfer. The physicians that utilized the system made comments like, “Telemedicine is my second pair of eyes” has expanded my practice capabilities”, “...brought a sense of security to being a sole physician practicing in a rural remote community”, “I would have transferred this patient immediately, but due to telemedicine I was able to retain the patient in the community, close to family and friends where she belongs”.

DTS offered many examples of the challenges that were overcome with the use of telemedicine but one in particular references a young girl thrown from a horse. The initial response from the rural ED physician was to airlift the child to a Level II trauma center however, “through the eyes of an emergency and trauma physician, radiologist and neurologist the case was handled in the rural hospital with the rural physician”.

Although the Dakota Telemedicine System was discontinued due to financing, the North Dakota Healthcare Association created the North Dakota Bio-Terrorism Wide Area Network and took over were DTS left off.

Funding Considerations - The Rural Utilities Service (RUS) at the U.S. Department of Agriculture (USDA) has the ability to finance rural wireless expansion and provides loan and grant programs available for rural health care and rural emergency communications. The FCC’s “e-rate” offers discounts on telecommunications for rural health-care providers. The Department of Commerce’s National Telecommunications and Information Administration offers Technology Opportunity Program grants, and the Economic Development Administration has focused resources on rural broadband needs. Funding is also available from the Department of Homeland Security and the Department of Health and Human Services that can be used on emergency communications and information technology.

The benefits of telehealth for educational purposes have clearly been demonstrated and hopefully the advantages of telemedicine will also be recognized.

For more information see **Resources.**

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RESOURCES (By Subject Matter)

Adverse Incident

How-To-Guide Pediatric Supplement Adverse Drug Events from the Pediatric Infinity Group (American Academy of Pediatrics www.aap.org ,
Child Health Corporation of America www.chca.com, National Association of Children's Hospitals and Referred Institutions www.childrenshospitals.net,
National Initiative for Children's Healthcare Quality www.nichq.org)
IHI Global Trigger Tool for Measuring Adverse Events
http://www.ihi.org/IHI/Results/WhitePapers/IHIGlobalTriggerToolWhitePaper.htm,
Principals of Patient Safety in Pediatrics from American Academy of Pediatrics
http://aap.org
Reducing and Preventing Adverse Drug Events to Decrease Hospital Costs
http://www.ahrq.gov/qual/aderia/aderia.htm

Continuing Education

Health Professions Education – A Bridge to Quality
http://books.google.com/books?hl=en&lr=&id=Ib6pckASxjkC&oi=fnd&pg=PA1&dq=Continuing+Education+in+emergency+medical+care+and+its+implications+on+performance+improvement&ots=DM4wtbu3SE&sig=SiSvv-Ez3EUHMeyFeNAwuMnLup0
The Goose, the Gander, or the Strasbough Pate' for all: Medical Education, World, and the Internet http://www.med-smart.org/downloads/proceedings_ssgrr_2000.pdf.

Customer Satisfaction

AHRQ – A Tool Kit for Redesign in Healthcare
http://www.ahrq.gov/qual/toolkit/toolkit4a.htm,
NHTSA – A Leadership Guide to Quality Improvement for Emergency Medical Service Systems
http://www.nhtsa.dot.gov/people/injury/ems/leaderguide/,
Doc's Need Soc's – A QI Tool for Primary Care
http://www.wvrhep.org/socs/chap1.htm,
BNET – Buyer – Vendor Role in Quality Management
http://jobfunctions.bnet.com/whitepaper.aspx?docid=93486

Emergency Medical Services – Protocols

Model Pediatric Protocols
http://bolivia.hrsa.gov/emsc/SearchpubID.aspx?id=EP001059&from=results
Nova Scotia – Evidence Based Medical Policy, Protocol and Procedure Manual
http://emergency.medicine.dal.ca/ehsprotocols/protocols/toc.cfm

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Family Centered Care

IHI – Patient Centered Care
http://www.ihi.org/IHI/Topics/PatientCenteredCare/,
HRSA – EMSC
http://bolivia.hrsa.gov/emsc/SearchResults.aspx?SearchPhrase=quality%20improvement,
NACHRI – Three Approaches to Patient Safety and Quality Improvement
http://www.childrenshospitals.net/AM/Template.cfm?Section=Home&CONTENTID=22958&TEMPLATE=/CM/ContentDisplay.cfm,
National Association of EMT
http://www.naemt.org/divisionsAndCommittees/pediatricCommittee/emsc.htm

Information Technology

Microsoft Solutions for the Healthcare Industry.
http://www.microsoft.com/resources/healthcare/default.aspx
Institute for Medical Informatics-Washington Hospital Center products and services.
http://www.imedi.org
St. Joseph Mercy Oakland Hospital
http://www.stgoesoakland.org
InTouch Health
http://www.intouchhealth.com

Injury Illness Prevention

Safe Kids Worldwide - www.usa.safekids.org/index.cfm
eMedicine - www.emedicine.com/ped/topic3046.htm
Rural Assistance Center - www.raconline.org/info_guides/ems/#faq,
Agency for Healthcare Quality – www.qualitytools.ahrq
American College of Emergency Physicians -
www.acep.org/webportal/PatientsConsumers/HealthSubjectsByTopic
Medical Matrix - www.medmatrix.org/_
EMSC - http://bolivia.hrsa.gov/emsc/index.aspx
American Red Cross – www.redcross.org
American Heart Association – www.aha.org

Measurable Cost Reduction

Rural Assistance Center (RAC)
http://www.raconline.org/search/doc_subjectresults.php?sub1=351&doc_sort=date,
AHRQ - Quality Tools
http://www.qualitytools.ahrq.gov/resources/docindex.aspx
Six Sigma
http://www.isixsigma.com/sixsigma/six_sigma.asp, http://grants.nih.gov/grants/guide/pa-files/PA-01-044.html.

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Pediatric Medication

Medscape – The Internet as a Source of Pediatric Medication Information
http://www.medscape.com/viewarticle/416667
Medscape – Hospital Survey shows Pediatric Patients Need More Protection from Medication Errors
http://www.medscape.com/viewarticle/411835
Institute for Safe Medication Practices
http://www.ismp.org/Newsletters/acutecare/articles/20020601.asp
http://www.ismp.org/Newsletters/acutecare/articles/20061214.asp
Determining if a Pediatric Drug Dose is Safe
http://instructors.butlercc.edu/nr105/Math/mpedsafe.htm
Emergency Nurses Association (ENA)
http://www.ena.org/store/item.asp?ITEM_ID=354&DEPARTMENT_ID=26
http://www.ena.org/store/item.asp?ITEM_ID=386&DEPARTMENT_ID=26

Pediatric Transfers

IEEE Explore – The Significance of Telemedicine in a Rural Emergency Department
http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=775488,
Academic Emergency Medicine - Impact of a Transfer Center on Inter-hospital Referrals and Transfers to a Tertiary Care Center
http://www.aemj.org/cgi/content/abstract/12/7/653.

Quality Improvement

Continuous Quality Improvement Process
http://betterkidcare.psu.edu/CenterDirectors/ContQualityImprove.pdf,
Improvement Methods
http://www.ihi.org/IHI/Topics/Improvement/ImprovementMethods/Resources/,
MedQIC, Quality Improvement tools for Rural and Critical Access Hospitals
http://medqic.org/dcs/ContentServer?cid=1132261933588&pagename=Medqic%2FMQTools%2FToolTemplate&c=MQTools

Quality Improvement Results

Understanding Quality Measurement
http://www.ahcpr.gov/chtoolbx/toolcon.htm,
Quality Tools
http://www.qualitytools.ahrq.gov/resources/docindex.aspx,
Understanding Quality Measurement
http://www.ahcpr.gov/chtoolbx/toolcon.htm,
Performance Measures Reporting Obligations
http://www.nedarc.org/nedarc/collectingData/defineYourNeeds/assessWhatYouHaveToDo.html.

Quality Management

Implementation of Total Quality Management: Facilitators and Barriers
http://gateway.nlm.nih.gov/MeetingAbstracts/102233880.html,
Leading System Improvement
http://www.ihi.org/IHI/Topics/LeadingSystemImprovement/,
Does it really matter who is responsible for quality improvement? An empirical study of the effects of locus of responsibility on quality improvement implementation.
http://gateway.nlm.nih.gov/MeetingAbstracts/102234602.html.

PEDIATRIC TEXT AND REFERENCE BOOKS

Advanced Pediatric Emergency Care, 1/e
Jenkins, 2007, Prentice Hall

Clinical Manual of Emergency Pediatrics 4/e
Edited by - Ellen Crain & Jeffrey Gershel,
2003, McGraw-Hill

Clinical Skills Manual for Pediatric Nursing, 4/e
Bindler & Ball, 2008, Prentice Hall

CrashCards 4/e
Pat Hirt, RN, 2006, CrashCards, Inc.

Harriet Lane Handbook – A Manual for Pediatric House Officers 17/e
2005, Elsevier Science Health Science Division

Pediatric Emergencies II CD, Dynamic Lecture Series, 1/e
Larmon & Snyder, 2008, Prentice Hall

Pediatric Emergencies: A Manual for Prehospital Care Providers, 2/e
Eichelberger, Pratsch, Ball & Clark, 1998, Prentice Hall

Pediatric Health Case Studies, 1/e
Rothfeld & Krepcio, 1999, Prentice Hall

Pediatric Nursing Care Plans, 2/e
Axton & Fugate, 2003, Prentice Hall

Pediatric Nursing: Caring for Children, 4/e
Ball & Bindler, 2008, Prentice Hall

Pediatric Prehospital Care l/e
Markenson & NAEMT, 2001, Prentice Hall

Pediatric Quick Reference Guide, 1/e
Jenkins, 2003, Prentice Hall

Prentice Hall Pediatric Drug Guide, 1/e
Bindler, Howry, Wilson, Shannon & Stang,
2005, Prentice Hall

Prentice Hall Real Nursing Skills: Pediatrics 3/CD Set, 1/e
2006, Prentice Hall

Textbook of Pediatric Emergency Medicine, 5/e
Gary Fleischer, MD, Stephen Ludwig, MD, Richard Ruddy, MD,
Benjamin Silverman, MD, 2006, Lippincott, Williams & Wilkins

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COMPANION DOCUMENTATION – (can be found at www.dsmcbane.com - See file -Pediatric Survey Complete Documentation 2007)

Includes:
- Notification of Future Survey
- Survey Cover Letter
- Reminder
- Survey EMS & Hospital
- Survey Results EMS & Hospital
- Pediatric Project Participant Comments

All project documentation can be found at www.dsmcbane.com.