PEM TODAY

Translating Science to Stretcher in Pediatric Emergency Medicine

Improving Primary Care Follow Up After An ED Visit

The question of how to assist and encourage families of children with chronic illnesses to follow discharge instructions, such as a visit to their PCP, is a fundamental issue for pediatric emergency physicians.

Zorc et al. from the Children's Hospital of Philadelphia recently tackled the question of how to improve follow up after an ED visit for children with asthma in an RCT. Despite national recommendations, PCP follow up rates after ED visits for asthma are low, especially in US inner city children.

They applied a multipronged intervention to one group, including a brief video discussing beliefs and misconceptions reported in previous studies, a mailed reminder to visit a PCP in follow up, and a letter for the family with results of asthma symptom screening performed in the ED (if positive). The control group received standard discharge instructions to follow up with their PCP within 3 to 5 days.

The primary outcome measure was a PCP follow up during the 4 weeks after the ED visit. Secondary outcome measures included asthma related quality of life (AQoL), use of controller medication and ED visits during the 6 months after enrolment.

More than 90% of the study group (n=217) and control group patients (n= 216) were black, most were insured through medical assistance programs and their PCPs were based at teaching hospitals, not private offices, with high use of EDs for asthma care.

What makes this study so attractive is that while these interventions represent some additional work for ED staff, they would, if shown to be successful, be practical and feasible enough to be implemented in many EDs without a large amount of additional resources.

Disappointingly, there was no difference in PCP follow up rates within 4 weeks of the ED visits, at 47% and 46% in intervention and control groups respectively. There were also no differences in other asthma related outcomes. An initial difference in asthma beliefs between groups after the ED intervention had disappeared at a 3-month repeat phone interview.

In This January 2010 Issue:

Although it is difficult to tell how generalizable these results are outside the inner city setting in the United States, these results are sobering for any ED clinician. ED management decisions need to take into account that it may be a minority of our patients who follow a specified discharge plan, and that even a well-designed, single intervention to change the "beliefs" of families may not do the trick.

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Read More : Zorc JJ, Chew A, Allen JL, Shaw K. Beliefs and Barriers to Follow-up After an Emergency Department Asthma Visit: A Randomized Trial. Pediatrics 2009; 124:1135-1142

Recombinant Hyaluronidase-facilitated Subcutaneous Pediatric Rehydration

The young child presenting with dehydration is a common scene in EDs worldwide. With mild and moderate dehydration, oral rehydration therapy (ORT) should be the therapy of choice, but it is not always tolerated by the children.

Allen et al. aimed to evaluate subcutaneous rehydration using an initial small infusion of recombinant human hyaluronidase (rHuPH20), a less allergenic version of its animal precursor, to facilitate subsequent fluid absorption.

This single-arm multi-center study was intended to test efficacy, safety, as well as operator, patient and parent satisfaction. The power calculation was achieved with 51 patients enrolled. 48 were deemed to have been successfully rehydrated via the infusion.

Entry criteria used a validated dehydration scoring scheme, but a wide range of children ranging from -3.5% to 30.8%, as demonstrated later by entry and exit percentage body weight comparisons, were entered.

Age was between 2 months to 10 years and 85% had a diagnosis of gastro-enteritis. Ondansetron anti-emetic was given to 15%.

During the study, appropriate measurements were made for safety and efficacy. The median time to discharge was 3.3 hours, however, 3 children required hydration for more than 24 hours. There are nice pictures of the infusion and comprehensive analysis of local site reaction, which was common but mild.

Despite over half of the participants having local swelling of over 5cm, very few children had high pain scores (defined by age-appropriate tools). Despite these adverse events, 90% of parents were satisfied or very satisfied with the technique. One patient developed cellulitis at the injection site.

Is this technique the 'Holy Grail'? Have we found the tool that will eliminate dehydration from EDs? Well, it seems that many clinicians may preserve ORT for milder cases such as many of the children in this study. Secondly, many clinicians use oro/naso-gastric tube hydration for similar cases.

Finally, the primary efficacy endpoint was the investigators' subjective judgment as to whether successful rehydration had occurred and hospital admission for IV infusion avoided. Given the fact that this was an unblinded study, one would want to see some more objective criteria before adopting this technique. Nonetheless, the study shows that this technique may have a place in our armamentarium of strategies for managing dehydration.

It will be an interesting challenge to compare this technique with "normal practice", which would include a more conservative approach for milder cases, and an IV approach for the more severe. This will thus enable us to find its role in our clinical practice.

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Read More : Allen CH, Etzwiler LS, Miller MK, Maher G, Mace S, Hostetler MA, Smith SR, Reinhardt N, Hahn B, Harb G; for the INcreased Flow Utilizing Subcutaneously-Enabled-(INFUSE) Pediatric Rehydration Study Collaborative Research Group. Recombinant Human Hyaluronidase-Enabled Subcutaneous Pediatric Rehydration. Pediatrics. 2009;124(5):e858

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A Closer Look at Adverse Drug Events

Bourgeois and colleagues took a closer look at adverse drug events (ADEs), using the National Center for Health Statistics data which collects outpatient and Emergency Department visit information throughout the United States. The data analyzed was from children 0 to 18 years of age seeking medical treatment for an ADE between 1995 and 2005.

The authors defined ADEs slightly differently from some research groups, including dosing errors, elevated drug levels and secondary effects (e.g. injuries from drug-induced dizziness). They did not include overdoses from taking the wrong drug - a reasonable step given the known frequency of accidental ingestions in children, and the fact that they wanted to concentrate on analyses that would inform clinical decisions by prescribers.

The primary purpose is laudable – providing additional information on the burden of ADEs in children, including age-specific incidences and the prevalence of specific medications. This information could then lead to the identification of areas for targeted prevention strategies.

Dermatologic conditions were the most common ADE (45%), followed by gastrointestinal symptoms (16.5%). The authors were unable to obtain sufficient data for accurately phenotyping reactions by severity, yet this is a critical need in prevention.

Most dermatological manifestations of ADEs are minor, and as such, the recommendation that anticipatory guidance (counselling) for patients is important when initiating therapy. Important questions remain: What should be done with mild self-limiting skin symptomatology? What do we say to patients about the Stevens Johnson syndrome with its rare but potentially fatal consequence? When should a patient contact a health care provider during the course of evolving symptomatology?

While the incidence of ADEs did not increase over the study period (p=0.2), the data is available only until 2005. Given the prominence of regulatory drug safety action on biologics in conditions such as rheumatic, neurologic, dermatologic diseases, it will be interesting to see whether more recent data will hold true to this trend of steady incidence. There is increasing use of these agents in some pediatric centers because existing therapy is failing to resolve symptoms.

Perhaps this is time to rethink drug monitoring in the outpatient and ED realm – we need new ways of monitoring and managing the current therapeutic armamentarium. Paradigm shifts are neither easy nor necessary if there isn't a new place to go. Perhaps the evolution of clinical genotyping coupled with vastly improved clinical phenotyping will play a large role in helping to answer these difficult questions.

Will predictive pharmacogenomics be the new paradigm in preventing reactions before they even develop? New strategies to monitor and manage patients on drug therapy are urgently needed to reduce both the burden on health services and the high cost of ADE-induced morbidity and mortality.

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Read More : Bourgeois FT, Mandl KD, Valim C, Shannon MW. Pediatric adverse drug events in the outpatient setting: an 11-year national analysis. Pediatrics. 2009;124(4):e744-50.

This is another paper written in collaboration with the late Dr Michael Shannon from Boston, MA. Michael left us prematurely and left behind a huge contribution to pediatric emergency medicine, clinical pharmacology and toxicology. We will miss Michael forever.

To the Point

#1 Pediatr Emerg Care. Ipratropium bromide for acute asthma exacerbations in the emergency setting: a literature review of the evidence. Dotson K et al.

Inhaled ipatropium bromide (IB) has been shown to improve lung function and decrease symptoms and hospitalization rates for asthmatic children being treated in the ED. However, its dosing regiment is not variable per institution. Upon completion of their literature review, the authors changed their ED protocol to include an IB dose of up to 500 micrograms with every beta agonist given, but not exceeding 1500 micrograms in the first hour of treatment.

#2 Pediatr Emerg Care. Dacryocystitis: diagnosis and initial management in pediatric emergency medicine. Kiger J et al.

Dacrocystitis is an infection of the nasolacrimal apparatus frequently secondary to nasolacrimal duct obstruction. The recommendations of the authors are to admit all afebrile infants ≤28 days with IV antibiotics after culturing the purulent drainage and a full sepsis work up for the febrile infant. A CT is warranted if intracranial abnormalities are suspected or if there are signs of respiratory distress secondary to the significant obstruction of the nares.

#3 Implement Sci. Barriers and supports to implementation of MDI/spacer use in nine Canadian pediatric emergency departments: a qualitative study. Scott SD and the Pediatric Emergency Research Canada (PERC) MDI/spacer Study Group.

It has been established that Albuterol administered with a meter dose inhaler and a spacer is equally efficacious and cheaper than nebulized Albuterol in acute asthma exacerbations. So why do so few EDs use it? Lack of leadership with the transition, lack of education, perceived resistance from patients/parents and perceived increase in cost and workload were identified barriers.

#4. Pediatrics. Pediatric Burn Injuries Treated in US Emergency Departments Between 1990 and 2006. D'Souza AL et al.

Looking at the trends of non-fatal burn injuries in those ≤20 years old revealed that 58% occurred in boys, 58% were <6 years old and 92% of the injuries occured at home. The hand/finger was most frequently affected (36%) followed by the head/face (21%). Although the number of injuries per year went down 31% over the 17-year period, the authors suggest strategies need to be created to better target families with young children in order to reduce this preventable injury.

#5 J Trauma Nurs. The role of the trauma nurse leader in a pediatric trauma center. Wurster LA et al.

The trauma nurse leader role was developed by a group of trauma surgeons, hospital administrators, and ED and trauma leaders. The trauma nurse leader role has become an essential part of the specialized pediatric trauma care provided at Nationwide Children's Hospital.

#6 JAMA. Surgical Mask vs N95 Respirator for Preventing Influenza Among Health Care Workers: A Randomized Trial. Loeb M et al.

Given the fact that N-95 masks may be in short supply during pandemic flu seasons this study set out to see if surgical masks, which are cheaper and more accessible, would be an appropriate alternative. They were. Of note though, influenza infection occurred in greater than one-fifth of enrolled employees.

#7 Arch Pediatr Adolesc Med. A randomized trial of nebulized 3% hypertonic saline with epinephrine in the treatment of acute bronchiolitis in the emergency department.Grewal S et al.

Have you ever wondered if 3% hypertonic saline with epinephrine would be more efficacious than normal saline with epinephrine to treat acute bronchiolitis? Don't. It's not. But the thought was a good one because nebulized hypertonic saline in CF patients has been shown to improve mucociliary clearance and sputum expectoration. Oh, well.

#8 Pediatrics. The "fear factor" for surgical masks and face shields, as perceived by children and their parents. Forgie SE et al.

There is a misperception held by parents and physicians that children are scared of doctors wearing a surgical mask. Kids were okay with it. And kids had no preference of a face mask with a clear plastic shield versus a surgical mask which obscures half the face.

#9 Pediatr Emerg Care. Disparties in Presentation, Evaluation, and Treatment of Clavicle Fractures in Preschool Children Presenting to an Emergency Department. Soto F et al.

A retrospective chart review of clavicular fractures in children <24 months revealed the most common cause was falling from the bed/crib. No big surprise there, but only 32% were given analgesia in the ED and just half were given a prescription for analgesia on discharge. No immobilization was performed in over a third of the cases.

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PEM TODAY

Editorial Note

With a dedicated Editorial Board and Staff we are bringing you another issue of PEM-Today that covers new knowledge in Pediatric Emergency Medicine. With over 400 health care providers signed up to receive free PEM Today through our PRETx.org website, there seems to be an appetite for this kind of knowledge mobilization. Well, no surprise, we are talking about happy people. A recent study showed that PEM physicians are the most satisfied with their jobs and the "happiest on the block" out of 42 subspecialties (Leigh JP et al. BMC Health Serv Res. 2009;9:166).

Ran Goldman, Vancouver, BC, Canada

Three Sites to Check Out

PEMFellows.com

PEMFellows.com
Pediatric Emergency Medicine Network

Drs. Angela Lumba, Purva Grover, Marc Auerbach, Charles G Macias, Todd Chang, Sujit Iyer, and David Schnadower are working hard to provide clinical evidence including multimedia-based learning to those registering. In the spirit of time, they are also twittering.
An informative newsletter will complete the reading experience at:
http://www.pemfellows.com/images/stories/newsletter/newsletter.pdf

PEM-Database.org

Pem-Database.Org
Homepage

Our own Editorial Board member Dr Itai Shavit developed a long-standing database of all the recent papers related to PEM. Updated frequently, it brings you a wealth of information simply accessible through quick and easy navigation. The updating is done so quickly that it seems as though Dr Shavit never sleeps.

Keepinitup.org

KeepingUp
with Emergency Medicine

Dr Clay Smith from Vanderbilt University Medical Center created a beautifully made website that provides General EM written and audio CME-accredited information on the most recent studies out there. Some PEM included.

Screening for Child Abuse

Severe cases of child abuse galvanize an ED – everyone speaks in hushed tones about the burns, the breaks, and the bruises of overtly inflicted injuries. When child abuse is more subtle however, we ironically underreport.

Pediatric EDs attempting to screen for abuse are hampered by often inarticulate victims, by the need for quick through-put of patients, and by insensitivity to subtle presentations. An effective screening tool, unfortunately, is elusive. One landmark study by Jenny et al. underscored the fact that even red flags of abusive head trauma may still not raise the index of suspicion enough. Re-injury of previously abused children may prove fatal.

A new review by Louwers et al. attempted to identify interventions that increased rates of confirmed child abuse detection. The use of entrance criteria included peer review, pediatric ED population, and institution of an intervention. For unknown reasons, papers without abstracts on PubMed and burn cases were omitted from potential review. Of 15 potential candidate papers, one was not peer reviewed and 10 did not actually apply the intervention in practice, leaving four papers addressing 8,987 patient visits.

The majority of these visits (6,422) were screened by trauma checklist interventions for children under the age of 6.

Pless et al. instituted the Accident SCAN, a 10-item checklist filled in by trauma nurses which complemented a physician physical findings record. Benger et al. introduced a flowchart with 4 questions which was placed in a patient's file and included a child protection register check. While Pless noted an increase in confirmed cases (from 0.86% to 1.13%, OR 1.32, 95% CI 0.72 – 2.40) and Benger found increased reporting (from 0.6% to 1.4%, OR 2.33, 95%CI from 0.89 – 6.1), neither were statistically significant.

One study which did show a significant difference was that of Sidebotham et al. Charts of all children between the ages of 0-18 were audited before and after a re-education and feedback intervention with a 5-item abuse screen checklist. The percentage of children discussed with the on-call pediatric abuse registrar went from 0.22% to 1.32%, an OR of 6.0 with 95% CI 1.71-21.2. Although the percentage of referred cases increased, no information on confirmed abuse was collected.

The three questions shared by all checklists included 'findings consistent with history', 'delay in seeking care', and 'changing histories of event'. The Sidebotham paper included 'previously seen at ED' and 'head injury or fracture in child <1 year'.

One likely reason for lack of statistical clarity is the relatively low incidence of physical abuse these screens are most likely to catch.

US incidence has stabilized at approximately 10.6 cases of abuse per 1,000 children, with 4 – 5 investigations for each substantiated case. Of confirmed cases, however, only 10% are victims of physical abuse, while 60% are victims of neglect and 13% are victims of multiple maltreatments. Finding a difference in confirmed cases with incidences of 0.25% simply requires a larger sample. Increased attention to the three common red flag questions, however, should be an easy addition to the routine while larger studies are conducted.

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Read More: Jenny C, Hymel KP, Ritzen A, Reinert SE et al. Analysis of Missed Cases of Abusive Head Trauma. JAMA 1999;281:621-626.

Louwers EC, Affourtit MJ, Moll HA, de Koning HJ, Korfage IJ. Screening for child abuse at emergency departments: a systematic review. Arch Dis Child. 2009.

Pless IB, Sibald AD, Smith MA, Russell MD. A reappraisal of the frequency of child abuse seen in pediatric emergency rooms. Child Abuse Negl. 1987;11(2):193-200.

Benger JR, Pearce V. Simple intervention to improve detection of child abuse in emergency departments. BMJ. 2002;324 (7340):780.

Sidebotham PD, Pearce AV. Audit of child protection procedures in accident and emergency department to identify children at risk of abuse. BMJ. 1997;315(7112):855-6.

ED Management of H1N1 and Other Surges

H1N1 challenged many of our EDs over the last several months. In the aftermath, what lessons can we learn? H1N1 is one pandemic but the lessons are likely to be used for future acute surge in patients.

The primary questions are, "What is the nature of the issue? What is the length of the expected response and where are our gaps?", with case specific, anticipatory and solution development transferable between different occasions.

The first step is data-driven analysis of current operations, opportunities and constraints. An intimate knowledge of the ED and surrounding environments (pre-hospital, community, other facilities) is necessary.

Subsequently, the identification of stakeholders and face-to-face contact with them to define the problem, develop common expectations, enlist support, and assign roles is imperative. The process is usually time-consuming and complex, often due to lack of previous experience or perceived direct relation to surge impact.

In determining potential capacity and personnel, additional (external to ED) resources might include local providers and services, regional facilities and national experts and organizations. Local care plans should be transparent and engage patients and medical personnel within the ED, hospital and greater medical community. If external staff is operating in the ED, special effort must be undertaken to ensure their awareness and understanding of the environment and care needs.

General pediatricians, for example, may be most effective in managing patients with lower acuity, while critical care or high intensity subspecialists may be most helpful for acutely ill patients. Ensuring patient care, disease specific and logistic education for additional non-physician staff is vital as well. Development of an acute surge specific chart, using multidisciplinary reporting sections and prompts for assessment, investigation, medical decision making and treatment, as well as etiology-specific order sets and discharge instructions, may be useful. Expansion of traditional roles and possible detouring steps (and locations) for patients to be seen faster, may also improve throughput.

Identifying regional or national best practices and adapting those, can save development time and effort during a developing crisis.

Despite possible time constraints, trialing and simulating new protocols prior to critical need is a bonus. The Plan-Do-Check-Act (PDCA) cycle can identify what works and what does not, and direct appropriate next steps.

A long-term view is crucial when ED surge response is planned. Efforts to conserve physical resources and personnel for a prolonged surge should include frontline providers, as well as leaders and supervisors. Sharing leadership and supervisory responsibilities between providers and disciplines may be essential to ensure leadership presence and capacity.

Once the acute event subsides, there should be an "all-hands-on-deck" review of the processes. Evaluating the systemic successes and opportunities rather than the individual providers' or disciplines' responses will be helpful. As with any new process, review of delivery and quality of clinical care, provider assessment, financial ramifications and impact on personnel, can serve to ensure incremental improvement before we hit the next pandemic.

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A Helping Hand for Oral Rehydration in Gastroenteritis

Acute gastroenteritis is a common presenting complaint in emergency departments and a significant cause of morbidity and mortality worldwide. Oral rehydration is effective for most children who fall short of severe dehydration, but persistent vomiting complicates treatment, concerns parents and makes for an unpleasant waiting room. In the past, the range of antiemetics available for children was diverse, moderately ineffectual and suffered from a range of side effects that limited their appeal.

Uhlig et al. have published in *Pediatrics* a prospective randomized trial using rectal dimenhydrinate to treat children suffering from infectious gastroenteritis over 2 winter periods in Germany. A total of 217 children from age 6 months to 6 years were included from 5 hospitals and 6 pediatric practices. Children were given 40mg dimenhydrinate or placebo suppositories, commenced on oral rehydration and discharged home, to be followed up in clinic the following day and by telephone a week or so later.

Rectal dimenhydrinate reduced vomiting, did not decrease hospitallization or increase parental satisfaction, and no significant difference was reported in the number of adverse events.

While the authors appeared disappointed that there was no significant weight gain after 18-24 hours of treatment , it is likely related to the original exclusion of children with clinically significant weight loss or dehydration. Despite decreased vomiting, failure of all other end-points to achieve a significant effect does suggest that this treatment is not recommended, particularly when the route of administration takes on an extra element of infectivity during diarrheal illness.

The dissolving tablet on everyone's lips these days is ondansetron. In *Alimentary Pharmacology & Therapeutics,* Yilmaz et al. have contributed an interestingly designed randomized study to the growing body of literature supporting the use of ondansetron in acute gastroenteritis. Children presenting between 7am and 9am weekdays to two EDs in Turkey with acute vomiting and diarrhea were enrolled for oral rehydration and treatment with ondansetron(0.2 mg/kg) or placebo liquid. The unusual enrolment time relates to an 8-hour observation period and the need to complete the study protocol by 5pm. No comment was made on the fate of children who presented after 9am or on weekends. Over 12 months, 109 patients were enrolled and followed up after 24 hours.

Consistent with other studies, it was found that ondansetron decreased the amount of vomiting and need for hospitalization and/or intravenous fluids. In this study, however, it did not decrease the rate of representation to ED. There was no significant prolongation of diarrhea, as in some previous studies, but on average, children in the ondansetron group suffered 4 bouts of diarrhea compared to 3 bouts for placebo in the first 24 hours - a statistically significant event!

The medical management of acute gastroenteritis still overlooks oral rehydration all too frequently, and persistent vomiting appears to be one of the stumbling blocks. A potent and safe antiemetic is a useful adjunct in these situations.

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Read More: Uhlig U, Pfeil N, Gelbrich G, Spranger C, Syrbe S, Huegle B, Teichmann B, Kapellen T, Houben P, Kiess W, Uhlig HH. Dimenhydrinate in children with infectious gastroenteritis: a prospective, RCT. Pediatrics. 2009;124(4):e622-32

Yilmaz HL, Yildizdas RD, Sertdemir Y. Clinical trial: Oral ondansetron for reducing vomiting secondary to acute gastroenteritis in children - a double-blind randomized study. Aliment Pharmacol Ther. 2009