Creating a culture of lifelong learning among Med-Peds Residents

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Abstract

Introduction
Institutional Culture is difficult to change but is imperative to the quality of physicians at an institution and its trainees.

Background/Rationale
Not all physicians practice life-long learning. Barriers include emphasis on clinical productivity, ineffective online searching, inadequate personal initiative and institutional culture. We were concerned that our institutional culture did not routinely stimulate the dynamic discussion of recent literature. To impact this culture, we implemented a lifelong learning lecture series for combined medicine-pediatrics (Med-Peds) physicians.

Methods
Articles were selected from the American Academy of Pediatrics Grand Rounds and American College of Physicians Journal Clubs. 8-10 Articles were reviewed in ‘rapid fire’ style and heated discussion was encouraged. Participants completed tests assessing knowledge pertaining to the articles to quantify their engagement.

Results
120 articles were reviewed during 15 lectures. 37 out of a potential 40 physicians participated. Participants answered a mean of 11% more questions correctly on short term recall (p=0.0026) and on long term recall (p=0.0600) when compared to their baseline knowledge. When comparing the questions that pertained to lectures the participants attended versus those they did not attend participants answered 7% more questions correctly on short term recall (p=0.0800) and long term recall (p=0.1200).

Conclusions
Culture is difficult to measure. The improved correct responses to questions about the papers presented suggests that the participants did engage in the discussion of the articles. Given the nature of Med-Peds training, culture change has the potential to affect the culture within both departments.
The ability to practice lifelong learning and interpret current medical literature is crucial to physician development according to the milestones outlined for pediatrics and internal medicine by the American College of Graduate Medical Education. \(^1\)\(^-\)\(^2\) It is also essential for certification with the American Boards of Pediatrics and Internal Medicine. \(^3\)\(^-\)\(^4\) Unfortunately some physicians do not meaningfully engage the literature in the context of their patient care. \(^5\)\(^-\)\(^8\) Barriers cited include lack of access to medical information, poor skills in searching information resources, time constraints, emphasis on clinical productivity, lack of personal initiative, team dynamics, and institutional culture. \(^7\)\(^-\)\(^8\) Medical innovation and research continues to rapidly evolve making it arduous for physicians to stay up to date with current medical evidence. For combined internal medicine and pediatrics (Med-Peds) physicians this challenge is doubled as they attempt to absorb the literature from two major specialties.

Journal clubs are widely used in residency programs to teach evidence based medicine and promote lifelong learning. Advantages include ease of implementation, adaptability, faculty comfort, minimal preparation time, and resident-centered approach to teaching. Improvements have been found to be rather small and short term with regards to knowledge learned about clinical epidemiology and biostatistics, critical appraisal skills, self-reported reading habits and use of the medical literature. \(^9\)\(^-\)\(^10\) Other novel approaches have been used to incorporate lifelong learning into residency curriculums and have had some encouraging outcomes. Examples include but are not limited to a supplementary rotation where the resident developed critically appraised topics based on clinical questions assigned by an inpatient team, an electronic database of clinical questions and the related medical evidence, a database searching tutorial, a laboratory experience focused on problem solving and evidence-based medicine skill development and an evidence based medicine curriculum. \(^11\)\(^-\)\(^15\)

Educators who have tried to inject enthusiasm for lifelong learning and evidence based medicine into resident training realize that changing institutional culture is an important but daunting task. One author emphasizes that changing attitudes towards incorporating evidence-based medicine into our daily lives as physicians as an imperative first step but is the hardest thing to do. \(^16\)

At our residency we were concerned that our institutional culture did not routinely stimulate the dynamic discussion of recent literature. In an attempt to impact this culture, we implemented a lifelong learning curriculum for Med-Peds residents. The major goal of this intervention was to stimulate a culture of lifelong learning among our Med-Peds physicians and increase their confidence in their ability to apply current medical literature to the care they provide to patients. To our knowledge such lifelong learning sessions have not been described specifically targeted for Med-Peds physicians.

### Methods

This was a prospective cohort study. All post-graduate level (PGY) Med-Peds residents and core Med-Peds faculty were invited to participate in the curriculum. The educational intervention was a lecture series given at our weekly Med-Peds noon conferences. Landmark articles were selected from American College of Physicians (ACP) journal club and American Academy of Pediatrics (AAP) grand rounds. \(^17\)\(^-\)\(^18\)
They were selected by the first author according to their relevance to daily patient care at our institution. Summaries of 8-10 articles were individually reviewed in “rapid-fire” style. A clinical vignette was described prior to each paper and an audience response system Turning Point was used to stimulate interest in the topic and attain feedback from the audience about their current approach to such a clinical situation. After the findings of the study were revealed, an energetic discussion was encouraged to gather opinions about how the study did or did not change the status quo of institutional clinical practice. At each session the resident physicians filled out a questionnaire. The questions were true/false questions assessing knowledge regarding the outcomes of landmark articles discussed at that session. The interval between each session was usually 4-8 weeks and each questionnaire also included questions regarding the session prior to the current session – these questions were intended to represent “short term recall”. In the spring of each year the residents filled out a questionnaire including all of the previous questions for the last year which was recorded as “long-term recall”. Participation in the conference and the survey was voluntary. Survey responses were anonymous. The residents and faculty assigned themselves an anonymous alias so that we could track individual answers to the questions over time but this alias was not in any way linked to an identifying information that would link that individual to their survey responses. The Institutional Review Board at East Carolina University approved our study under reference number UMCIRB 12-001487.

Results

The lecture series started in August 2012 and has continued through October 2015. In total 15 sessions were held which included one pilot session. Initially we reviewed 10 articles per session but in order to facilitate more time for the discussions between each study we decreased this to on average 8 studies per session. There was equal balance between pediatric and adult studies. Studies reviewed were very diverse with regard to content as can be seen in Table 1.
| Journal               | Relevant to Pediatrics                                                                 | Relevant to Medicine                                      |
|-----------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Acad Emerg Med        | Dexamethasone in Acute Asthma                                                          | Inhaled steroids in acute asthma                          |
| Age Ageing            |                                                                                        | Non Invasive Ventilation in Elderly.                      |
| Am J Gastroenterol    |                                                                                        | Proton Pump Inhibitors in Clostridium Difficile           |
|                       |                                                                                        | Rifaximin and Hepatic Encephalopathy                      |
| Am J Kidney Dis       | Risk factors for CKD in adolescents                                                    |                                                            |
| Am J Med Genet        | DiGeorge Syndrome & behavior                                                           |                                                            |
| Am J Public Health    | Gun Related Violence                                                                    |                                                            |
| Am J Prev Med         | Associations of Appropriate Car Seat Use.                                              |                                                            |
| Journal                        | Topic                                                                 | Additional Information |
|-------------------------------|----------------------------------------------------------------------|------------------------|
| Am J Roentgenol               | Imaging in Appendicitis                                              |                        |
| Am J Sports Med               | Ankle braces and Injury in Adolescents                               |                        |
| Ann Intern Med                |                                                                      | INR monitoring and warfarin. |
|                               |                                                                      | Statins and Mortality   |
|                               |                                                                      | Screening for Lung Cancer in Smokers. |
|                               |                                                                      | Antiplatelet agents and Stroke |
| Ann Rheum Dis                 |                                                                      | Rheumatoid Arthritis and cardiovascular risk. |
| Arch Dis Child                | Cardiac Testing in ALTE.                                             |                        |
| Arch Pediatr Adolesc Med      | Growth percentiles and risk of childhood obesity.                    |                        |
| Arch Intern Med               | BP goal and diabetes                                                | BP Goal and diabetes   |
| Br J Psychiatry               |                                                                      | Agitation in Dementia  |
| Br J Sports Med               | Sickle Cell Trait and sudden death                                   |                        |
| Journal                        | Title                                                                 | Summary                                                                 |
|-------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|
| BMJ                           | Intravenous Bolus Fluid Rate in Children                             | Depression in Elderly patients Hypnotics and Prognosis Glucose Self-Monitoring in Diabetes. DPP-4 Inhibitors and Diabetes. Risk of Venous thrombosis and contraception. Smoking Cessation |
| Caries Res                    | Caries in Children.                                                   |                                                                        |
| CADTH Therapeutic Review      |                                                                        | Disease Modifying Agents Multiple Sclerosis.                              |
| Circulation                   | Congenital Heart Disease and psychiatric disorders Pulmonary Artery Hypertension | NSAIDS and Cardiovascular risk |
| Clin Infect Dis               | Measles Vaccine Timing                                               |                                                                        |
| Cochrane Database Syst Rev    | Influenza Treatment                                                  | Reduced Salt Diet and Mortality                                         |
| Journal                        | Topic                                                                 | Topic                                                                 |
|-------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|
| Crit Care Med                 | Risk factors of Sedation in Children                                |                                                                      |
|                               |                                                                      | Influenza in Children.                                               |
| Eur Heart J                   |                                                                      | Secretagogues versus Metformin                                       |
|                               |                                                                      | ACE inhibitors/ARB treatment                                         |
|                               |                                                                      | Contrast Induced Nephropathy                                          |
| Gastroenterology              |                                                                      | Anticoagulants and GI bleed Risk.                                    |
| J Adol Health                 | Obesity and Eating disorders                                        |                                                                      |
| J Am Coll Cardiol             |                                                                      | High Sensitivity Troponin                                             |
| Journal                        | Topic                                           |
|-------------------------------|------------------------------------------------|
| J Am Soc Nephrol             | Timing of Anti-hypertensive Medications.        |
| J Am Geriatr Soc             | Prognosis in Geriatric Patients                |
| JAMA & JAMA Pediatrics       | Febrile Seizures and Immunizations.             |
|                               | Migraine Treatment                              |
|                               | Vaccination in Children with JIA                |
|                               | In- Hospital Resuscitation prognosis            |
|                               | Pertussis Vaccination                           |
|                               | Prognosis in Dialysis Patients                  |
|                               | Hypoxia and Bronchiolitis                      |
|                               | Childhood Obesity x 2 studies                   |
|                               | Length of Steroid Treatment in COPD.            |
|                               | Fluid and Salt intake in Heart failure          |
|                               | Insulin Dose in DKA                             |
|                               | Gabapentin for Alcoholism                       |
|                               | Osteomyelitis Management                        |
|                               | Ablation for Atrial Fibrillation.               |
|                               | Peanut Allergy                                  |
| J Allergy Clin Immunol       | Steroids and Acute Rhinosinusitis               |
|                               | Inhaled Corticosteroids and Growth              |
|                               | Shoulder pain and Rotator Cuff disease          |
| Journal                        | Topic                                           | Journal                        | Topic                                           |
|-------------------------------|-------------------------------------------------|-------------------------------|-------------------------------------------------|
| J Clin Endocrinol Metab       | Introduction of Egg in Infants                  | Thyroid Nodule Management     |
| J Infect Dis                  | Thyroid Nodule Management                       | Epidemiology Viruses          |
| J Neurol Neurosurg Psychiatry | Parkinson’s Disease and Prognosis               |
| J Neurosurg                   | Shunt Failure in Hydrocephalus                   |
| J Ped Gastroenterol Nutr      | Probiotics and Pediatric Gastroenteritis        |
| J Ped Surg                    | Penicillin Allergy                               |
| J Rheumatol                   | Biologics for Treatment of JIA.                 |
| Lancet                        | Strep Pharyngitis Diagnosis                     | Statins and Prognosis         |
|                               | Kawasaki’s Treatment                             | Stroke and T-PA               |
|                               | Radiation Risk in Pediatrics                    | Screening for Diabetes        |
|                               |                                                  | Newer Anticoagulants and Atrial Fibrillation. |
| N Engl J Med                  | Neonatal Herpes Suppressive therapy             | HIV and Acute TB Treatment    |
| Neurology                          | Pediatrics           |
|-----------------------------------|----------------------|
| Midazolam in Acute Seizure Treatment | Direct Hyperbilirubinemia in Newborn |
| Neonatal HIV                       | Bacteremia in Newborn |
| Treatment of Head Lice             |                      |
| Pediatric Obstructive Sleep Apnea  |                      |
| Scoliosis Management              |                      |
| Prophylaxis for Febrile UTI       |                      |
| Enterovirus Vaccine.              |                      |
| Introduction of Peanut to infants |                      |
| Out of Hospital Cardiac Arrest in Children |                      |
| N-Acetyl Cysteine and Alcoholic Hepatitis |                      |
| Alzheimer’s Dementia Treatment    |                      |
| Contraception and Thrombosis      |                      |
| Fluids in Sepsis                  |                      |
| Sciatica and MRI                  |                      |
| Transfusion in Acute GI Bleed     |                      |
| Treatment of Meniscal Tears.      |                      |
| Treatment of Rheumatoid Arthritis. |                      |
| Antibiotic Choice in Pneumonia.   |                      |
| Sepsis Management                 |                      |
| First Seizure in Adults           |                      |
In total we discussed 120 studies relevant to the practice of Med-Peds. Test data was not analyzed for the 2 sessions in 2015 so in total we had test data on 108 articles reviewed. 37 (33 residents and 4 faculty) out of a potential 40 participants submitted answers to some of the knowledge tests at least once.

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|-------------------------------------|--------------|--------------------------------------------|

| Fever in Newborn | DKA Treatment and Cerebral Edema |
|------------------|-------------------------------|
| Comorbidities of ADHD | Ultrasound for Vesicoureteral Reflux |
| Adolescent Post-Partum Depression | |

| Pediatr Dermatol | Infantile Hemangiomas and Propranolol |
|------------------|-------------------------------------|
| Pediatr Infect Dis J | Antibiotics and E-Coli 0157 Infection |
| Rheumatology | Intra-articular Corticosteroids for JIA |
| Br J Geriatr Pract | Long term Benzodiazepine Use |
| J Rheumatol | Biologics for Treatment of JIA. |
Because the physicians recorded a unique identifier we were able to analyze each individual’s performance and change over time. We had comparative data for short term recall for 20 out of the 37 participants and long term recall for 28 out of 37 participants pertaining both to lectures they attended and those they did not attend.
Participants who attended the lectures answered a mean of 11% more questions correctly on short term recall.

| Class       | Performance in Knowledge test (Mean % correct) by Class | Not Present at Lectures | Present at Lectures |
|-------------|--------------------------------------------------------|-------------------------|---------------------|
|             |                                                        | Short-Term Recall | Long Term Recall | Pre-Test | Short-Term Recall | Long Term Recall |
| Faculty     |                                                        | 69%                | 74%               | 68%      | 68%                | 73%               |
| MP2013      |                                                        | 52%                | 50%               | 63%      | 70%                | 64%               |
| MP2014      |                                                        | 63%                | 58%               | 60%      | 73%                | 64%               |
| MP2015      |                                                        | 57%                | 60%               | 58%      | 66%                | 60%               |
| MP2016      |                                                        | 61%                | 63%               | 58%      | 71%                | 71%               |
| MP2017      |                                                        | 56%                | 57%               | 45%      | 53%                | 58%               |
| MP2018      |                                                        | 39%                | 56%               | 54%      |                    | 80%               |
| Overall     |                                                        | 56%                | 61%               | 58%      | 68%                | 67%               |
recall (p=0.0026) and on long term recall (p=0.0600) when compared to their baseline knowledge. When comparing the questions that pertained to lectures the participants attended versus those they did not attend participants answered 7% more questions correctly on short term recall (p=0.0800) and long term recall (p=0.1200). P values were calculated using matched pairs t-tests and these are the values reported. We also reached the same conclusions using the Wilcoxon test.
| Participants | Differences in % Correct in Knowledge Test by Individual |
|--------------|----------------------------------------------------------|
|              | Recall From Pretest When Present | Recall Present Versus Not Present |
|              | Short Term | Long Term | Short Term | Long Term |
| MP 2013a     |            |           |            |           |
| MP 2013b     | 11         | 12        | 14         |           |
| MP 2014a     | 12         |           |            | 17        |
| MP 2014b     | 3          | 10        | 3          | 22        |
| MP 2014c     | 21         | 17        | 4          | 27        |
| MP 2014d     | 15         | -15       | 5          | -30       |
| MP 2014e     | 23         | 12        | 24         | 8         |
| MP 2015a     | 10         | 13        | 6          | 10        |
| MP 2015b     | 17         | 16        | 13         | 8         |
| MP    |     |     |     |     |
|-------|-----|-----|-----|-----|
| 2015c | -11 | -11 | -25 | -4  |
| 2015d | 33  | 24  | 27  | -6  |
| 2015e | -10 | -31 | 20  | 8   |
| 2016a | 19  | 17  | 6   | 5   |
| 2016b | 6   |     | -1  |     |
| 2016c | 17  | 16  | 20  | 5   |
| 2016d | 26  | 37  | 26  | 29  |
| 2016e | -12 | 14  | -7  | 16  |
| 2016f | 10  |     |     | 5   |
| 2017a | 32  | 46  | 36  | 10  |
| 2017b | 17  | 23  | 0   | 8   |
| 2017c |     |     |     | 8   |
| 2017d | -25 | -37 | -25 | -27 |
| 2018a | 12  |     |     | 32  |
|                |         |         |         |         |
|----------------|---------|---------|---------|---------|
| **MP 2018b**   |         |         |         | 39      |
| **MP 2018c**   |         |         |         | 31      |
| **MP 2018d**   |         |         |         | -21     |
| **Faculty a**  | 10      | 10      | -10     | -10     |
| **Faculty b**  |         |         |         | 19      |
| **Faculty c**  |         | 28      |         | 33      |
| **Faculty d**  |         | -19     |         | -10     |
| **Mean**       | +11*    | +11**   | +7*     | +7**    |

* Percent correct increase from pretest to short term recall when participants present. P=0.0026

** Percent correct increase from pretest to long-term recall when participants were present P=0.0600

* Increase in percent correct when participants present versus not present (short term recall) p=0.0800

** Increase in percent correct when participants present versus not present (long term recall) p=0.1200
Discussion

High quality medical education is determined in large part by the institutional educational culture. Clinical productivity and documentation, billing and general service provision continues to increase the time pressures on physicians. The motivation to continuously review recent literature and take the time to discuss findings with colleagues can be overwhelmed by service needs. This is especially true for institutions like ours that serve a large volume of high-acuity patients, the majority of whom are socioeconomically disadvantaged. For Med-Peds physicians the challenge is increased by the sheer volume of literature from two disciplines and perhaps decreased confidence to interpret the literature in comparison to their categorical colleagues.

Culture is difficult if not impossible to measure. One encouraging outcome was that the Med-Peds physicians who attended lectures had a trend towards better knowledge of the content of the papers discussed when compared to those who did not attend the lectures and this was sustained over time. Many residencies (including our own) usually provide formal teaching according to systems and topics. However patient care is much more haphazard and diverse than that. Our curriculum reflects the diversity of daily Med-Peds patient care which may increase enjoyment, participation and recall. Likewise lectures in residency often focus on generic review of topics, lack interactivity and are very presenter dependent. This kind of rapid-fire but case-based format focuses more on management and with the potential to impact daily clinical decision making.

While we do not have any objective evidence of a change in behavior in our physicians we anecdotally did feel a palpable change in the culture. During the lectures residents and faculty alike voiced their opinions about the status quo of clinical practice and how particular papers did or did not affect their likelihood of changing their practice. Quite often the discussions about the paper would grow tangents in other directions leading to richer conversation about the evidence behind how we practice. The authors also noted both in clinic and on the wards that Med-Peds residents were including more information gained from the literature into their management plans and documentation.

Other weaknesses of our study included that we failed to ensure that every participant that attended the lecture actually filled out the test questions – this could in turn result in some residents who attended the lectures being incorrectly placed in the “not present” group. However correction of this error would have made the results stronger. Also physicians were given the pre-test before the lecture but it was not picked up until the end so they could have filled out answers during the lecture. This would have resulted in some of the answers being incorrectly recorded as “baseline knowledge”. Again correction of this error would have just made our results stronger. Another weakness includes the variability in the time interval between each lecture and the subsequent “short term recall” and “long term recall” questionnaires. On average the “short term recall” questions were 4-8 weeks after the lecture but this was not standardized and sometimes was longer than this. Similarly, the “long term recall” questionnaires were filled out in the spring which was more than 8 months after some of the lectures but only a few months after some of the more recent lectures.

During evaluation of our curriculum we thought about possible future steps to address our overall goal of stimulating a culture of lifelong learning from the standpoint of a Med-Peds community. As the volume and complexity of medical literature continues to increase, a published Med-Peds journal club summarizing landmark papers from both medicine and pediatrics could be helpful in providing a resource for Med-Peds physicians. Additionally, other specialties such as Emergency medicine have
developed podcasts where the speakers interact together in a fun entertaining fashion while they contemporaneously review new studies relevant to their specialty and debating the relevance of the study to real world practice. A similar idea could be very beneficial to Med-Peds physicians with the material directed at our practice.

Conclusion

We succeeded in creating a lecture series session that encouraged lifelong learning and the use of evidence based medicine by reviewing articles with high clinical impact in an interactive enjoyable fashion with our Med-Peds residents and faculty.

Take Home Messages

Notes On Contributors

Mary Catherine Turner was a faculty member during the time of the study and is the current MedPeds Program director at East Carolina University.
Nathan Andrew Brinn was the MedPeds program director at East Carolina University at the time of the study and is currently a clinical associate professor at University South Florida.
Dale Newton was a clinical professor and a associate program director of the MedPeds residency program at East Carolina University at the time of the study. He is currently retired and enjoying time with his family.

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Appendices

Declaration of Interest
The author has declared that there are no conflicts of interest.