

## **Learning Clinical Examination of the Prepubertal Female Using Deliberate Practice on Photographs**

### **A. Study Purpose and Rationale**

Pediatric, family medicine, emergency medicine, and Ob/Gyn residents are uncomfortable with sexual abuse evaluation. Mastery requires years of training and many hours of didactic and clinical experience. Residents across these specialties underestimate the prevalence of sexual abuse and their knowledge base needs improvement (15,9). In addition to having limited exposure to sexual abuse patients, residents may have little experience with what is normal as they do not routinely perform genital exams on prepubescent patients (14). Consequently, residents have poor knowledge of prepubescent genital anatomy; in one study, only 13% of residents surveyed correctly identified 3 anatomic structures on photos of prepubescent female genitalia and 41% incorrectly interpreted photos as abnormal (15). This is particularly concerning as in this study, correct identification of anatomy was correlated with correct interpretation of findings (16).

Additionally, lack of knowledge of prepubescent anatomy and proper interpretation of the genital exam is not limited to residents. There is overall poor agreement between pediatric emergency department (PED) attendings and child abuse experts. One study found that 70% of patients that PED attendings judged to have abnormal findings were thought to be normal when evaluated by a child abuse expert(10).

We intend to develop a computer assisted tutorial on the interpretation of 250 consecutive deidentified colposcopic photographs of prepubescent females collected over a period of 2 years at both the Columbia Child Advocacy Center and Manhattan Child Advocacy Center. The computer image bank would be tested across multiple learner levels and would be aimed at improving current educational materials and allowing for a quantitative evaluation of a learner's performance. This in turn would allow both the learner and evaluator to tailor the amount of deliberate practice necessary to reach mastery. The investigators have already tested this approach using a 234 item image bank of ankle Xrays where they demonstrated that the approach successfully improves learner ability to correctly classify the cases (17). That image bank is able to discriminate between learners of different training levels. If successful in this new domain, with deidentified colposcopic photographs of prepubescent females, this will suggest that this learning framework may be able to generalize to the many health education situations where classification of visual images is a part of the diagnostic process.

### **B. Study Design and Statistical Analyses**

**PHASE 1:** We have already collected 250 deidentified colposcopic photos of prepubescent females from the CAC of New York Columbia Presbyterian Hospital and the Manhattan CAC. To ensure sufficient representation of pathology in our learning set, of the 250 images total 50 images have abnormal pathology. With each colposcopic photo, we have also collected the age of the patient, basic history of present illness, and disposition. All 250 images would be identified by a coded system that the researchers would create devoid of name, medical record number, date seen, or location seen so as to insure patient privacy.

**PHASE 2:** We developed a computer tutorial with the deidentified colposcopic photographs of prepubescent females presented as unknowns with a basic history so that the learner will interpret them in a fashion consistent with that in clinical practice. With each photo, the subject designates the anatomy to be normal or abnormal and also is asked about the disposition of the patient: admit, discharge, or discharge with referral to sexual abuse specialist. The program is designed to give the participant immediate feedback by way of a gold standard reading of the colposcopic photographs (by child abuse specialists, see Phase 3) with comments on all relevant visual features.

**PHASE 3:** Expert child abuse specialists would rate each photograph case to determine a gold standard interpretation. We would determine their agreement with the actual clinical report. Colposcopic photos with poor reliability would be excluded.

**PHASE 4:** The final image set would be tested on 4 groups: [20] medical students, [30] residents from pediatrics and [30] emergency medicine or family practice residents, [10] subspecialty fellows and 10 PEM physicians. We would determine standards for the amount of practice required to achieve a minimum level of proficiency necessary for interpretation of the prepubescent female genital exam.

Phases 1 and 2 are completed already and I am joining the project currently in Phase 3.

**Statistical Analyses:** This study is a prospective cohort study using an expert-novice comparison model. For each learning level group and each subject, the following will be calculated: accuracy, sensitivity, specificity, positive predictive value, negative predictive value, likelihood ratio positive and negative, collectively referred to as the "test characteristics."

**Plotting Learning Curves:** The expectation is that the subjects would show improvement with successive practice, and this could be captured by a running estimate of the aforementioned test characteristics. With each additional case, the test characteristic in question will be computed, and then graphed as a function of cases completed to that point: a learning curve. Since the result is weighed down by the early cases, where performance would not have been as good, these cumulative statistics underestimate the final

performance level of each subject. However, the goal is to report, at a fine level of granularity, the relative changes in performance over successive repetitions. In addition to the individual learning curves, group level summary curves will be plotted where the mean of the test characteristic estimates of all subjects at that sequence point was calculated.

**C. Study Procedure**

No procedures will be performed during this study.

**D. Study Drugs**

Not Applicable

**E. Medical Device**

Not Applicable

**F. Study Questionnaires**

Not Applicable

**G. Study Subjects**

We propose to study 100 individuals broken down as follows: 20 medical students, 30 pediatric residents, 30 emergency medicine residents, 10 pediatric emergency medicine fellows and 10 pediatric emergency medicine attending physicians.

**H. Recruitment of Subjects**

We would approach the Residency Program Directors of Emergency Medicine and Pediatrics to solicit their residents' participation, the Medical Student Pediatric Clerkship Director to solicit student participation and the director of the Division of Pediatric Emergency Medicine to recruit practicing attending physicians.

**I. Confidentiality of Study Data**

All image bank photos of patients will be de-identified prior to subject testing or review by a child abuse specialist. The identity of the subjects testing the image bank – medical students, residents, fellows, and attending physicians – will also be de-identified and a unique code number will be assigned to each study subject. Subjects will be grouped by learner level during analyses. Data will be entered electronically by the study investigators onto a password-protected database, and only authorized individuals will have access to the database.

**J. Potential Conflict of Interest**

There are no potential conflicts of interest to disclose.

**K. Location of Study**

All four phases of the project would be carried out at the Children's Hospital of New York.

**L. Potential Risks**

There will be no potential risks to subjects.

**M. Potential Benefits**

The study subjects may directly benefit from testing the image bank if they are able gain mastery of prepubescent female genitalia. We hope that the information gained from this study will benefit future medical students, residents, and attending physicians by guiding the development of an effective computerized prepubescent anatomy training module that may be implemented at academic institutions.

**N. Alternative Therapies**

Not Applicable

**O. Compensation to Subjects**

Study subjects will be given a \$5 Starbucks gift card at the completion of the image bank from an internal education fund as participation in this study will be don't on the subject's own time.

**P. Costs to Subjects**

There will be no costs to subjects.

**Q. Minors as Research Subjects**

Not Applicable

**R. Radiation or Radioactive Substances**

Not Applicable

**References**

1. Brayden RM, Altemeier III WA, Yeager T, Muram D. Interpretations of Colposcopic Photographs: Evidence for competence in assessing sexual abuse? *Child Abuse and Neglect*. 1991; 15(12):6976
2. Adams JA, Wells R. Normal Versus Abnormal Genital Findings in Children: How well do examiners agree? *Child Abuse and Neglect*. 1993;17(5): 663675
3. Palusci VJ, McHugh MT. Interdisciplinary Training in the Evaluation of Child Sexual Abuse. *Child Abuse and Neglect*. 1995; 19(9): 10311038
4. Sinal SH, Lawless MR, Rainey DY, Everett VD, Runyan DK, Frothingham T, HermanGiddens M, St. Claire K. Clinician Agreement on Physical Findings in Child Abuse Cases. *Archives of Pediatric Adolescent Medicine*. 1997; 151:497501
5. Paradise JE, Martin FA, Beiser AS, Berenson AB, Greenberg DB, Winter MR. Assessments of Girls; Genital Findings and the Likelihood of Sexual Abuse: Agreement among physicians self-rated as skilled. *Archives of Pediatric Adolescent Medicine*. 1997; 151: 883891
6. Horner G, McCleery J. Do Pediatric Nurse Practitioners Recognize Sexual Abuse? *Journal of Pediatric Health Care*. 2000;14:4549
7. Lentsch KA, Johnson CF. Do Physicians have Adequate Knowledge of Child Sexual Abuse? The Results of Two Surveys of Practicing Physicians, 1986 and 1996. *Child Maltreatment*. 2000; 5: 7278
8. Starling SP, Sirotiak AP, Jenny C. Child Abuse and Forensic Medicine Fellowship Curriculum Statement, *Child Maltreatment*. Feb 2000; 5(1): 5862
9. Olsen ME, Kalbfleisch JH. Sexual Abuse Knowledge Base Among Residents in Family Practice, Obstetrics/ gynecology, and Pediatrics. *Journal of Pediatric Adolescent Gynecology*. May 2001;14(2):8994
10. Makoroff KL, Vrauley JL, Brandner AM, Myers PA, Shapiro RA. Genital Examinations for Alleged Sexual Abuse of Prepubertal Girls: findings by pediatric emergency medicine physicians compared with child abuse trained physicians. *Child Abuse and Neglect*. 2002; 26:12351242
11. Starling SP, Boos S. Core Content for Residency Training in Child Abuse and Neglect. *Child Maltreatment*. Nov 2003; 8(4): 242247
12. Ericsson KA. Deliberate Practice and the Acquisition and Maintenance of Expert Performance in Medicine and Related Domains. *Academic Medicine*. Oct 2004; 79 (10): S70-S81
13. Ward MGK, Bennett S, Plint AC, King WJ, Jabbour M, Gaboury I. Child Protection: A Neglected Area of Pediatric Residency Training. *Child Abuse and Neglect*. March 2004; 28: 11131122.
14. Dubow SR, Giardino AP, Christian CW, Johnson CF. Do Pediatric Chief Residents Recognize Details of Prepubertal Female Genital Anatomy: a national survey. *Child Abuse and Neglect*. 2005; 29:195205
15. Heisler KW, Starling SP, Edwards H, Paulson JF. Child Abuse Training, Comfort, and Knowledge Among Emergency Medicine, Family Medicine, and Pediatric Residents. *Med Educ Online*. 2006; 11:25
16. Adams, J. Guidelines for Medical Care of Children Evaluated for Suspected Sexual Abuse: an Update for 2008. *Current Opinion in Obstetrics and Gynecology*. 2008; 20:435441
17. Pusic M, Pecaric M, Boutis K. How Much Practice is Enough? Using Learning Curves to Assess the Deliberate Practice of Radiograph Interpretation. *Acad Med*. 2011; 86:731-736.