ADDENDUM to: JDE 2013;77:1655

This article reports on the clinical component of the project "Teaching to Make a Difference" that we conducted in Kumasi, Ghana. The specifics of this clinical component could not be included in the article in the Journal of Dental Education.[1] After reading the J Dent Educ publication, you may find this additional clinical information useful when designing a similar project.

The authors,
Dec 2013

[1] Peters MC, Adu-Ababio F, Ananaba NP, Johnson LA. **Students' Clinical Learning in an Emerging Dental School: An Investigation in International Collaboration Between Michigan and Ghana**. J Dent Educ 2013;77(12):1655-1662.

"Teaching to Make a Difference"

CLINICAL COMPONENT

The first clinical field experiences of the students were provided in Block B, five months later followed by their first clinical treatment experiences in Block C (Table 1). The same group of children from two local primary schools participated in both course periods. Resident-dentists and experienced community oral health officers participated as clinicians and adjunct-teachers.

METHODS

Clinical Research

To investigate the impact of the students' treatment on patient oral health, basic clinical parameters were recorded and pre/post Oral Health Related Quality of Life (OHRQoL) and fear interviews were administered. Based on a cross-over research design in balanced groups, twenty-eight children between six to nine years old participated in pre- and post-intervention interviews. These children came from two primary schools, one from middle and one from low socio-economic background (SES). The children were assigned to either group 1 or 2 according to the total number of affected teeth, to insure optimal balance of treatment needs with approximately the same number of caries-affected teeth in Block B and Block C (Table 1).

Table 1. Distribution of children (Group 1 and 2) and interventions received during Block B and Block C.

Intervention Period / Children	Block B	Block C
Group 1 (N=17)	OHRQoL survey OH-instruction Clinical examination ART (N=17; 22 ART-restorations)	OHRQoL survey OH-instruction Clinical examination and evaluation ART (N=8; 10 ART-restorations)
Group 2 (N=11)	OHRQoL survey OH-instruction Clinical examination	OHRQoL survey OH-instruction Clinical examination ART (N=9; 14 ART-restorations)

Prior to oral health instructions and treatments in Block B and Block C, the children answered questions about their oral health related quality of life (OHRQoL). All children received preventive oral health instructions during first and second visit of the research team. Group 1 (N=17) received atraumatic restorative treatment (ART) during the first visit, while for group 2 (N=11) treatment was planned after six months. For the students this distribution resulted in the following clinical experiences: 22 observe-and-assist treatments in Block B and 24 treatments provided in Block C. A total of 46 restorations were placed (29 occlusal and 17 two-surface restorations). All restorations in this demonstration project (except for one occlusal restoration in a maxillary first molar) were placed in deciduous teeth.

Clinical Care Activities

The Information Leaflet, Consent/Assent Form, and Script for Verbal Child Assent together ensured that any of the schoolchildren who participated in the study was doing so willingly. Students familiarized themselves with working closely together with community oral health officers. Changes in the children's oral health and OHRQoL were investigated, using the following assessment instruments:

- **Patient Care Instruments:**

The Screening Form, Oral Health Related Quality of Life (OHRQoL) and Fear Survey, Case Report, Clinical Evaluation and Referral forms were all used to accurately capture the data required for the research study while the identifiers of the schoolchildren were protected. These

instruments were used to record patient information and track changes in oral health as well as to teach best documentation practices (Fig 1).

Fig 1 Clinical experiences: two students examine a child in the schoolyard (Block B).

- **Clinical care outcomes: children's oral health status**

Atraumatic Restorative Treatment (ART) is a minimally invasive dental procedure to treat early caries disease. The procedure is a common dental therapy used in dental practice all around the world. It is considered a routine standard-of-care treatment procedure that can be performed under field conditions.

The ART protocol consisted of: (a) cavity preparation with hand instruments: widening of cavity entrance (if necessary) with opening instrument (hatchet), (b) excavation of caries with spoon excavators, resulting in a clean enamel-dentino junction and affected dentin in the central part of the cavity, (c) cleaning of cavity with wet and dry cotton pellets, (d) application of cavity conditioner, cleaning with wet and dry cotton pellet, (e) application of handmixed self-curing, high-strength glassionomer material (Fuji IX, GC Corp) for restoration of the tooth using

vaseline-coated, gloved thumb-pressure.[2] Currently, there is no known, generally accepted procedure to manage cavitated caries lesions that is less invasive. It needs to be stressed that there is little pain to children with this procedure. Any and all school children that had advanced caries disease, for which ART is not appropriate, were given a referral to KNUST Dental Clinic (where they could receive dental care at no charge) or any other dental clinic. Returning to the schools in Block C, the restorations of group 1 were evaluated using ART-criteria.[3] Where restorations were lost, the open cavity floor was assessed for its hardness (remineralization) determined by probing the dentin surface with an explorer (tug-back sensation on the explorer indicating carious dentin).[4,5]

- **Clinical care outcomes: children's quality of life**

The questionnaires for the children aimed to evaluate the outcome whether (A) the children perceived this type of attention to dental health and oral care as positive; and (B) whether their quality of life was improved by the treatments received. The instrument used consisted of a series of tested questions.[6] The age-specific instrument has been reported to be a reliable indicator for emotional and social well-being of young children and can be used to document the social impact of oral disease.[7] The questionnaires were culturally adjusted to the targeted Ghanaian child population. The OHRQoL and Fear Questionnaire can be found at open.michigan.[8]

Data Analysis

Student (PPI, Knowledge Test) and patient data (OHRQoL and Fear Questionnaire) were analyzed using mixed models with repeated measures (significance at .05 level).[9]

RESULTS

Providing Clinical Care: a practical real-world learning experience.

During Block B, the students screened and interviewed 28 school children (mean age 7.6 $\pm$ 0.9 year; gender distribution F/M: 8/20) under supervision of the researchers. The children were divided into two groups: 1 and 2, respectively. Two residents (DDS) and two community oral health officers provided treatment to 17 children (group 1) assisted by the students. These children received a total of 22 ART restorations (15 occlusal and 7 two-surface restorations).

During Block C all children were clinically re-examined. Oral examination revealed that eight children from group 1 had one more carious tooth indicated for ART treatment. In group 2

(N=11), two teeth (2 children) were no longer suitable for ART treatment: one showed pulpal involvement and abscess (referred for extraction) and one tooth had become too mobile (exfoliation expected within 2 months). Therefore, 9 children in group 2 received ART restorations. The restorations of group 1 were evaluated in Block C. Two occlusal restorations needed replacement due to loss (1x) or extreme wear (1x) of restorative material. Two additional teeth had lost their restoration: one occlusal and one two-surface restoration (partial). However, the caries process was stabilized and the teeth did not require further restoration. Children in group 1 (N=8) and group 2 (N=9) received a total of 14 occlusal and 10 two-surface restorations provided by the students in Block C. These restorations included the 2 replacements and the 8 new lesions. The students showed proficiency in delivering these 24 ART-treatments under field conditions. Referrals were provided to the university dental clinic in case of need for follow-up or additional treatment needs. Each student performed 3 ART-restorations in Block C and had multiple assist experiences (Fig. 2).

Fig 2 Clinical experiences: clinical team of students and community oral health officer treat a schoolchild (Block C).

Oral Health Quality of Life & Fear Questionnaire

The children were interviewed by the students in an individual, one-on-one setting at the beginning of both blocks B and C. As the instruments were geared towards young children, the initial interviews functioned as icebreakers. This greatly enhanced patient-student provider contact. The one-time intervention did not result in a significant difference between the two groups in any of the areas. This is neither remarkable, nor unexpected. Small group size and large variation in responses contributed as well. The OHRQoL-outcome indicated that responses from children who were treated in the first period B tended to be different from those that received treatment later on (Block C). The children treated in Block B (group 1) seemed to be happier in Block C than children in group 2 (not yet treated), in particular for those of the mid-level SES school. As expected, group 1 had less tooth-related problems when compared to group 2. This was the case for both areas: the clinical issues, but even more so in social aspects, with the low-SES school having steeper slopes (improvement). All children showed a more positive perception of their teeth and smile in Block C. As expected, in particular in the low-SES school, the cleaning level went up and the fear factor declined, although none of these differences reached significance.

LIMITATIONS

The limitations of conducting instructional and clinical research in the setting of a new school in the process of establishing itself were many. The clinical research project was a field trial with limited resources. Instead of being a robust epidemiologic study, it was rather intended to be a small demonstration project of the type of research that would be feasible with limited means while insuring a positive outcome for the local population. Thus, the results cannot be generalized to a larger audience.

DISCUSSION

Over the course of two two-day field clinics dental students new to patient care expanded their learning about the caries process and how to provide care for children with cavitated carious lesions using ART. The applied interactive clinical component facilitated in-depth discussion about the subject. In particular in the case of an active carious lesion (Block B) turning into an arrested and remineralized caries-affected lesion clinically visible in Block C after the glass ionomer restoration was lost. Or, another case of an active carious lesion, where the cleansing and hardening

effect of saliva could be demonstrated by the remineralized, hardened dentin in Block C. Food for thought and real-world clinical examples that provoked a stimulating discussion on these topics.

None of the dental students had previous experience in patient care. The powerful learning from own experience and the rapidly acquired ability to deliver sustainable healthcare to a group of children, were an eye-opener and significant motivator for the students. With limited expertise and time they were able to contribute to the children's oral health.

CONCLUSIONS

The supervised field clinics in the short course *Applied Cariology – Healthy Teeth* provided a powerful interactive learning environment. The limited patient care experiences turned novice dental students into dental care providers who were able to improve children's oral health and well-being. The simple ART field treatments delivered by the students in this program alleviated clinical problems in children and resulted in an enhanced quality of life. In addition, the students became familiar with professional collaboration and delivery of oral health care in a team setting that included community oral health officers.

REFERENCES

1. Peters MC, Adu-Ababio F, Jarrett-Ananaba NP, Johnson LA. Students' Clinical Learning in an Emerging Dental School: An Investigation in International Collaboration Between Michigan and Ghana. J Dent Educ 2013;77(12):1655-1662.
2. Frencken JE, Pilot T, Songpaisan Y, Phantumvanit P. Atraumatic restorative treatment (ART): rationale, technique, and development. J Public Health Dent 1996;56(Spec Iss 3):135-40; discussion 161-3.
3. Frencken JE, Taifour D, van 't Hof MA. Survival of ART and amalgam restorations in permanent teeth of children after 6.3 years. J Dent Res 2006;85(7):622-6.
4. Banting DW. The diagnosis of root caries. J Dent Educ. 2001;65(10):991-6.
5. Peters MC, Flamenbaum MH, Eboda NN, Feigal RJ, Inglehart MR. Chemomechanical caries removal in children: efficacy and efficiency. J Am Dent Assoc. 2006;137(12):1658-66; quiz 1729-30.
6. Inglehart MR, Briskie D. Assessing 5 to 12 year old children's oral health-related quality of life. Under review. 2011.
7. Do LG, Spencer AJ. Evaluation of oral health-related quality of life questionnaires in a general child population. Community Dent Health. 2008;25(4):205-10.
8. open.michigan. At: http://open.umich.edu/
9. SPSS for Windows, Rel. 19.0.0. Chicago: SPSS Inc. 2011.