EDITORIAL

Developments with Regard to End-of-life Decisions in Newborns
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Despite enormous technological advances in neonatology, there are still conditions that cannot be successfully treated. The decision when to start and when to withhold treatment in individual cases remains very difficult. Even more difficult are the decisions regarding end-of-life measures in infants who have no hope for improvement and lead a life of severe suffering that cannot be alleviated. Recently, there was a brief but intense wave of reactions in the international press concerning a supposedly new practice of terminating the life of severely defective newborn babies in The Netherlands. These accounts derived, in particular, from developments in the University Medical Centre of Groningen where a protocol was developed together with the legal authorities, for life-ending measures without ensuing prosecution. Within the Netherlands, the protocol comes as the result of decades of debate both inside and outside the country (1).

Newborns in whom medical end-of-life decisions are considered can be divided into three categories. Those who will die despite the use of continued invasive medical technology comprise the first group. They are infants with underlying diseases, eg Potter’s Syndrome, in whom death is inevitable. When the futility of treatment becomes apparent, treatment is withheld and the patient dies. There are no ethical or legal dilemmas in this group of patients (2).

The second group are patients who can theoretically survive, but whose expectations regarding the quality of life after the intensive care period are very grim. They are patients with severe congenital intracranial abnormalities or severe neurologic injury. Neonatologists around the world are prepared to withhold or withdraw intensive care treatment in newborns because of the predicted poor quality of life (3, 4). The interest of the infant is paramount, and all treatment decisions are based on the interest of the child. Children in this category are expected to die when intensive treatment is withdrawn. There is difference of opinion about the legitimacy of administering palliative medication to shorten life after treatment is withdrawn (5–7).

The third group consists of patients with a poor prognosis who are not dependent on technology for stability, and whose suffering is severe and sustained, and cannot be alleviated by any means. These are children who remain viable after intensive treatment, but whose condition is one of hopeless suffering without the prospects of any sort of independent life. In these children, in retrospect, one might not have wanted to start treatment if the outcome would have been known. The possible strategies for these infants are to wait for nature ‘to take its course’ and accept a sometimes long period of suffering, withdrawal of all medical interventions including tube-feeding and hydration, or deliberate ending of life with lethal drugs (qualified as ‘newborn euthanasia’ in many countries).

Evaluations of the medical practice of end-of-life decisions in different countries in Europe have shown that in very rare situations deliberate ending of life in newborns does take place (4, 8–10). The medical diagnoses reported in these surveys were extreme prematurity, severe asphyxia, cerebral injuries and severe congenital abnormalities. Ending the life of a newborn is against the law in all these countries and, as a consequence, data on the decision making process in these cases have remained scarce. In the Netherlands, efforts have been made to regulate the medical practice of euthanasia (death on request) and deliberate ending of life in newborns. Reports from the medical profession, case reports, court cases and national surveys have all contributed to a long and intense public discussion (11). Finally an approach was chosen with obligatory reporting of life-ending procedures and public review of all cases. The protocol reflects the intentions for transparency and accountability.

With the increased use of technology and advanced drugs, the dilemma of how to deal with sick newborns with untreatable diseases, severe suffering and no hope of improvement becomes more apparent. Also, in the Caribbean, the impact of new technologies and complex treatments are of growing concern (12). Surfactant treatment for respiratory disorders in newborns may serve as an example: following introduction in Curaçao, the mortality of newborns with respiratory distress syndrome has decreased, however complex new morbidities have increased (13). More often physicians will be confronted with newborns from group 3. It is of great importance that physicians anticipate and learn to deal with the new realities of medicine and the law, even if they fall outside the usual medical and legal categories. A standard approach to these new realities that satisfies all social and legal cultures is simply not available. Efforts should be made by the medical profession to openly discuss the dilemmas regarding end-of-life decisions for newborns and to develop a coherent and integrated approach to address them.

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REFERENCE
ABSTRACT

The subtypes of 141 isolates of human immunodeficiency virus type-1 (HIV-1) from Jamaica were determined by a combination of env and gag heteroduplex mobility analysis (HMA) genotyping. The majority of HIV-1 isolates were subtype B (131/141, 93.0%); one (0.8%) isolate each of subtypes C, D and E was found and 7 (4.9%) were indeterminate. These results and the failure of the sets of primers used to amplify some of the HIV-1 isolates provide strong evidence of genetic diversity of the HIV/AIDS epidemic in Jamaica. Surveillance of the circulating HIV-1 genetic subtypes is a prerequisite for developing regional vaccine strategies and understanding the transmission patterns of the virus. This is the first study of its kind in Jamaica and the findings complement data from other Caribbean countries. This work supports the view of colleagues from the French and Spanish-speaking Caribbean that an epidemiological network supported by regional laboratories will help track this epidemic accurately with positive outcomes for the public.

INTRODUCTION

The extensive genetic variation which characterizes the Human Immunodeficiency Virus Type-1 (HIV-1) is an important feature of the HIV/AIDS epidemic (1, 2). The genetic variability of HIV-1 is generated by the lack of proof reading ability of the reverse transcriptase, the rapid turnover of HIV-1 in vivo, host selective immune pressures and
the recombination events during viral replication (1-5). Based on differences in genetic sequences, HIV-1 isolates have been classified into three different groups including the major (M) group of HIV-1, responsible for the majority of infections in the epidemic, outlying groups O (outlier) and N (non-M/non-0). Currently, it is known that the M group contains 9 sub-types, several non-recombinant sub-sub-types, and at least 16 circulating recombinant forms (CRFs) (1-7). The genetic variation of HIV-1 has several public health implications although the biological significance is not fully understood (1, 8). It is known that HIV-1 subtypes vary in their geographical distribution (1, 2). The differences in HIV-1 sub-types and geographical location impact on the design of efficacious vaccines, diagnostic testing and the generation of antiviral resistance and aid the surveillance of patterns of transmission of the virus (1).

Several techniques have been used in the subtyping of HIV-1 (1, 2, 9). The definitive method involves genetic sequencing of the envelope (env), group antigen (gag) or polymerase (pol) genes but this is expensive and time consuming and requires highly qualified personnel (1, 8, 9). The heteroduplex mobility assay (HMA) has been shown to be a reliable, effective, rapid, inexpensive and standardizable method of HIV-1 subtyping. This method correlates well with genetic sequencing and characterization by phylogenetic analysis. The HMA has been introduced by UNAIDS in several developing countries as a tool for monitoring subtype distribution. The combination of results from gag HMA and env HMA allows the recognition of inter-subtype recombinant strains. This is not possible when only one genomic region is typed (1, 2, 8, 9). We used the HMA in the present study which is the first of its kind to be done in Jamaica in what is still a growing HIV/AIDS epidemic.

METHODS
Between August 2001 to January 2005, 3 ml EDTA blood samples were received by the Microbiology Department, University Hospital of the West Indies (UHWI), for leucocyte immunophenotyping for immune monitoring of a cohort of HIV-1 infected patients who were attending the HIV adult and paediatric outpatient clinics at the UHWI and other healthcare facilities throughout Jamaica. In each case, the peripheral mononuclear blood cells (PBMC) were separated from the remnant EDTA blood samples using density gradient centrifugation with Histopaque® 1077 (Sigma-Aldrich Inc., St Louis, Mo, USA) and the cells were kept frozen at – 20°C. A total of 276 consecutive PBMC samples were retrieved for HIV-1 subtyping.

Two microlitres of the PBMC were used as the DNA template for two-step nested polymerase chain reactions (PCR) carried out in a Perkin Elmer 9600 Thermal Cycler (Perkin-Elmer Corp. Norwalk, Conn.) using the PCR mixtures and amplification programmes described in the HIV-1 env/gag HMA subtyping kits manuals (10, 11). The PCR amplicons were genotyped using the HMA as previously described with modifications (10, 11). The HIV-1 HMA subtyping kits which include plasmid clones of the complete genome of HIV-1 subtypes A-J of the major M group of HIV-1 sequences and primer pairs for PCR amplification of the HIV-1 env and gag genes were obtained from the National Institutes of Health (NIH) AIDS Research and Reference Program (10, 11). The PCR core reagents used were commercially prepared (Invitrogen, Life Technologies, Grand Island, NY). For PCR amplification of the env gene, the primer pair used in the first round PCR was ED3/ED14, and ED5/ED12 in the second round. When ED5/ED12 failed, the ES7/ES8 primer pair was used (10). For amplification of the gag gene, the primers from the subtyping kit including the HIG777/HIP202 primer pair in the first round and HIGag 1584/g17 in the second round were used. Failure of the gag primers from the subtyping kit led to their replacement with DT1/DT7 and DT3/DT6 as first and second round primers, respectively (12).

The plasmids from the env and gag subtyping kits were amplified using second round primers. The second round PCR amplification of the env gene yielded a 1.2 Kb fragment spanning the V1-V5 coding region of HIV-1 gp120. Second round amplification of the gag gene resulted in a 748 bp fragment of the HIV-1 p17/p24 gene. The PCR products were resolved by agarose gel electrophoresis.

The heteroduplexes/DNA hybrids which were generated by combining aliquots of the second round PCR products of samples of unknown subtype and the reference subtypes were separated by Criterion™ precast polyacrylamide gel electrophoresis (5% polyacrylamide, 6 M urea; Bio-Rad Laboratories, Hercules, Ca). The heteroduplexes were visualized under UV light after ethidium bromide staining. The HIV-1 subtype assigned was that of the heteroduplex with the highest electrophoretic mobility.

RESULTS
The HIV-1 env gene was amplified successfully in 139/259 (53.7%) PBMC samples, the gag gene in 154/276 (55.8%), both env and gag genes in 111/276 (40.2%) and neither env or gag were amplified in 47/276 (17.0%). As shown in Fig 1, all gag (35/35,100%) and env (21/21, 100%) reference subtype plasmids were amplified successfully by all second round primers.

The env and gag HMA were performed on the PCR amplicons of 141 samples and of these 134 (95.0%) were unambiguously genotyped. The HMA was indeterminate in 7 samples (4.9%). The majority of HIV-1 isolates were subtype B (131/141, 93.0%) while 1 (0.8%) isolate each of subtypes C, D and E was found (Fig. 2.).

DISCUSSION
A panel of primer sets from North American and British sources was used in the PCR amplifications. Nonetheless, just over 50% of the isolates were successfully amplified.
The low sensitivity of the PCR amplification of the HIV-1 isolates and the relative high level of non-concordance between the PCR results for the *gag* and *env* regions might reflect the marked genetic heterogeneity of the virus (9, 12). This is supported by the fact that all NIH reference plasmids were successfully amplified using the same primer sets which failed to amplify the HIV-1 isolates.

In another study done by McCutchan et al, a PCR fingerprinting approach for genetic characterization of HIV-1 was carried out to compare HIV-1 isolates from North America and Zambia using primer pairs in *gag* gene. The authors observed that several primer pairs which consistently amplified North American isolates were unable to amplify most of the isolates from Zambia due to primer mispairing. The DNA sequencing of these isolates revealed that consistent differences from the primer sequences in the Zambian isolates were responsible for their distinctive PCR fingerprint. Based on their observations, they suggested that Zambian HIV-1 isolates and other genetically diverse isolates should be included in the matrix of experimental approaches needed to define vaccine requirements (13). Other workers have reported the problem of unamplifiable HIV-1 strains with *env* primers of the current HMA kits due to the broad heterogeneity within the gp120 region of the *HIV-1 env* gene (13). In some geographical locations prior exposure to antiretroviral drugs contributes to heterogeneity of HIV-1 strains. However this would not have applied in the present study since at the time of sampling most patients had not begun to receive antiretroviral drugs. These drugs only became widely accessible in Jamaica under the National HIV/AIDS Prevention and Control Project in the middle of 2004 (14).

The majority of HIV-1 isolates from patients in Jamaica were found to be genetic subtype B. This is the predominant subtype in other parts of the Caribbean, North America, Western Europe, Australia and South America (15–20). Jamaica, therefore, is positioned to benefit when the HIV-1 subtype B prophylactic and therapeutic vaccines, including those currently in preclinical and clinical trials, become available (21–23).

Although the number of HIV-1 sub-types C, D and E strains was low. The presence of HIV-1 non-B subtypes in the HIV/AIDS population in Jamaica is important. The present study indicates that HIV-1 non-B subtypes are beginning to contribute to the genetic and antigenic diversity of the HIV/AIDS epidemic in Jamaica. The HIV-1 subtype C, the dominant subtype in China and India, is the most prevalent subtype worldwide accounting for approximately 50% of infections (24, 25). Subtype D is generally limited to East and Central Africa with sporadic cases observed in Southern and Western Africa (26). Subtype E is a recombinant strain (CRF01_AE), and not a distinct subtype as initially thought. Subtype E co-circulates with subtype B within the intravenous drug user (IDU) population and among fishermen in Thailand and it also occurs in Vietnam and South East Asia (1, 27, 28). At the time of writing, the transmission patterns...
of the HIV-1 subtypes in Jamaica are not known and were beyond the scope of the present study.

We intend to report the results of further studies involving nucleic acid sequencing and phylogenetic analysis which will provide more detailed information on the genetic diversity and origins and transmission patterns of these viruses in Jamaica. In addition, the authors concur with colleagues from the Francophone Caribbean that an epidemiological network supported by regional laboratories will help to continue tracking the HIV epidemic accurately (29). Information derived from combined efforts will be of strategic value to policy makers and will bring positive benefits to the Caribbean public as the knowledge is applied to issues such as the use of antiretroviral drugs and vaccines.

REFERENCES
Field Trial to Test and Evaluate Primary Tobacco Prevention Methods in Clusters of Elementary Schools in Barbados

A Lwegaba

ABSTRACT

To evaluate methods of preventing young children from experimenting with tobacco and to determine cost effectiveness, students (n = 1005) in 31 primary schools, from randomly selected higher grade-levels were recruited into a partially randomized, single blinded controlled trial in which seven groups of schools were randomly assigned to a combination of teaching, leaflet, and drama, in order to modify students’ knowledge, attitudes, beliefs and behaviour (KAB). The eighth group (n = 346) with ten schools, distantly separated from the former, was assigned to be the control, but was dropped from comparison analysis for lack of randomness at baseline. The mean, standard deviation and median age of the intervention groups was 9.94 years (0.81), 10.0 years, (n = 669) at baseline; and 10.62 years (0.66), 11.0 years, (n = 397), at 12 months follow-up. In all, 6.6% had ever used tobacco at least once at a median age of seven years. Teaching health education at school when combined with other methods was significantly better at improving KAB. In 2003, after a year post-intervention, the occurrence of experimentation smoking in the last 30 days, dropped from 9.2% to 1.2% (p = 0.00), equivalent to 87% (95% CI 78, 93) reduction in the group exposed to health education compared to none in the leaflet-only group and Numbers Needed to Treat (NNT) = 12.5. Due to its cost-effectiveness (comparable to child immunizations) at BDS$1.89 to 2.89 or US$1 to 1.5 per child contacted and BDS$100 to 140 (US$50 to 70) capital investment in other resources per school, the experience could be utilized routinely in elementary schools.

INTRODUCTION

Primary prevention in children is the most effective way to prevent adverse health effects of tobacco. Similar to trends elsewhere (1), in Barbados between 1970 and 1999, the median age of tobacco experimentation dropped from 15.5 to 11.5 years (2, 3). The prevalence of ever using tobacco in...
adolescents increased from 18% to 36%. In girls, it increased from 7.2% to 36%. Prevalence of current habitual smoking for those aged 15 years and over was 9% and 11% in 1992 and 2000 respectively (4, 5). In 2000, 8% of school youths aged 11–17 years had smoked in the past 30 days, 0.7% smoked daily and 1% believed they could not quit (6).

Early adolescent smoking is associated with higher frequencies of: mental problems, poor performance at school, nicotine dependence leading to hardcore smoking (7–10). Yet in the Caribbean, like other developing regions, little or no effort has been invested in primary tobacco prevention in children (11–13). Local efforts (eg by the National Council on Substance Abuse) have been made in a few schools on promotion of skills to prevent substance abuse but none was evaluated scientifically with valid data.

The aim of this study was to: (a) develop methods for primary prevention skills against tobacco use in elementary school children aged 9–11 years through information, education, and communication (IEC) that modify knowledge, attitudes, beliefs and behaviour (KAB); (b) determine cost-effectiveness; and (c) recommend suitable prevention strategies. Built on trans-theoretical and health belief models, it was hypothesized that anti-tobacco IEC modifies KAB positively and that some methods were more effective than others.

METHOD

Study design: A single blinded controlled field trial, with two parallel groups in which the exposed group consisted of seven random school (cluster) groups. It was designed to measure change in KAB as the primary outcome between intervention and control in two parallel non-randomized cluster groups; while for secondary outcomes, effectiveness of the different modes of interventions by comparison of seven randomly selected and assigned intervention clusters. Subjects were blinded to exposure of other clusters. After it was found out that the two parallel groups were different (not random) in 16 of 37 variables at baseline, the analysis was restricted to the different levels of KAB exposure in the 7 intervention clusters. Clusters of schools rather than individuals were selected. Individuals in the same school interact and are more similar. In order to reduce contamination of effects and for practical convenience, feasibility of exposure, and to economize resources, blinding between groups and a cluster design were the most suitable.

Sample and setting: (Fig 1). The following grade-levels cover the seven years in Barbados’ primary education: Reception-1 (age 4–5), Reception-2 (age 5–6), Infant (age 6–7), Grade-1 (age 7–8), Grade-2 (age 8–9), Grade-3 (age 9–10) and Grade-4 (age 10–11). Nationally, there are 80 primary schools and eight polyclinics. Primary schools in Barbados are largely similar as regards possible confounders: the teaching environment, staff complement and similar age sets.

Step 1: For follow-up purposes, schools were grouped into clusters as the unit of selection according to geographic location of polyclinics service areas, and therefore blinding of clusters by distance. Forty-two (42/80) schools located within four service areas of Warrens, Black Rock, Maurice Byer polyclinics formed a geographically continuous block stretching from central west to the north of the island. In addition, the southern Randal Phillip was entered in the study as two parallel clusters. The former was assigned to the intervention, as its many schools (32/42), could further be divided into sub-intervention clusters for testing seven different methods of exposure. Both areas were separated from each other deliberately by a cordon of unselected polyclinics’ service areas.

Step 2: The sample size (n = 1005) was computed to detect a difference between exposed and control of ± 4.8% for the change in proportions reporting smoking in the last 30 days in students in grade-levels 3 and 4 at power 80% in ratio of 5:2 in two parallel groups. It was estimated that 31 schools each contributing a minimum of 32 students would make the required sample size, from all the ten schools in the control area and 21 of 32 in the exposed area. Cluster effects were not considered at this level of two parallel groups.

Step 3: Forming clusters within the exposed group: seven of 32 schools within three conjoined polyclinic service areas were selected randomly. To each of the selected seven nuclei schools, two geographically adjacent schools, cordoning off others by distance to enhance blinding between clusters, were added to form the seven clusters. In turn, these clusters were again randomly assigned to the seven interventions. In the southern area, all 10 schools (except one that opted not to enter the study) became the control.

Eligibility: None of the schools had ever been involved in a similar promotion. Participants were from the two higher grade-levels, three and four, who were capable of filling in a self-administered questionnaire, under supervision at school. At large schools, with more than one class within grade-levels 3 and 4, classes were stratified at grade-levels at each school and at least one was picked randomly from each grade-level.

Intervention: The experimental series, in step 3 above, consisted of seven sub-intervention arms: teaching, drama, leaflet, teaching and drama, teaching and leaflet, teaching and drama and leaflet, leaflet and drama. The eighth group, the control, was left to usual school activities. Preparations and implementation activities started in November 2001 and last contacts ended in 2004.

Developing teaching curriculum: Schools in the teaching arms of experimental series nominated contact teachers for a one-day workshop. It examined background information and
rationale for the project; dealt with teachers’ concerns and misconceptions in question and answer sessions. Its three working groups modified a draft questionnaire and made a list of topics to cover in one or two classroom sessions, and teaching resources. The list, not limited to the following, centred on: description of tobacco and its constituents; misconceptions and myths of the glamour of tobacco and commercial advertising; tobacco abuse and its effects on body parts, diseases associated with and/or caused by tobacco; immediate and later consequences: loss of pocket money, hygiene, fitness, life expectancy, and quality of life; prevention by developing healthy lifestyles: good personality, making choices, pledge to abstain, making friends and overcoming peer pressure. The workshop’s proceedings and the questions and answers were circulated as part of an action plan. Absentees were updated subsequently. In the implementation, contact teachers were asked to exclusively use the method assigned to their school and only materials for the selected activity were resourced for the school. At baseline, and at 12 months of follow-up, students filled in questionnaires consisting of 40 items.

A modified and simplified data collecting tool was based on the extensively used global youth tobacco survey, GYTS, available in GYTS Barbados country report at Centre for Disease Control and Prevention, USA, website (cdc.gov) (1). Questionnaires had blinded identifiers (student ID). The teacher read out the instructions, emphasized that it was not a test but asked for sincere responses and told students that the process ensured personal confidentiality at all levels. Completed and uncompleted questionnaires in sealed envelopes were forwarded to the principal investigator. A primary school students’ drama team performed the drama, one session in 10 schools: “The life you save may be your own” and this proved quite popular. It was videotaped and interactively recorded on CD. All contact teachers attended a mid-year review as a feedback on the first questionnaire,

<table>
<thead>
<tr>
<th>Other Interventions</th>
<th>(n) Before</th>
<th>(n) After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teach</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Teach/Drama</td>
<td>104</td>
<td>58</td>
</tr>
<tr>
<td>Teach/Leaflet</td>
<td>27</td>
<td>58</td>
</tr>
<tr>
<td>Teach/Drama/Leaflet</td>
<td>150</td>
<td>53</td>
</tr>
<tr>
<td>Leaflet/Drama</td>
<td>111</td>
<td>33</td>
</tr>
<tr>
<td>Drama</td>
<td>53</td>
<td>71</td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaflet</td>
<td>165</td>
<td>61</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>674</td>
<td>396</td>
</tr>
</tbody>
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Fig. 1: Profile of field trial design

Notes: n = average size of groups. During analysis, group size varied because some students did not respond to all parts of the questionnaires. Secondly, participating students in a cluster may increase when the absentees join. Dropouts occurred due to school activities, and senior graders left primary to join secondary schools. It was difficult to account for individuals, as many students did not use personal identifiers consistently.
during which they watched the drama. After the final questionnaire, all primary schools in the island were sent teaching instructions, a book, drama CD, drama videotape and leaflets to initiate or continue their own anti-tobacco activities.

Ethics: The Ministry of Health research ethics committee reviewed and approved the study, while the Ministry of Education gave permission to contact schools. Schools were given a choice as to whether to participate and there was no hindrance of activities in the control schools. Participatory schools used minimal contact time and nominated contact teachers for the project. Students were the beneficiaries of the project.

Analysis

Variables: Questionnaires collected information from each subject concerning 40 items; some are listed here. Demographic data: name of school, allocated study group number, student admission number (ID), birth date, age, gender, class, parents and people living with subject. Data on tobacco use: friends, brothers, sisters, parents who use tobacco, if ever experimented with tobacco, what age and type, and cigarettes smoked per month. Data on attitudes: desire to smoke and banning smoking in public. Knowledge data: is smoking good for: boys, girls, adults? Does it make a person: smart, popular, or sociable? Is it harmful to: the public, pregnancy and passive smokers? Is it easy to quit? Where did they learn about tobacco and what was the source of information. Knowledge of diseases caused and its effects on: fine coordination, mental concentration, cognitive functions, sports, spending money, skin and lips, accidents and injuries, fertility, respiration and circulation. Most responses were simple: yes, no, don’t know or fill in.

Data were entered in SPSS version 11, recoded as necessary and analyses run through the software. EPInfo 6 statistic calculator was employed on some of collapsed categories in cross-tables.

Outcome measures: The control group was dropped after initial analysis as explained earlier. Henceforth, the analysis refers to other intervention group(s) vs leaflet only. The primary outcome was efficacy by change in 30-days smoking prevalence in other experimental groups vs leaflet-only group; and within and between groups’ differences in variables for intervention arms; and cost-effectiveness in unit cost per student, as the secondary outcome. All p-values used 2-tail tests at \( p = 0.05 \) for significance. Established smoking in young childhood being rare, annual incidence would have been an insensitive indicator. Instead, last 30-days reported smoking prevalence was used and therefore individuals were not followed for progression from smoking initiation.

Cluster as unit of analysis: Cluster being the unit of allocation of the intervention was analysed by summary measures as described by Wear (14). It is known to be more reliable than intercluster correlation coefficient and modeling methods, given that the clusters are few, < 10, but, it reduces sample size, power and makes the confidential intervals and p-values larger (14). A database post-hoc random sample drawn by statistical processor from all clusters was used to standardize, or test the comparability of each cluster across variables. For univariate analysis, summary statistics were checked for homogeneity and heterogeneity of the comparison groups at the two time periods.

Categorical variables analysis: Proportions and prevalence of responses for variables yes, no, don’t know were expressed as per cent; and level of significance tested by chi-square or Fishers exact test, if number was small in table cells.

Continuous variables analysis: Difference of groups’ means were compared for significance by Anova; by two independent groups t-test used for other experimental and leaflet only groups; and Levene’s test for equality of variance was applied. Age four was assumed to be the earliest subjects could have remembered experimentation, so, age reported at four years or less was recoded as four years.

Efficacy: To summarize how well a sub-intervention group did relative to others in its outcomes for 27 variables, an efficacy index was devised. Each sub-intervention group’s performance, measured by absolute change from the before to the after data was ranked relative to the other groups; and total rank score, mean and median rank computed. (A post-hoc matrix for the 27 variables in rows and experimental groups in columns was constructed with cells filled in with intervention ranked performance for each variable). Example, if a group was ranked second all through, relative to others in 27 variables, its cells would be filled with twos. From its total, 54, its mean rank and median rank for 27 variables is two. The derived mean rank distribution and median rank score for each group were displayed as the efficacy ranking of the interventions in box whisker plots.

Cost effectiveness: Smoking prevalence rather than incidence in the last 30 days is used in youth studies because smoking status is erratic and not established. Therefore, the number needed to avert smoking in a student, NNT, the reciprocal of attributable risk reduction, in this case 30-days smoking prevalence reduction in relation to that in leaflet-only, was not the basis for effectiveness. Cost-effectiveness analysis was based on per school resource investment and resource expenditure per child contacted. The components per student were one hour part-time teaching per student, costs for staged drama per student, and costs per leaflet. Resource investment per school included: orientation workshop, handouts, teaching guides and references (15) per teacher; videocassette (VC) and interactive DVD. School and technological infrastructure were assumed to be available from other sources.
RESULTS
Significant differences (data not displayed) in 16/37 variables at baseline between experimental groups and control disqualified controls for comparison. Instead, the least exposed group, the leaflet-only, with fewer than six significant differences was used for comparison analysis (Tables 1, 2 and Fig. 2). At baseline, 669 and 346 primary school children responded, in experimental and control groups respectively. For reasons stated above, analysis of the control was excluded from the report, henceforth. At each analysis, group sizes varied for each variable because some students did not fill out all information on the questionnaires, but this did not

Table 1: Comparison of other exposed groups and leaflet-only group at baseline, (the Before), and follow up, (the After).

<table>
<thead>
<tr>
<th>% Yes, Y, Response</th>
<th>Other Exposed gps</th>
<th>Leaflet gp</th>
<th>p-level</th>
<th>Other Exposed g</th>
<th>Leaflet gp</th>
<th>p-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/F Ratio</td>
<td>0.98 (n = 486)</td>
<td>0.81 (n = 163)</td>
<td>NS</td>
<td>0.78 (n = 334)</td>
<td>0.86 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>Age (Mean)</td>
<td>9.97 (n = 500)</td>
<td>9.87 (n = 116)</td>
<td>0.94</td>
<td>10.57 (n = 383)</td>
<td>10.49 (n = 59)</td>
<td>0.32</td>
</tr>
<tr>
<td>Persons in home, mean</td>
<td>4.89</td>
<td>3.31</td>
<td>0.28</td>
<td>4.69</td>
<td>5.08</td>
<td>0.12</td>
</tr>
<tr>
<td>Friends using tobacco – Mean</td>
<td>0.99 (n = 505)</td>
<td>0.63 (n = 166)</td>
<td>0.08</td>
<td>0.69 (n = 337)</td>
<td>1.31 (n = 59)</td>
<td>0.19</td>
</tr>
<tr>
<td>% parents using tobacco</td>
<td>14.9 (n = 495)</td>
<td>10.5 (n = 161)</td>
<td>0.12</td>
<td>12.5 (n = 336)</td>
<td>16.5 (n = 61)</td>
<td>NS</td>
</tr>
<tr>
<td>% with siblings using tobacco</td>
<td>6.1 (n = 505)</td>
<td>7.2 (n = 166)</td>
<td>0.06</td>
<td>3.9 (n = 337)</td>
<td>8.5 (n = 61)</td>
<td>NS</td>
</tr>
<tr>
<td>% ever used tobacco: Y</td>
<td>3.1 (n = 481)</td>
<td>1.8 (n = 163)</td>
<td>0.12</td>
<td>3.4 (n = 298)</td>
<td>11.5 (n = 61)</td>
<td>NS</td>
</tr>
<tr>
<td>% current SMK in last 30days</td>
<td>9.2 (n = 496)</td>
<td>2.5 (n = 186)</td>
<td>NS</td>
<td>1.2 (n = 336)</td>
<td>3.3 (n = 61)</td>
<td>NS</td>
</tr>
<tr>
<td>% want to experiment: Y</td>
<td>0.8 (n = 493)</td>
<td>1.2 (n = 163)</td>
<td>NS</td>
<td>0.9 (n = 334)</td>
<td>0 (n = 61)</td>
<td>NS</td>
</tr>
<tr>
<td>% tobacco is good: Y</td>
<td>1.6 (n = 499)</td>
<td>1.8 (n = 164)</td>
<td>NS</td>
<td>0 (n = 340)</td>
<td>0 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>% tobacco smartens: Y</td>
<td>2.7 (n = 504)</td>
<td>1.8 (n = 165)</td>
<td>NS</td>
<td>10.9 (n = 320)</td>
<td>5 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>% makes person popular</td>
<td>3.8 (n = 494)</td>
<td>3.7 (n = 164)</td>
<td>NS</td>
<td>0 (n = 336)</td>
<td>0 (n = 59)</td>
<td>NS</td>
</tr>
<tr>
<td>% relaxes; Y</td>
<td>1.2 (n = 505)</td>
<td>3.0 (n = 160)</td>
<td>NS</td>
<td>0.3 (n = 260)</td>
<td>1.7 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>% good for boys: Y</td>
<td>0.14 (n = 498)</td>
<td>0 (n = 153)</td>
<td>NS</td>
<td>0.06 (n = 341)</td>
<td>5.2 (n = 58)</td>
<td>0.00</td>
</tr>
<tr>
<td>% good for adults: Y</td>
<td>14.2 (n = 494)</td>
<td>14.0 (n = 141)</td>
<td>NS</td>
<td>5.7 (n = 335)</td>
<td>6.7 (n = 59)</td>
<td>NS</td>
</tr>
<tr>
<td>% passive SMK harm: Y</td>
<td>58.6 (n = 500)</td>
<td>63.0 (n = 162)</td>
<td>NS</td>
<td>83.6 (n = 396)</td>
<td>68.3 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>% ban public SMK: Y</td>
<td>73.3 (n = 498)</td>
<td>72.0 (n = 161)</td>
<td>NS</td>
<td>85.9 (n = 333)</td>
<td>77.9 (n = 59)</td>
<td>NS</td>
</tr>
<tr>
<td>% revent in pregnancy: Y</td>
<td>91.1 (n = 492)</td>
<td>90.8 (n = 163)</td>
<td>NS</td>
<td>95.2 (n = 336)</td>
<td>86.7 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>% easy to quit: Y</td>
<td>17.2 (n = 494)</td>
<td>19.5 (n = 164)</td>
<td>NS</td>
<td>22.9 (n = 336)</td>
<td>13.6 (n = 59)</td>
<td>NS</td>
</tr>
<tr>
<td>(Mean) tobacco diseases listed</td>
<td>1.85 (n = 494)</td>
<td>1.50 (n = 164)</td>
<td>0.12</td>
<td>2.25 (n = 336)</td>
<td>1.78 (n = 59)</td>
<td>0.00r</td>
</tr>
<tr>
<td>% affects fine movements: Y</td>
<td>8.7 (n = 504)</td>
<td>27.6 (n = 116)</td>
<td>NS</td>
<td>35.9 (n = 410)</td>
<td>18.6 (n = 59)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects class-work: Y</td>
<td>9.9 (n = 504)</td>
<td>17.4 (n = 166)</td>
<td>NS</td>
<td>60.5 (n = 385)</td>
<td>33.3 (n = 60)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects sports: Y</td>
<td>9.6 (n = 501)</td>
<td>17.5 (n = 166)</td>
<td>NS</td>
<td>53.3 (n = 329)</td>
<td>16.6 (n = 42)</td>
<td>NS</td>
</tr>
<tr>
<td>% wastes money: Y</td>
<td>8.3 (n = 505)</td>
<td>14.6 (n = 116)</td>
<td>NS</td>
<td>59.6 (n = 329)</td>
<td>28.2 (n = 29)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects lips/skin: Y</td>
<td>8.2 (n = 503)</td>
<td>14.7 (n = 116)</td>
<td>NS</td>
<td>58.9 (n = 329)</td>
<td>52.5 (n = 40)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects injuries: Y</td>
<td>8.3 (n = 503)</td>
<td>10.2 (n = 166)</td>
<td>NS</td>
<td>54.4 (n = 331)</td>
<td>27.5 (n = 40)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects fertility: Y</td>
<td>9.3 (n = 504)</td>
<td>15.7 (n = 165)</td>
<td>NS</td>
<td>47.7 (n = 331)</td>
<td>26.8 (n = 41)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects breathing: Y</td>
<td>9.1 (n = 502)</td>
<td>13.3 (n = 166)</td>
<td>NS</td>
<td>59.2 (n = 331)</td>
<td>29.5 (n = 41)</td>
<td>NS</td>
</tr>
<tr>
<td>% affects heart: Y</td>
<td>8.3 (n = 503)</td>
<td>6.6 (n = 166)</td>
<td>NS</td>
<td>58.1 (n = 327)</td>
<td>28.2 (n = 39)</td>
<td>NS</td>
</tr>
<tr>
<td>% leant/discussed tobacco: Y</td>
<td>79.2 (n = 500)</td>
<td>74.7 (n = 166)</td>
<td>NS</td>
<td>81.5 (n = 396)</td>
<td>73.7 (n = 76)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Notes:
Prevalence per cent is quoted for Y = yes response. The p value at $\alpha = 0.05$ was quoted for chi-square or Fishers exact test when appropriate.

* $p < 0.05$, ** $p < 0.01$ and NS, not significant $p > 0.05$ and NP = not computable. Actual values can be derived from proportions.

T = t-test for equality of means for independent samples, at $\alpha = 0.05$, in which Levene’s F-test for equality of variance was considered. 95% confidence intervals for differences of means between Other Exposed groups and the Leaflet group at baseline before and at follow-up a year later were for: (1) Age of subjects: -0.028; 0.027 and -0.140; 0.140; 0.042; (2) Persons in home: -0.177; 0.343 and -0.886, 0.103; (3) Friends using tobacco: 0.206; -0.043; -1.56; 0.32; (4) (Mean) tobacco diseases listed: 0.126, 0.552; 0.123, 0.883.
matter because the clusters were the unit of analysis. The mean, standard deviation (sd), and median at baseline (n = 669), and at follow-up (n = 397) for the intervention group were respectively 9.94 (0.81), 10.0 and 10.62 (0.66), 11.0.

Overall, students who had ever used tobacco, at least once, were 6.6%; mainly by smoking cigarettes, at a median age of 7.0 years. Parents living with the children, predominantly mothers, in the before and after comparison; 43.7%, 6.0%, 43.3% p = 0.34 and 49%, 6.3%, 40% p = 0.19 for mother, father, and both, respectively, was similar in all groups. Post-intervention experimental group improved significantly in anti-tobacco KAB outcomes, 3.5 times better than leaflet-only group in 18 vs 5 of 22 variables respectively. The distribution of most variables among clusters was not significantly different, when compared using a post-hoc randomly selected overall sample (data not shown). There was a decline in smoking in the previous 30 days before filling in the baseline and the final questionnaires from 9.2% to 1.2% (p = 0.00) in other exposure group and a rise from 2.5% to 3.3% (p = 0.66) in leaflet-only group; equivalent to protecting 8% of individuals from smoking or 87% (95% CI 78, 93) of smoking in those experimenting with tobacco; NNT = 12.5, Table 3. The belief that it is easy to quit smoking remained high post-intervention. Important predictors of student’s tendency to tobacco experimentation, by forward stepwise regression were: liberal views on smoking in public and smoking as a

Table 2: Sources of anti-tobacco information reported by students.

<table>
<thead>
<tr>
<th>Source</th>
<th>% Before (n = 669)</th>
<th>% After (n = 397)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>12.5</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>Schools and environment</td>
<td>51.1</td>
<td>69.9</td>
<td></td>
</tr>
<tr>
<td>Public media</td>
<td>20.6</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td>2.2</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>5.2</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>No response</td>
<td>8.1</td>
<td>0.8</td>
<td></td>
</tr>
</tbody>
</table>

p < 0.001

Note the prominent role of school and its environment. NS = Not significant.

Table 3: Change in the prevalence of smoking reported by children in intervention groups in 30 days prior to baseline and follow-up questionnaires, a year later.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Before</th>
<th>After</th>
<th>Absolute change</th>
<th>NNT</th>
<th>Rank of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>6.8 (n = 59)</td>
<td>7.1</td>
<td>0 (n = 63)</td>
<td>0 *6.8</td>
<td>*14.7</td>
</tr>
<tr>
<td>T+Drama</td>
<td>10.1 (n = 99)</td>
<td>10.0</td>
<td>0 (n = 58)</td>
<td>0 *10.1</td>
<td>*9.9</td>
</tr>
<tr>
<td>T+Leaflet</td>
<td>7.4 (n = 27)</td>
<td>8.1</td>
<td>3.4 (n = 58)</td>
<td>3.4</td>
<td>4.0</td>
</tr>
<tr>
<td>T+D+Leaflet</td>
<td>6.3 (n = 150)</td>
<td>4.9</td>
<td>0 (n = 53)</td>
<td>0 *6.3</td>
<td>*15.8</td>
</tr>
<tr>
<td>L+Drama</td>
<td>7.3 (n = 110)</td>
<td>7.3</td>
<td>0 (n = 33)</td>
<td>0 *7.3</td>
<td>*13.6</td>
</tr>
<tr>
<td>Drama</td>
<td>7.8 (n = 51)</td>
<td>7.6</td>
<td>2.7 (n = 71)</td>
<td>2.7</td>
<td>5.1</td>
</tr>
<tr>
<td>All above</td>
<td>9.2 (n = 496)</td>
<td>9.2</td>
<td>0 (n = 336)</td>
<td>0 *9.2</td>
<td>*12.5</td>
</tr>
<tr>
<td>Leaflet-only</td>
<td>2.5 (n = 165)</td>
<td>2.5</td>
<td>3.3 (n = 61)</td>
<td>3.3</td>
<td>4.6</td>
</tr>
</tbody>
</table>

NB: In the other intervention groups 8%, were prevented from smoking vs none in leaflet-only; equivalent to 87% (95% CI 78–93) reduction in smoking in children experimenting with tobacco. *Prevalence changes and number needed to intervene, NNT, where the end prevalence was zero could have been higher or lower depending on the baseline prevalence and therefore should be interpreted with caution. **The gender standardized rates if whole group’s male to female ratio applied to groups.
good attribute \((p \neq 0.02)\), failure to appreciate health risks/diseases \((p = 0.03)\) and being young in age \((p = 0.046)\). For repeated smoking: a company of siblings or friends using tobacco \((p \neq 0.002)\); tobacco availability \((p = 0.004)\); liberal views that smoking is good: for boys \((p = 0.001)\) and that it should be allowed in public places \((p = 0.019)\).

Desired improvement in skills in the other exposure group occurred in 20/22 variables, of which it was significant in 18; and in the leaflet-only group, 12/22, of which it was significant in five. Significant concordance of both comparable groups in improvement of skills occurred in: tobacco smartens, tobacco relaxes, affects skin and lips, wastes money, affects breathing and heart. Concordance occurred in both groups with an increase in perceptions and knowledge that tobacco makes a person popular. The direction of change in the former represents perceptions and knowledge that are easy to acquire or change and the reverse for the latter. Teaching ranked best when combined with other methods, Fig. 2. The leaflet was least effective.

Ministry of Education would have paid about BDS $50/hr for part-time teaching, or $1.66 per student. A leaflet from the Government Printer would cost BDS $0.23. Staged drama targeting 600 pupils in 10 schools was about BDS $78, $10, $12; drama on video cassette (VC) and interactive DVD cost $40 per school; together $140 per teacher. Schools had the technological infrastructure, from other sources, to use VC and DVD (BDSS1 = US$0.5).

**DISCUSSION**

Overall, the experimental group, exposed to teaching, drama or to a combination of teaching, drama and leaflet improved significantly in 3.5 times more variables on KAB outcomes than the leaflet-only; and teaching combined with other methods performed best. One year post-intervention, smoking prevalence in the previous month declined from 9.2% to 1.2% in the experimental group but did not in the leaflet-only group, 2.5% to 3.3%. In the experimental group, the belief that it is easy to quit smoking increased significantly; and in both comparison groups, undesired responses in the belief that tobacco makes a person popular increased significantly. The power of tobacco addiction and its false popularity need to be stressed.

Multivariate analysis agreed with known risk factors (16–21). For predicting tobacco experimentation: liberal views on smoking in public, smoking as a good attribute, failure to appreciate health risks (diseases) and being young in age were important. For acquiring smoking habit: a company of siblings or friends using tobacco, tobacco availability and beliefs and liberal views such as smoking is good for boys and that it should be allowed in public places, were significant.

Ranked in decreasing order of importance for efficacy were: teaching and drama; teaching, leaflet, drama; teaching and leaflet; teaching; leaflet and drama; and leaflet-only. Therefore teaching combined or supplemented by other methods was the best strategy (Fig. 2). Singly, teaching was better than drama and in turn better than leaflet. However, drama and video are popular media and have been used successfully to promote tobacco; thus, counter promotion needs to use the same media (22–26). The latter two should not be used singly. Leaflets and drama require teaching to clarify the messages they carry. Singly, the leaflet probably entirely depends on personal initiative to read, comprehend and correctly analyze the message; while drama leaves long-term imprints and raises immediate positive curiosity. Overall, the leaflet ranked last in KAB changes. The leaflet was however effective in causing significant desired changes in six variables. This might be an attribute of how the messages on the leaflet were displayed. A human picture was labelled with types of damage and arrows pointing at organs. The role of teaching places teachers central in anti-tobacco KAB in primary schools in Barbados.

Cost effectiveness based on non-commercial transactions: one teacher-guided teaching followed-up by video shows and interactive DVD and leaflets by students at their own convenient time at BDS$1.89 – 2.89 per child contacted, compares favourably with childhood immunizations. In addition, the anti-tobacco infrastructure capital investment per school would be BDSS100 – 140. The DVD would replace drama due to its logistical demands, although, drama could be initiated locally by each school.

Weaknesses of the study: The sample size at design stage was not adjusted for cluster effects. The two geographically selected non-random groups proved to be significantly different in 16/37 variables at baseline and this bias led to the abandonment of the control group in further analysis. Post-randomization selection bias: groups varied in size; reducing power because 49% of sample size, but not clusters, was lost during follow-up. Two questionnaires in a school project are unusual, so the drop was due to waning interest in a second questionnaire by school teachers, not students, because of demands of other competing activities; and because, senior students, former grade 4, were admitted and dispersed into secondary schools. Two intervention clusters recruited more subjects than at baseline. Students might have been absent, but participated and responded to one phase of data collection. It is unlikely that absentees were different from others within the same cluster; if less related to ability or willingness to participate, selection biases would be minimal. It was difficult to follow individuals through and do sensitivity analysis or exclude them from analysis, because, students did not consistently provide personal identifiers. To
overcome the cluster effects, the study used a recommended cluster unit analysis and appropriate standardization. Reported “smoking” in the last 30 days is a proxy measure for new and repeat smokers, essentially a prevalence rather than an incidence measure. However, it is convenient, practical and widely used for adolescents (27). Without biomarkers, children’s recall and “denial response” biases could reduce prevalence of tobacco use, however, only if discriminatingly. Single blinding and low power could minimize difference in effect tending to β error. Field standardized interventions could not be strictly ascertained, partly due to resource constraints. Schools may have tried their own initiatives that probably accounted for some (modification) of the changes in KAB scores.

Strength of the study: The nuclei schools in clusters within the intervention arm were randomly selected and clusters randomly allocated to sub-interventions. The subjects within groups were blinded by geographical isolation and teachers were requested and provided to participate in the only activity assigned to each school. Analysis confirmed that, randomized experimental groups did not differ significantly at baseline and at follow-up for confounders: age, gender, and years at school. Rigorous, innovative summary analysis was used to capture the effects and errors; yet, there were significant differences in effects and modification of the different interventions. Additionally, high cost-effectiveness may allow direct transfer of this experience. This was probably the first time to test and evaluate the efficacy and cost-effectiveness of tobacco prevention in children in primary schools in the Caribbean.

Teaching when combined with other methods was better at improving children’s preventive skills against tobacco but did not tackle children’s appreciation of addiction. Messages to children should clearly explain the dangers of addiction and promote positive role models to enhance the evolving ‘no smoke’ culture. Due to its cost-effectiveness, akin to immunization, at US$2 for 87% (95% CI 78, 93) reduction in smoking experimenters, the experience can be successfully operated routinely for children in similar primary schools.

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This report does not contain any expression for or by PAHO/WHO or collaborators who are acknowledged.

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Iron Deficiency Anaemia in Jamaican Children, Aged 1–5 Years, with Sickle Cell Disease
L King1, M Reid1, TE Forrester1

ABSTRACT

Objective: The aim of this study was to determine, using a combination of measures, the prevalence of iron deficiency anaemia (IDA) in children under five years-of-age who have sickle cell disease (SCD) and attend the Sickle Cell Clinic (SCU) of the Tropical Medicine Research Institute.

Materials and Methods: Children with homozygous sickle cell anaemia (Hb SS) or doubly heterozygous for Hb S and Hb C (Hb SC) disease who had not received a blood transfusion within three months prior to the iron measurements, were enrolled. The diagnosis of IDA was made if transferrin saturation was less than 16% with serum iron less than 10.7 µmol/l and a low mean corpuscular volume (MCV) for age.

Results: Twelve children (8.5%), seven with Hb SS and five with Hb SC had IDA. Adjusting for genotype, children with IDA had significantly higher red blood cell (RBC) counts (4.3 x10^9/l vs 3.0 x 10^9/l, p < 0.001) and total iron binding capacity (TIBC) (65.6 µmol/l vs 55.2 µmol/l, p < 0.004) but significantly lower reticulocyte (retic) counts (7.8 % vs 12.2%, p = 0.001) than children without IDA.

Conclusion: Iron deficiency anaemia is a clinical problem which affects children with SCD in Jamaica. The higher RBC counts in the IDA group may be due to decreased haemolysis and increased red cell survival whilst the lower reticulocyte counts may be due to impaired erythropoiesis. These observations need to be extended by clinical studies to establish improved diagnostic measures for IDA in SCD. Additionally, clinical trials are needed to determine whether treatment of IDA in children with SCD reduces morbidity and is associated with clinical benefits such as improvements in neurocognitive function.

Anemia por Deficiencia de Hierro en los Niños Jamaicanos Entre 1 y 5 Años de Edad, que Padecen la Enfermedad de Células Falciformes
L King1, M Reid1, TE Forrester1

RESUMEN

Objetivo. El objetivo de este estudio fue determinar – mediante una combinación de medidas – la prevalencia de anemia por deficiencia de hierro (ADH) en niños menores de cinco años de edad que padecen la enfermedad de células falciformes (ECF), y asisten a la Clínica de Células Falciformes (CCF) del Instituto de Investigación de Medicina Tropical.

Materiales y métodos. Se inscribieron niños con anemia de células falciformes homocigóticas (Hb SS) o enfermedad doble heterocigoto por Hb S y Hb C (Hb SC), que no habían recibido transfusión de sangre por un periodo de tres meses antes de las mediciones de hierro. Se diagnosticaba ADH si la saturación de la transferrina era menor del 16%, con hierro en suero inferior a 10.7 mol/l, y un volumen corpuscular medio (VCM) bajo para la edad.

Resultados. Doce niños (8.5%), siete con Hb SS y cinco con Hb SC presentaban ADH, después del ajuste de las diferencias en el genotipo, los niños con ADH tuvieron conteos de glóbulos rojos (RBC) (4.3 x10^9/l vs 3.0 x 10^9/l, p < 0.001), y capacidad total de fijación del hierro (TIBC) (65.6 µmol/l vs 55.2 µmol/l, p < 0.004) significativamente más altos, pero conteos de reticulocitos (7.8% vs 12.2%, p = 0.001) significativamente más bajos que los niños sin ADH.

Conclusión. La anemia por deficiencia de hierro es un problema clínico que afecta a los niños con ECF en Jamaica. El hecho de que los conteos de RBC sean más altos en los grupos con ADH, puede
Iron deficiency is one of the most common nutritional deficiencies worldwide and is the leading cause of anaemia, especially in children and adult women (1, 2). Children in the developing world are especially vulnerable because of the increased requirements of growth (3), high helminth burden (2, 4) and diets with low iron bioavailability (2). In Jamaica, the prevalence of iron deficiency anaemia (IDA) in children is estimated at about 30% (5).

In sickle cell disease (SCD), the chronic haemolysis characteristic of the disorder results in an increased availability of iron from red cell destruction. Additionally, the reported increase in absorption of iron from the gastrointestinal tract (6) as well as the iron provided by blood transfusions (7, 8) would suggest that iron deficiency is unlikely in SCD. Indeed, Serjeant et al (9) have reported that serum iron levels were significantly higher in young children with Hb SS than in controls, standardized for age and gender. However, in contrast to these findings Rao et al (10) and Vichinsky et al (11) using different criteria have reported cases of IDA in SCD with prevalence of 12% and 8% respectively. The identification of IDA in children with SCD is important, as IDA contributes to worsening of anaemia (11) and may have negative long-term consequences on neurological development (12, 13) and growth (3).

The diagnosis of iron deficiency is based primarily on laboratory measurements. However, conventional tests used, mean corpuscular volume (MCV), transferrin saturation and serum ferritin are limited because of varying ranges of sensitivities and specificities, as they may be modified by conditions other than iron deficiency such as age (14), chronic inflammation (15), genetic polymorphism (16) and by SCD (11, 17, 18). Current literature suggests that a low MCV for age, transferrin saturation less than 16% and serum ferritin less than 25 ng/ml are each 100% sensitive for IDA in SCD (10, 11). On the other hand, whilst serum ferritin less than 25 ng/ml is 100% specific for IDA in SCD, transferrin less than 16% and low MCV for age have specificities of 77–87% and 97% respectively (10, 11). Thus, it has been proposed that the use of a battery of tests to define iron status in a population improves precision in diagnosis of IDA. At the Sickle Cell Unit (SCU) in Jamaica, iron status is determined by the use of iron study tests: MCV, serum iron, total iron-binding capacity (TIBC) and transferrin saturation. Using this battery of tests, we sought to determine the prevalence of IDA in children under five years-of-age attending the SCU, and to describe differences between the IDA and non-IDA groups in terms of anthropometric and haematological variables.

MATERIALS AND METHODS
The sample consisted of children under five years-of-age with homozygous sickle cell anaemia (Hb SS) or doubly heterozygous for Hb S and Hb C (Hb SC) disease who attended the SCU during a two-year period (November 2001 – November 2003) and had iron measurements performed. Iron measurements are performed at the SCU on the initial visits of new patients and on clinical suspicion of IDA. Children who received a blood transfusion within three months prior to the iron measurements were excluded from the study. One hundred and forty-one children: 121 with Hb SS and 20 with Hb SC disease satisfied the study criteria.

The diagnosis of SCD was determined by Hb electrophoresis on cellulose acetate, pH 8.4, and citrate agar, pH 6.2. Quantitative HbA2 levels by cellulose acetate membrane and HbF by Betke method confirmed the diagnosis. The haematological variables – haemoglobin (Hb), nucleated blood cell (NBC) count, platelet count (plts), red blood cell (RBC) count, and MCV, were determined using a Coulter MAX-M. Reticulocyte counts (retics) were performed by tube test method (staining technique). Serum iron and iron-binding capacity (TIBC) were determined using an Abbott Alycon autoanalyser. Transferrin saturation was calculated from serum iron and TIBC. The child was classified as having IDA if all three criteria: transferrin saturation less than 16%, serum iron less than 10.7 mmol/l, low MCV for age: 0.5–2 yr < 70 fl, 2–5 yr < 73 fl (19) were present. Cut-off points were based on laboratory standards as well as other studies (10, 11). Height and weight measurements performed at the time of iron measurements were recorded and body mass index (BMI) calculated.

Statistics
Values are expressed as means ± sd. Differences in mean values between the IDA group and the non-IDA group adjusting for genotype effects were determined by ordinary linear regressions. The Stata statistical package version 8 for Windows™ (Stata Corporation, College Station, TX) was used for data-analysis.

RESULTS
Using our IDA criteria, 12 children, seven with Hb SS and five with Hb SC had IDA resulting in a prevalence of 8.5%. There was a significantly greater than expected prevalence in
patients with Hb SC (42%) vs Hb SS (5.8%). The distributions of serum iron concentration and transferrin saturation were skewed to the right with median, minimum and maximum values being 9.7 µmol/l, 0.2 µmol/l, 40.7 µmol/l and 18%, 1%, 71% respectively (Figure). In contrast, the distribution of MCV for the total sample was left skewed with median, minimum and maximum values being 83 fl, 57 fl and 102 fl respectively (Figure).

The anthropometric characteristics of the IDA and non-IDA groups are shown in Table 1. There was no significant difference in the means of the anthropometric variables between the two groups. The haemoglobin concentration ranged from 5.5 g/dl to 12.1 g/dl with a mean of 9.3 g/dl in the IDA group and from 5.6 g/dl to 11.4 g/dl with a mean of 8.3 g/dl in the non-IDA group (Table 2). This difference (9.3 g/dl vs 8.3 g/dl) in mean values was statistically significant (p < 0.03). As expected, patients with Hb SC had significantly higher Hb (~ 2gm/dl) than did patients with Hb SS, this being independent of IDA status. However, in a regression model with haemoglobin concentration as the outcome variable and IDA status and genotype entered simultaneously as independent categorical factors there was no significant difference in mean haemoglobin concentration of IDA groups, adjusting for genotype (Table 2).

Children with IDA also had significantly higher RBC counts (4.3 x10^9/l vs 3.0 x 10^9/l, p < 0.001) and TIBC (65.6 µmol/l vs 55.2 µmol/l, p < 0.004) than children without IDA, independent of genotype (Table 2). On the other hand, reticulocyte counts were significantly lower in the children with IDA than in children in non-IDA group (7.8% vs 12.2%, p = 0.001), this difference also being independent of genotype (Table 2).

Compared to the tri-test measure for the diagnosis of IDA in this study, each individual criterion was as sensitive but specificity varied from 46% to 64% (Table 3). Low MCV for age had the best test performance characteristics and serum iron the worst.

DISCUSSION
In this cross-sectional study, a battery of tests was used in order to increase the specificity in diagnosing IDA. Using these tests, data demonstrated that of the 141 children with Hb SS and Hb SC who had had serum iron determination within the last two years at the SCU, 8.5% of children tested would be considered to have IDA. The data further demonstrate that there were significant differences in haematological and biochemical indices with RBC counts (p < 0.001) and TIBC (p < 0.004) being significantly higher in the IDA group versus the non-IDA group. On the other hand, reticu-
The diagnosis of IDA in SCD is difficult and it is possible that subjects in the IDA and non-IDA group may have been misclassified. At present, the absence of stainable iron in marrow is considered to be the gold standard for diagnosing iron deficiency. However this test is invasive and is not offered routinely. Further, in SCD, the distribution of iron within the body may be highly compartmentalized, thereby reducing the specificity of this measure in diagnosing IDA (7, 20, 21). Alternatively, serum ferritin concentrations and/or ratios based on transferrin receptor concentration to ferritin concentration have been proposed as the best non-invasive measure of iron status in individuals (14, 22, 23). However, serum ferritin levels are increased independent of iron status, have been misclassified. Therefore, there is the urgent need to develop and validate a non-invasive but specific measure of iron stores in SCD. Serum hepcidin, a 25-amino acid peptide made by hepatocytes and whose physiological function is to regulate iron absorption, may emerge as this marker (25).

At the SCU, serum ferritin assays are unavailable. Therefore, in this study, the authors used three criteria, low serum iron concentration, low transferrin saturation and low MCV for age for diagnosing IDA. Individually, each measure has been shown to be as sensitive but with much lower specificity than serum ferritin and the tri-test measure in diagnosing IDA in SCD (11, 26). Using the tri-test measure, the proportion of individuals with IDA in this study (8.5%) is similar to the proportion of persons with IDA in case series reported in the literature (10, 11). Therefore, assuming that the true prevalence of IDA in young children with SCD is 8.5% then the minimum specificity of the tri-test measure would be ~91%. This compares favourably with the test performance characteristics of serum ferritin (11).

Iron deficiency anaemia in SCD is associated with decreased haemolysis and increased red cell survival (27, 28). The mechanism of this is thought to be due to the lowering of the intracellular concentration of deoxyhaemoglobin S (MCHC-S) because of insufficient iron for haem synthesis. The lower MCHC-S results in a decreased rate of polymerization of the sickle haemoglobin when deoxygenated (27). In the present study, the higher RBC levels in the IDA group than in non-IDA group may have been due to decreased haemolysis and increased red cell survival in the IDA group. Additionally, the lower reticulocyte count in the IDA group than in non-IDA group suggests that erythropoiesis was impaired in the IDA group.

Whether the reduction in haemolysis and increased red cell survival associated with IDA in SCD is accompanied by clinical benefit is unclear (27). Clinically, there is evidence

Table 2: Haematological variables by genotype and IDA group

<table>
<thead>
<tr>
<th>Variables</th>
<th>SC n = 5</th>
<th>SS n = 7</th>
<th>ALL n = 12</th>
<th>SC n = 15</th>
<th>SS n = 114</th>
<th>ALL n = 129</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g/dl) †</td>
<td>10.5 (0.5)</td>
<td>8.4 (2.3)</td>
<td>9.3 (2.0)</td>
<td>10.2 (0.6)</td>
<td>8.1 (1.2)</td>
<td>8.3 (1.3)</td>
</tr>
<tr>
<td>NBC (x 10^9/l) †</td>
<td>10 (2.5)</td>
<td>12.6 (2.8)</td>
<td>11.5 (2.9)</td>
<td>9.3 (2)</td>
<td>16.3 (7.6)</td>
<td>15.4 (7.6)</td>
</tr>
<tr>
<td>RBC (x 10^12/l) †</td>
<td>4.6 (0.3)</td>
<td>4 (0.9)</td>
<td>4.3 (0.8)**</td>
<td>3.9 (0.4)</td>
<td>2.9 (0.6)</td>
<td>3 (0.7)</td>
</tr>
<tr>
<td>Plts (x 10^9/l)</td>
<td>285.4</td>
<td>386.9</td>
<td>344.6</td>
<td>390.4</td>
<td>430.3</td>
<td>421.6</td>
</tr>
<tr>
<td>Retics (%) †</td>
<td>6.4 (3.4)</td>
<td>8.7 (4.3)</td>
<td>7.8(4)*</td>
<td>7.1 (2.6)</td>
<td>12.9 (4.3)</td>
<td>12.2 (4.5)</td>
</tr>
<tr>
<td>TIBC (µmol/l)</td>
<td>63.1 (7.2)</td>
<td>67.4 (8.4)</td>
<td>65.6(7.9)*</td>
<td>57.4 (13.1)</td>
<td>55 (12)</td>
<td>55.2 (12)</td>
</tr>
</tbody>
</table>

Table 3: Test Performance characteristic of individual criterion for diagnosing iron deficiency anaemia in young children with sickle cell disease compared with the tri-test criteria.

<table>
<thead>
<tr>
<th>Transferrin saturation criterion</th>
<th>Serum Iron criterion</th>
<th>Low MCV age criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity %</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Specificity %</td>
<td>64.3</td>
<td>46</td>
</tr>
<tr>
<td>Positive Predictive Value %</td>
<td>20.7</td>
<td>14.6</td>
</tr>
<tr>
<td>Likelihood ratio positive</td>
<td>2.8</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Sensitivity is the proportion of diseased patients correctly identified. Specificity is the proportion of healthy patients correctly identified. The positive predictive value (PPV) is the probability of a patient having the disease following an abnormal test result assuming a prevalence of 8.5%. The likelihood ratio of a positive test is the ratio of the probability (likelihood) of a positive test result in an abnormal patient and in a normal patient = Sensitivity/(1- specificity).
that IDA contributes to worsening of anaemia (11) and has negative long-term consequences on neurocognitive development (12, 13), especially if it develops during early childhood. Children with SCD have impaired neurocognitive development from various postulated factors including cerebrovascular accidents (CVAs) – clinical CVAs and silent infarcts (29), an encephalopathic process (30), and chronic anaemia (31). It can therefore be argued that development of IDA in children with SCD would exacerbate neurocognitive impairment. Additionally, IDA is associated with impaired growth (3) and this may further worsen the growth deficit observed in SCD (32).

In summary, IDA is a clinical problem, which affects children with SCD in Jamaica. However, the highly selective nature of the sample requires one to exercise caution in generalizing the findings of this study. Nonetheless, these observations need to be extended by clinical studies to establish improved diagnostic measures of IDA in SCD and further to determine whether treatment of IDA reduces morbidity and improves neurocognitive development in children with SCD.

REFERENCES
The Impact of the Establishment of a Neonatal Intensive Care Unit on the Outcome of Very Low Birthweight Infants at the University Hospital of the West Indies

H Trotman¹, M Barton¹

ABSTRACT

A retrospective analysis of the outcome of inborn very low birthweight infants admitted to the neonatal unit of the University Hospital of the West Indies pre- (period 1) and post- (period 2) establishment of a neonatal intensive care unit was conducted. During the study, 250 infants were admitted to the neonatal unit, 132 (53%) during period 1 and 118 (47%) during period 2. There was improved survival during period 2 when 81 (69%) infants survived compared to period 1 when 73 (55%) survived (p = 0.02). This increased survival was due to an increase in survival of infants weighing 750 – 999g in period 2 when 17 (65%) infants survived compared to 9 (29%) in period 1 (p < 0.05). There was an increase in the number of infants ventilated in period 2, 39 (33%) compared to 12 (9%) period 1 (p < 0.001). Infants who were ventilated in period 2 were less likely to die than those ventilated in period 1 (OR 0.05, CI 0.01, 0.66). After controlling for gender, weight, gestational age and ventilation, infants born in the second time period were less likely to die than those born in the first time period (OR 0.33, CI 0.14, 0.76). The establishment of a neonatal intensive care unit has resulted in improved survival of very low birthweight infants; further improvement in survival of these infants will be dependent on increased accessibility to surfactant therapy, initiation of total parenteral nutrition and availability of trained personnel.

Impacto del Establecimiento de una Unidad Neonatal de Cuidados Intensivos en el Estado Clínico de los Recién Nacidos con muy Bajo Peso en el Hospital Universitario de West Indies

H Trotman¹, M Barton¹

RESUMEN

Se llevó a cabo un análisis retrospectivo del estado clínico de los recién nacidos con peso extremadamente bajo, ingresados en la unidad neonatal del Hospital Universitario de West Indies, antes (periodo 1) y después (periodo 2) del establecimiento de una unidad neonatal de cuidados intensivos. Durante el estudio, 250 recién nacidos fueron ingresados en la unidad neonatal: 132 (53%) durante el periodo 1 y 118 (47%) durante el periodo 2. En este segundo periodo, se produjo un aumento de la supervivencia, al sobrevivir 81 (69%) recién nacidos, en contraste con el primer periodo, en el que sobrevivieron 73 (55%) infantes (p = 0.02). Este aumento se debió a un incremento en la supervivencia de los infantes que pesaban 750 – 999 g en el periodo 2, en el que 17 (65%) recién nacidos sobrevivieron, en comparación con el 9 (29%) en periodo 1 (p <0.05). Hubo un aumento en el número de recién nacidos ventilados en el periodo 1(OR 0.05, CI 0.01, 0.66). Después de ajustar por el sexo, peso, edad gestacional y ventilación, los infantes nacidos en el segundo periodo de tiempo eran menos propensos a morir que los ventilados en el primer periodo (OR 0.33, CI 0.14 – 0.76). El establecimiento de una unidad neonatal de cuidados intensivos ha traído como resultado un mejoramiento en la supervivencia de los recién nacidos con un peso extremadamente bajo al nacer. El mejoramiento ulterior de estos infantes dependerá de una mayor accesibilidad a la terapia surfactante, la iniciación de la nutrición parenteral total, y la disponibilidad de personal calificado.
INTRODUCTION
Neonatal mortality, particularly that of very low birthweight (VLBW) infants (ie birth weight less than 1500 g) has decreased in developed countries since the introduction of the concept of neonatal intensive care (1–6). The improvement in survival is not only related to availability of intensive care but also level of intensive care (7, 8).

Unfortunately, in many developing countries there is limited or no access to neonatal intensive care measures. Daga and Daga proposed that in the setting of developing countries a model of conservative newborn care – provision of warmth, feeding with breast milk and adequate resuscitation – could reduce neonatal deaths by 55–60% in babies weighing more than 1000 g. The judicial use of oxygen given via head box and the initiation of circulatory supportive measures could reduce mortality by a further 15–20% and 7–10% respectively. Hence a less technical, less expensive, less invasive and less labour intensive model of newborn care is a sensible approach for developing countries (9–11).

Other authors, however, have proposed that there is a role for neonatal intensive care units in developing countries but that these should be regionalized, with an organized neonatal transport system, rather than individual hospitals all attempting to develop neonatal intensive care units (12).

Description of the neonatal unit
The University Hospital of the West Indies (UHWI) is located in urban Jamaica and is a university affiliated institution. This hospital, along with two other public hospitals, serves mainly the population of Kingston and St Andrew, approximately 652 000 people (13).

Neonates admitted to the nursery are mainly inborn, but as one of two tertiary care paediatric facilities in the urban region, newborns from other hospitals in the island (both private and public) are often transferred to the unit. The unit also functions as a referral centre for some private paediatricians, as well as for the other tertiary level paediatric institution in the city.

The neonatal unit at the UHWI has a maximum capacity of 30 beds and the small Neonatal Intensive Care Unit (NICU) established in 2001 is a 6-bed unit, with the present capability of ventilating only three neonates at any one time. Surfactant is available but due to financial cost is not accessible to most of the babies; total parenteral nutrition is not readily available. Four consultant paediatricians, one of whom has specialist training in neonatology, are responsible for medical care of the neonates.

Outcome was defined as status at the time of discharge from the main ICU prior to establishment of the NICU and as status at the time of discharge from the neonatal unit post-establishment of the NICU.

With the introduction of a NICU at the UHWI, it is timely to review the survival rates of VLBW infants pre- and post-establishment of the NICU. We hypothesize that survival of VLBW infants post-NICU establishment will be greater than those pre-NICU establishment.

SUBJECTS AND METHODS
Study population
This was a retrospective, descriptive study looking at all inborn VLBW infants admitted to the neonatal unit in the two-year period prior to and after the development of a NICU. Study patients were identified from the neonatal unit/NICU admission logbooks. All VLBW infants admitted to the neonatal unit/NICU during the years 1999 and 2000 and 2002 to 2003 except those with lethal chromosomal or congenital anomalies were included. The year 2001 was excluded as it represented the transition period between ventilating babies in the main ICU and ventilating babies in the NICU. Patients’ records were retrieved and data on gender, birthweight, gestational age, diagnosis, outcome, ventilatory support and surfactant administration were extracted.

Prior to the opening of the NICU, nursing and medical staff attended a series of workshops on the care of the ventilated infant, managing the infant on a ventilator and also the mechanics of operating the current ventilators (Infant Star 950™ Tyco Health Care and Puritan-Bennett 840™ Mallinkrodt Inc Tyco Health Care) used in the NICU. Training of staff on the use of the new monitors (Agilent M3046A™ Phillips Medical Systems) for non-invasive measuring of heart rate, respiratory rate, oxygen saturation and blood pressure was also carried out. Medical personnel received training in the use of the IRMA™ blood analysis system International Technidyne Corporation for the determination of arterial blood gasses. A cadre of foreign NICU trained nurses contracted to the UHWI was assigned to the neonatal unit and these nurses were utilized in the NICU. One of the local sisters in charge of the unit was sent on a three month attachment to a NICU in the United Kingdom for updating of skills and on her return she supervised ongoing education of the nurses attached to the unit.

During the first study period, January 1999 to December 2000, babies who needed ventilation were ventilated in the hospital’s main intensive care unit (ICU). Neonates were co-managed by the anaesthetists and the consultant paediatricians. The anaesthetists primarily dealt with the ventilatory management of the neonates, while the paediatricians were responsible for the medical management and were the primary physicians. The general ICU is an eight-bed unit that services the entire hospital and at times neonates in need of ventilatory support could not be accommodated due to lack of space or adequate nursing staff. These infants were then managed on the neonatal unit with bubble nasal Continuous Positive Airway Pressure (CPAP). If any of these infants could not be adequately maintained on this mode of ventilatory support, they would usually succumb to their disease process, as no other alternative was available.
Bubble nasal CPAP was administered via an endotracheal (ET) tube placed in the nasopharynx, the ET tube would then be connected by way of a ‘T’ connector to two lengths of tubing. One of the lengths of tubing would be immersed in a bottle containing 1.5 L of water with centimetre gradations on the external aspect and the depth at which it was placed determined the amount of positive pressure delivered to the neonate’s airways. The remaining length of tubing would be connected to an oxygen outlet via a humidifier and this would deliver humidified oxygen to the neonate. At times, to allow for mixing of oxygen and air, this second tube would be connected to two short lengths of tubing via a ‘Y’ connector, one short tube would then be connected to an air outlet and the other to the oxygen outlet via a humidifier. Initially most neonates would be started at a pressure of 5 cm of water; the pressure would then be titrated based on the values of the arterial blood gases. Generally, pressures of greater than 8 cm of water were never used.

Prior to the establishment of the NICU, because of the decreased probability of infants weighing less than 1000g gaining admission to the main ICU, the degree of resuscitation of any of these infants who were not vigorous at birth was limited by the fact that post resuscitation and stabilization, there was no mechanical ventilatory support to offer them and an infant who is not breathing spontaneously could not benefit from nasal bubble CPAP. After the establishment of the NICU with the increased availability of ventilatory support for these infants, resuscitative efforts could be more aggressive. Also these infants could now be offered the benefit of surfactant (Survanta™ 4mls/Kg) administration. When placed on the ventilator, the usual initial settings were positive end expiratory pressure of 4 cm H2O, when placed on the ventilator, the usual initial settings were aggressive. Also these infants could now be offered the benefit of surfactant (Survanta™ 4mls/Kg) administration.

RESULTS

During the study, 250 VLBW infants were admitted to the neonatal unit, 132 (53%) during period 1 and 118 (47%) during period 2. There were no differences between the two study periods in the weight distribution, gender distribution and reasons for admission. The mean birthweight of infants in period 1 was 1004 ± 272 g (range 500–1490 g) and those in period 2 was 1071± 271 g (range 520–1490 g) p = 0.06. Neither were there any differences between the two study periods in mean birthweight and gestational age between the survivors and non- survivors (Table 1).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Survivors (%)</td>
<td>73 (55)</td>
<td>81 (69)*</td>
</tr>
<tr>
<td>Non-survivors (%)</td>
<td>59 (45)</td>
<td>37 (31)*</td>
</tr>
<tr>
<td>Males (%)</td>
<td>55 (42)</td>
<td>56 (48)</td>
</tr>
<tr>
<td>Females (%)</td>
<td>76 (58)</td>
<td>62 (52)</td>
</tr>
<tr>
<td>Total ventilated (%)</td>
<td>12 (9)</td>
<td>39 (33)**</td>
</tr>
<tr>
<td>No. babies ventilated – Survivors (%)</td>
<td>1 (8)</td>
<td>20 (51)*</td>
</tr>
<tr>
<td>No. babies ventilated – Non-survivors (%)</td>
<td>11 (92)</td>
<td>19 (49)*</td>
</tr>
<tr>
<td>Mean bwt ± SD survivors (g)</td>
<td>1156 ± 211</td>
<td>1159 ± 216</td>
</tr>
<tr>
<td>Mean bwt ± SD non-survivors (g)</td>
<td>819 ± 219</td>
<td>871 ± 278</td>
</tr>
<tr>
<td>Mean gestational age ± SD survivors</td>
<td>30.6 ± 2</td>
<td>30.6 ± 2</td>
</tr>
<tr>
<td>Mean gestational age ± SD non-survivors</td>
<td>27.7 ± 2</td>
<td>27.1 ± 2</td>
</tr>
</tbody>
</table>

* p < 0.05  ** p < 0.001

There was an increase in survival rate during period 2 when 81 (69%) infants survived compared to period 1 when 73 (55%) survived (p = 0.02) (Table 1). This increased survival was mainly due to an increase in survival of infants weighing less than 1000 g in period 2 when 20 (44%) infants survived compared to period 1 when 13 (22%) survived (p < 0.05). The major cause for mortality in both time periods was respiratory failure accounting for 69(95%) of the deaths in period 1 and 72 (89%) of the deaths in period 2. Other causes of mortality in period 1 were three (4%) sepsis and one (1%) Necrotising Enterocolitis (NEC) and in period 2, 1 (1%) sepsis, five (7%) NEC, one (1%) intraventricular haemorrhage, one (1%) pulmonary haemorrhage and one (1%) hypoxic ischaemic encephalopathy.

There was an increase in survival rate during period 2 when 81 (69%) infants survived compared to period 1 when 73 (55%) survived (p = 0.02) (Table 1). This increased survival rate during period 2 when 81 (69%) infants survived compared to period 1 when 73 (55%) survived (p = 0.02) (Table 1). This increased survival rate during period 2 when 81 (69%) infants survived compared to period 1 when 73 (55%) survived (p = 0.02) (Table 1).
There was an increase in the number of VLBW infants ventilated in period 2, when 39 (33%) infants received ventilatory support compared to 12 (9%) in period 1 (p < 0.001). Infants who were ventilated in period 2 were less likely to die than those ventilated in period 1 (OR 0.05, CI 0.01, 0.66).

As birthweight and gestational age increased the risk of dying decreased (OR 0.1, CI 0.01, 0.73) and (OR 0.57, CI 0.44, 0.74) respectively. There was a significant increase in survival of neonates weighing 750–999 g in period 2 when 17 (65%) of these infants survived compared to 9 (29%) infants in period 1 (p < 0.05) (Table 2). More babies weighing 750–999 g were ventilated in period 2, 12 (67%) than in period 1, 6 (33%) (p = 0.04).

There were 111 males admitted during the study periods, 55 (49.5%) in period 1 and 56 (50.5%) in period 2. One hundred and thirty-eight females were admitted, 76 (55%) in period 1 and 62 (45%) in period 2. There was no difference in survival of males between the two time periods; however, there was an increase in survival of females in period 2. Forty-five (73%) females survived in period 2 while 41 (54%) survived in period 1 (p < 0.05). Overall, females were less likely to die than males (OR 0.35, CI 0.16, 0.76).

The primary reason for ventilation was Respiratory Distress Syndrome (RDS). Eleven (9%) neonates received surfactant therapy in period 2 of whom 5 (45%) died, while only one baby received surfactant in period 1 and this baby did not survive. Overall for the four-year period, mean birthweight of survivors (1200 ± 200 g) was significantly greater than that of non-survivors (800 ± 200 g) (p < 0.001). Mean gestational age was also significantly greater for survivors (30.6 ± 2 weeks) than for non-survivors (27.4 ± 2 weeks) (p < 0.001).

Variables affecting outcome were entered into a multivariate logistic regression model, after controlling for gender, weight, gestational age and ventilation, infants born in the second time period were still less likely to die than those born in the first time period (OR 0.33, CI 0.14, 0.76).

DISCUSSION
There was a significant increase in the survival of VLBW infants in the two years post establishment of a NICU at the UHWI. Similar results have been demonstrated in previous studies (1, 3, 5, 6, 14). A greater proportion of neonates requiring ventilatory support had access to mechanical ventilation in the post-NICU period. The outcome of ventilation was also significantly improved in this period. We believe that this was as a result of decrease in the lag time between development of the signs of respiratory failure and commencement of mechanical ventilation. In the period prior to the establishment of the NICU, mechanical ventilation, when available, was reactive or responsive to clinical deterioration rather than pro-active or anticipatory as occurred in period 2. Even after controlling for mechanical ventilation, there was still increased survival of the VLBW infants born post-establishment of the NICU. This reflects the added benefits of neonatal intensive care measures such as better monitoring of the infants, improved medical care by appropriately trained nursing and medical personnel and more timely and appropriate intervention when there is clinical deterioration.

It is not surprising that the improved survival rate was as a result of increased survival of infants less than 1000 g. These infants, because of the immaturity of their lungs, would be at greatest risk of severe RDS and therefore would benefit the most from increased access to mechanical ventilation and neonatal intensive care measures. There was no improvement in survival rates for infants weighing less than 750 g post-introduction of the NICU. Nutrition plays a major role in the survival of these infants and the inability to support these infants with parenteral nutrition prior to initiation of oral feeds and the degree of negative nitrogen balance experienced by them are limiting factors in outcome. During neither study period was total parenteral nutrition available. The use of surfactant has also been shown to improve survival of VLBW infants (15). This treatment modality was not readily accessible during the study periods and for the few infants who received it, it was not administered in a timely manner (within six hours of onset of disease).

The establishment of a NICU at the UHWI has resulted in improved survival of VLBW infants. Further improvement in survival will be dependent on an increase in appropriately trained nursing and medical staff, the accessibility of surfactant and the availability of parenteral nutrition.

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The Quality of Health Research Reporting by the Daily Newspapers in Trinidad and Tobago

S Nichols¹, N Chase¹

ABSTRACT

In this study, the authors examined the scientific quality of health research reported in the three daily newspapers in Trinidad and Tobago. All medical research articles published for the period January 1 to December 31, 2003, were extracted using a standardized data collection form. The scientific quality of the articles was analyzed by taking into consideration various aspects of study design, as well as other issues associated with accurate reporting. Of the 321 eligible articles, 108 were collected from The Trinidad Express, 100 from The Trinidad Guardian and 113 from The Trinidad and Tobago Newsday. The percentages of articles reporting methodological components consistent with good scientific quality were as follows: objective(s) (99.7%), study design (79.8%), study procedure (70.1%), selection procedure (70.1%), description of participants (87.5%), control/matching group (74.9%), outcome variables (99.4%) and issues of validity and reliability (2.5%). In addition, the percentage of articles containing aspects of good report writing were as follows: authorship (71.3%), authors' affiliation (59.5%), location of the study (25.4%), source of the research material (83.1%), duration of the study (27.7%), study setting (72.0%), number of participants (74.1%), period in which the study was conducted (12.0%) and quantification of the results (66.7%). Observational studies were significantly more likely to be reported than experimental studies (71.5% versus 28.5%). Overall, articles reported in the Trinidad Express and the Trinidad and Tobago Newsday were of a better scientific quality than those in the Trinidad Guardian. These findings suggest a need to improve the overall scientific quality of reported health research in these newspapers by ensuring that reports answer the fundamental questions of what, why, who, where, when and how. This might be achieved by adopting a structured reporting format similar to that used by many peer-reviewed journals.

La Calidad de los Reportajes Sobre las Investigaciones de Salud Publicadas en los Diarios de Trinidad y Tobago

S Nichols¹, N Chase¹

RESUMEN

En este estudio, los autores examinaron la calidad científica de las investigaciones de salud reportadas en los tres diarios de Trinidad y Tobago. Todos los artículos de investigación médica publicados en el periodo de enero 1 a diciembre 31, 2003, fueron extractados mediante una planilla estandarizada de recolección de datos. La calidad científica de los artículos fue analizada tomando en consideración varios aspectos del diseño del estudio, así como otros problemas asociados con el arte de reportar con exactitud. De los 321 artículos elegibles, 108 fueron tomados del periódico The Trinidad Express, 100 del diario The Trinidad Guardian, y 113 del rotativo The Trinidad and Tobago Newsday. Los porcentajes de artículos que reportaban componentes metodológicos correspondientes a una buena calidad, fueron como sigue: objetivos(s) (99.7%), diseño del estudio (79.8%), procedimiento del estudio (70.1%), selección del estudio (70.1%), descripción de participantes (87.5%), grupo de control/apareamiento (74.9%), variables del resultado (99.4%) y problemas de validez y confiabilidad (2.5%). Además, el porcentaje de artículos que contienen aspectos sobre escritura de buenos reportes, fue como sigue: autoría (71.3%), afiliación de autores (59.5%), lugar del estudio (25.4%), fuentes del...
A search was done of all issues of the daily (i.e., newspapers with publications on four or more days of the week) and weekend publications of the Newsday, Express and Guardian from January 1 to December 31, 2003, for health research articles. Articles were included in the study if they were press released from peer-reviewed journals, sourced from an international news agency (e.g., Reuters, Associated Press), published in magazines and bulletins or written by local journalists. Editorials, commentaries, articles for debate and education, narrative reviews, letters to the editor, case reports and articles related to the local health sector and advertisement of health products and services were excluded. A standardized data extraction form was used to retrieve information of interest. To address issues related to the scientific quality of the health research, published items were classified as experimental (e.g., randomized controlled trials, clinical trials) and observational (cohort studies, cross sectional studies, case-control studies, ecological studies and case studies), meta-analysis (i.e., summation of the findings of many studies) and qualitative (e.g., focus group). The study location was classified as it pertained to an industrialized or developing country (16, 17). All errors associated with data extraction and entry were corrected before statistical analyses.

**Statistical Analysis**

All data were analyzed using SPSS version 11 for Windows. Overall, summary simple statistics such as mean, percentages and frequencies were computed. In addition, comparisons were made among the various newspapers using analysis of variance (ANOVA) with Bonferroni post-test comparisons for significant differences and the chi-square test.

**RESULTS**

Of the 321 eligible articles, 108 were collected from the Express, 100 from the Guardian and 113 from the Newsday. These represented 88 (22.2%) publication days per year for the Express, 58 (15.9%) publication days per year for the Guardian and 79 (21.6%) publication days/year for the Newsday. Overall, the percentages of articles reporting methodological components consistent with good scientific
quality were as follows: objective(s) (99.7%), study design (79.8%), study procedure (70.1%), selection procedure (70.1%), description of participants (74.9%), outcome variables (99.4%) and issues of validity and reliability (2.5%). In addition, the percentage of articles containing aspects of good report writing were as follows: authorship (71.3%), authors’ affiliation (59.5%), location of the study (25.4%), source of the research material (83.1%), duration of the study (27.7%), study setting (72.0%), number of participants (74.1%), period in which the study was conducted (12.0%) and quantification of the results (66.7%). When study designs were stated, the majority was of a non-experimental nature.

There were significant differences in various aspects of the scientific quality of reporting among the various newspapers. Health research articles published by the Express and Newsday were significantly more likely than those in the Guardian to include statements relating to study design, procedure for selecting participants, description of participants, authorship and author’s institutional affiliation. The Newsday was significantly more likely than both the Express and Guardian to include statements relating to the number of participants and study procedure. There were no significant differences among the newspapers in reporting location and period of the study (Table 2). Peer-reviewed journals were

<table>
<thead>
<tr>
<th>Questions to address the scientific quality of articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who?</td>
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<tr>
<td>Why?</td>
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</tbody>
</table>

Table 2: Characteristics of study methodology as reported by newspaper

<table>
<thead>
<tr>
<th>Methodological Feature</th>
<th>Express (n = 108)</th>
<th>Guardian (n = 100)</th>
<th>Newsday (n = 113)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives stated (%)</strong></td>
<td>No</td>
<td>0</td>
<td>0</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>98.2</td>
</tr>
<tr>
<td><strong>Study design (%)</strong></td>
<td>Not stated</td>
<td>19.1</td>
<td>50.8</td>
<td>9.7</td>
</tr>
<tr>
<td></td>
<td>Meta-analyses</td>
<td>2.6</td>
<td>2.2</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>24.3</td>
<td>14.4</td>
<td>23.0</td>
</tr>
<tr>
<td></td>
<td>Cohort</td>
<td>22.6</td>
<td>14.6</td>
<td>27.4</td>
</tr>
<tr>
<td></td>
<td>Case-control</td>
<td>9.1</td>
<td>0.8</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td>24.3</td>
<td>19.2</td>
<td>30.1</td>
</tr>
<tr>
<td><strong>Study procedure stated (%)</strong></td>
<td>No</td>
<td>33.0</td>
<td>53.1</td>
<td>9.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>67.0</td>
<td>46.9</td>
<td>90.3</td>
</tr>
<tr>
<td><strong>Sampling selection procedure (%)</strong></td>
<td>Not stated</td>
<td>36.5</td>
<td>58.5</td>
<td>11.5</td>
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<tr>
<td></td>
<td>Random</td>
<td>30.4</td>
<td>10.8</td>
<td>34.5</td>
</tr>
<tr>
<td></td>
<td>Volunteer</td>
<td>33.0</td>
<td>30.8</td>
<td>54.0</td>
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<tr>
<td><strong>Number of participants stated (%)</strong></td>
<td>No</td>
<td>33.0</td>
<td>53.1</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>67.0</td>
<td>46.9</td>
<td>90.3</td>
</tr>
<tr>
<td><strong>Outcome measures stated (%)</strong></td>
<td>No</td>
<td>7.4</td>
<td>23.0</td>
<td>7.1</td>
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<tr>
<td></td>
<td>Yes</td>
<td>92.6</td>
<td>77.0</td>
<td>92.6</td>
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<tr>
<td><strong>Characteristics of participants stated (%)</strong></td>
<td>No</td>
<td>0</td>
<td>1.0</td>
<td>0.9</td>
</tr>
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<td></td>
<td>Yes</td>
<td>100.0</td>
<td>99.0</td>
<td>99.1</td>
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<td><strong>Study setting stated (%)</strong></td>
<td>No</td>
<td>26.9</td>
<td>41.0</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>73.1</td>
<td>59.0</td>
<td>82.3</td>
</tr>
<tr>
<td><strong>Study Location stated (%)</strong></td>
<td>No</td>
<td>78.3</td>
<td>74.6</td>
<td>70.8</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>21.7</td>
<td>25.4</td>
<td>29.2</td>
</tr>
<tr>
<td><strong>Duration of study stated (%)</strong></td>
<td>No</td>
<td>72.3</td>
<td>82.8</td>
<td>75.7</td>
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<td></td>
<td>Yes</td>
<td>27.7</td>
<td>17.2</td>
<td>24.3</td>
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<td><strong>Author stated (%)</strong></td>
<td>No</td>
<td>27.8</td>
<td>56.9</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>72.2</td>
<td>43.1</td>
<td>84.1</td>
</tr>
<tr>
<td><strong>Institution stated (%)</strong></td>
<td>No</td>
<td>33.0</td>
<td>67.7</td>
<td>33.6</td>
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<tr>
<td></td>
<td>Yes</td>
<td>67.0</td>
<td>32.3</td>
<td>66.4</td>
</tr>
<tr>
<td><strong>Results quantified (%)</strong></td>
<td>No</td>
<td>35.2</td>
<td>41.0</td>
<td>24.8</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>64.8</td>
<td>59.0</td>
<td>75.2</td>
</tr>
<tr>
<td><strong>Tone of conclusion (%)</strong></td>
<td>Associative</td>
<td>13.0</td>
<td>8.0</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>Causal</td>
<td>87.0</td>
<td>92.0</td>
<td>84.1</td>
</tr>
</tbody>
</table>
4.2 95% CI: 2.4, 7.8; 95% CI: 2.6, 7.6; study design (odds ratio (OR) = 6.3, 95% Confidence Interval of the research were significantly more likely to indicate

Articles that cited journals were as follows: the New England Journal of Medicine (n = 28), the Journal of the American Medical Association (n = 18), the Lancet (n = 16) and the British Medical Journal (n = 15), and the Archives of Internal Medicine (n = 8). Articles that cited journals were as follows: the New England Journal of Medicine (n = 28), the Journal of the American Medical Association (n = 18), the Lancet (n = 16) and the British Medical Journal (n = 15), and the Archives of Internal Medicine (n = 8). Articles that cited a journal as the source of the research were significantly more likely to indicate study design (odds ratio (OR) = 6.3, 95% CI: 2.4, 7.8; p < 0.0001), study procedure (OR = 4.4, 95% CI: 2.6, 7.6; p < 0.0001), sampling method (OR = 4.4, 95% CI: 2.6, 7.6; p < 0.0001), number of participants (OR = 4.2 95% CI: 2.4, 7.8; p < 0.0001), location (OR = 2.3, 95% CI: 1.2, 4.5; p = 0.01) and institution responsible for the investigation (OR = 3.7, 95% CI: 2.2, 6.3; p < 0.0001) than those that lacked journal citations. Of the 91 reports that stated a study location, only five were performed in developing countries. The prime measures used in the quantification of results were percentage (49%), relative risk (31.9%), mean (8.9%) and odds ratio or likelihood (6.5%).

### DISCUSSION

In this study, we examined the scientific quality of health research reported in the three major daily newspapers in Trinidad and Tobago. The results suggest the need for journalists and editorial staff to focus their attention on the scientific quality of the health research articles published by their various newspapers. In particular, attention should be paid to the completeness of articles by ensuring that they answer the questions of who, why, what, where, when and how. Failure to address these fundamental issues severely reduces the scientific quality and utility of the publication from the perspective of providing good medical evidence.

Given the potential of newspapers to influence public perception and health behaviour, it is imperative that articles published be of good scientific quality to ensure that the newsprint medium make a positive contribution to informing the population on important issues in health.

The findings of a preponderance of observational studies (eg cohort studies, case-control studies etc) rather than experimental studies (eg clinical trials) reported in the major newspapers, supports the findings of previous studies (16, 17). In addition, the majority of reports presented findings as causal despite the fact that in over half of the reports a temporal sequence between possible cause and effect could not be established. Studies employing experimental designs are less prone to bias than those employing observational designs and therefore provide better source of evidence-based health research. Alternatively, it might reflect the frequency of various study designs as they appeared in the original sources used for extracting their reports. Journalists and editorial staff are constrained by their inability to evaluate the quality of evidence and arguments presented in medical journals and as such rely heavily on the peer review processes and the opinions of medical experts to guide them in the selection and development of stories (8). This is further supported by the fact that many of the health research articles were originally published in prestigious journals having large international circulations (ie high impact factors) and where the peer-review process is assumed to be of the highest quality (19). Alternatively, this finding might indicate an abdication of journalistic responsibility for complete balanced investigation on account of the fact that journalists usually work to tight deadlines for daily newspapers and have little time to identify and develop news articles (8). Thus, the use of journal press releases or articles reproduced from other international news agencies represents conveniently packaged information (8). Clearly, journalists with responsibility for producing articles on health research need to understand the nature of causal thinking in health research. This underscored the need for courses on fundamentals of epidemiological study interpretation for journalists. Such courses might be developed by institutions such as the Caribbean Health Research Council (CHRC), The University of the West Indies (UWI), and The Caribbean Epidemiology Research Centre (CAREC).

The finding of articles from general medical journals being the ones most frequently cited, while articles from specialist journals such as Neurology and Journal of Asthma were cited infrequently, suggests that journalists responsible for health research articles rely heavily on a few journals as sources of health research news. Thus, the newspaper medium within this context might be suggesting the health issues for consideration by society (20, 21). Notwithstanding this, articles extracted from peer-reviewed journals were

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<tr>
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<th>Express (n = 108)</th>
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<th>Newsday (n = 113)</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>Caution on study implications indicated (%)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>No</td>
<td>33.3</td>
<td>42.0</td>
<td>35.4</td>
<td>0.41</td>
</tr>
<tr>
<td>Yes</td>
<td>66.7</td>
<td>58.0</td>
<td>64.6</td>
<td></td>
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<tr>
<td>Validity/reliability of procedure addressed (%)</td>
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<td></td>
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<tr>
<td>No</td>
<td>94.4</td>
<td>99.0</td>
<td>99.1</td>
<td>0.04</td>
</tr>
<tr>
<td>Yes</td>
<td>5.6</td>
<td>1.0</td>
<td>0.9</td>
<td></td>
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<tr>
<td>Study time stated (%)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>No</td>
<td>89.6</td>
<td>91.5</td>
<td>82.3</td>
<td>0.09</td>
</tr>
</tbody>
</table>
significantly more likely to possess features congruent with good scientific reporting quality than those obtained from other sources. Health educators, health promoters, policymakers and providers of health services should not neglect the importance of this fact and should liaise with the journalists and editors to improve the overall scientific quality of health research articles by suggesting sources of seminal articles on health related issues. Additionally, they should seek to prepare articles for publication by the various newspapers. This will broaden the scope of coverage as well as the range of journal sources used.

Another important issue is the manner in which results are quantified. Although the majority of results were quantified, less than 5% of these stated explicitly what numerators and denominators were used in deriving the overall reported percentages, relative risks, odds ratios, and rates. The inclusion of numerators and denominators reduces the likelihood that the magnitude of findings would be exaggerated (12, 22). Risk means different things to different people. For most lay people, risk is more than some combination of the magnitude for potential damage and the probability of damage. Rather, the perception of risk is directly linked to one’s level of education, natural and social environments, ethical and political beliefs, and physical and mental health status (23). Thus, crude and poorly framed expressions of the probability and severity of an adverse health effect might have a little or serious effect on the way in which the public treat important health issues (24). This becomes even more important in the new health reform scenarios that seek to increase public involvement in health decision-making. Thus, journalists and editors should be aware of the fact that as far as health research reporting is concerned, the newspapers are an important source of health risk communication. Such reporting might be improved by stating the absolute risk associated with the putative risk factor. To optimize correct interpretation by the public, data might be presented as the excess number of persons who might develop the condition as a result of their exposure to the particular risk factor. Journalists must therefore strive to explain clearly the methodologies by which health risk severity are assessed and interpret the results emanating from such methodologies in a manner that facilitates a better understanding of the associated risks by the readership (23). Journalists need to evaluate the type of quantitative risks and uncertainties in question and decide on the key information that has to be communicated. Such a venture requires both excellent scientific expertise and the ability to translate technical information in an easily understood language. The vast array of relevant skills and competencies needed can only be realized by extensive collaborations among the various stakeholders in all aspects of the process.

Clearly, there is an urgent need for journalists and editors to be cognisant of the fundamentals of the process and goals of health research. A thorough understanding of these processes would allow the right balance to achieve completeness and good scientific quality. The authors strongly recommend that journalists and editors responsible for producing health research articles in the local newspapers become familiar with the fundamental principles of epidemiology, especially the interpretation of results emanating from studies using a variety of designs. In addition, improving editorial oversight and the development of presentation standards similar to the structured abstract format used by many peer-reviewed journals would ensure that health research articles address the important questions of what, who, why, when and how – fundamental prerequisites for completeness and good scientific quality. Thus, articles might include a brief introduction, the aim of the study, brief details of the methods, a results section summarizing the findings in words, tables, and graphs, a section interpreting the findings in context of studies of a similar nature, a limitations section, and a statement about the authors and potential conflicts of interest (25). We are convinced that this approach will allow journalists and editors to produce health research articles that are good news stories and compelling features in 500 words or less – the average length of articles published by the various newspapers. A major advantage of this study is that as far as we are aware it is the first to look at this issue within the content of the Trinidad and Tobago newsprint medium and should provide an initial foundation for studies investigating the reporting of important research issues in health such as HIV/AIDS. Another advantage was that unlike previous studies that were non-quantitative or based on sampling of newspapers (26), in this study, all daily and weekly issues of the various newspapers over the period of twelve months were reviewed. The study, therefore, provides a more complete picture on the pattern and scientific quality of health research reporting in these local newspapers in Trinidad and Tobago.

A limitation was that while the study was confined to the daily newspapers, there exist eight other weekly and evening newspapers in Trinidad and Tobago and numerous bulletins produced by organizations within the health sector. Thus, the findings in this study might only be applied to the scientific quality of health research articles in the daily newspapers in Trinidad and Tobago. Notwithstanding, we believe that with an estimated coverage of 188 000 daily readers, the development of excellent standards for reporting health research by the local newsprint industry would ensure that readers are provided with contemporary health issues in an accurate and timely manner. Another limitation of this study is that it did not address the editorial decision making process that determines which health research articles get published in these daily newspapers. Several factors are known to influence what gets published among these are newsworthiness of the article, journalists’ and editors’ confidence in handling the relevant issues, ease of extracting the article from its original sources, and space for publication of competing articles.
In addition, this study did not address behavioural issues associated with health research from the purview of the newsprint readership. A perusal of editorial columns, comments, letters to the editor and other health-related educational articles suggest that the major issues focused on during the period of interest were related to industrial actions by healthcare workers, outbreaks of infectious disease at public health facilities and issues focusing on overall delivery and performance of the health system. The apparent failure of the newsprint medium to engage feedback on issues related to its health reports might be due to the fact that such issues might have been more effectively and efficiently addressed by the multiplicity of television and radio stations call-in programmes as well as panel discussions and ensuing debates conducted by non-governmental, community-based and faith-based organizations. The interactive nature of these media provides the environment where many of the behavioural health issues related to the predominant areas reported by the newsprint medium (eg nutrition, diabetes mellitus, cancer, cardiovascular disease) might be addressed in a more timely and anonymous manner. Finally, we did not conduct a content analysis of the various published articles, as this would be the subject of a future investigation. While we used one approach to evaluate the quality of newspaper reporting of health research, there are other approaches each with its particular strengths and limitations (10, 27).

To summarize, the overall scientific quality of health research published by various newspapers in Trinidad and Tobago suggests the need for journalists and editors to develop systems of reporting that would ensure that reports are consistently complete and of a high scientific quality by addressing the funda-mental questions of what, why, who, where, when and how. Practically, this might be achieved by adopting a publication format similar to the structured abstract format used by many peer-reviewed journals and by overseeing improvements in all aspect of the editorial process from information gathering to the production of the final piece. In addition, establish selection guidelines might be formulated as a standard feature of the editorial oversight process. Such guidelines should present clear criteria for input from health professional and other stakeholders within the various disciplines of health with regards to the format and the nature of the articles to be published.

REFERENCES


A Content Analysis of Health Research Reported by the Daily Newspapers of Trinidad and Tobago
S Nichols¹, N Chase¹

ABSTRACT

The ability to translate health research into useful information for the layperson requires both excellent scientific expertise and communication skills that are often foreign to journalist and editors. In this study, we assessed the content of health research articles published in the local daily newspapers for the year 2003. Issues considered included physical presentation, coverage, primary content of the article relative to the country health profile, accuracy of the article compared to its original publication, health model (ie preventative versus medical/curative) and tone (emotive nature of the report, stakeholder addressed). The authors identified 321 eligible articles as follows, The Trinidad Express (108), The Trinidad Guardian (100) and The Trinidad and Tobago Newsday (113). More than 90% of the reports appeared in the newspapers within two weeks of their original journal publication; 10.5% of the articles had over 50% newspaper readership coverage. Headlines were prominently displayed for 70% of articles while 86% of the written text were located on the top right and left quadrant of pages where the eye naturally falls during reading. Photographs accompanied 36% of the articles. Approximately 72.5% of articles accurately reflected the content of the original publication and 67% of them were classified as preventative. There were similar proportions of good (45%) and bad (47%) articles. The top five predominant themes were nutrition (24.3%), cancer (18.2%) women's health (17.6%), heart disease (14.2%) and mental health (10.3%). The findings suggest a tremendous effort by journalist and editors to provide relevant health information in a timely and attractive manner; however, this should not be at the expense of accuracy.

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INTRODUCTION
While they have been criticized for attributing too much certainty to health research findings, for premature representation of findings as medical breakthroughs, and for being alarmist, incomplete, inaccurate and inconsistent, newspapers have become a major source of health related information for the general public (1–4). This information has the potential to influence the public belief about the aetiology of disease as well as the provision and use of health services (5, 6). Thus, the newsprint medium is an important source of health risk communication. The onus is therefore on journalists and editors to explain clearly the methodologies by which health risk severity are assessed and interpret the results emanating from such methodologies in a manner that facilitates a better understanding of the associated risks by the readership (7). Such a venture requires both excellent scientific expertise and the ability to translate complex technical information into a commonsense language that could be understood by the general newspaper readership. Unfortunately, journalists and editorial staff are constrained by their inability to evaluate the quality of evidence and argument presented in medical journals (5). It is therefore crucial for stakeholders in the health sector to analyze and monitor on a continuous basis the quality of health research reported in the newsprint medium (8–10). The authors, therefore, undertook a content analysis of the health research information published by the three local daily newspapers namely: the Trinidad and Tobago Newsday (Newsday), The Trinidad Express (Express), and The Trinidad Guardian (Guardian).

METHODS
All health research articles published in the three local daily newspapers (ie Newsday, Express, and Guardian) for the period January 1 to December 31, 2003, were retrieved and their contents recorded on a standardized form by one of the authors. Included in the study were peer-reviewed journals, press releases, articles from international news agencies such as Reuters and Associated Press and articles by local journalists based on published research. Excluded from the study were newspaper editorials, commentaries, articles for debate and education, narrative reviews, letters to the editor, case reports, articles related to the local health sector and advertisement of health products and services. The content of the articles were assessed by taking into consideration currency, coverage, prominence, relevancy, congruency, health model perspective, tone and orientation of the report. To determine interrater agreement, Cohen’s kappa (κ) was computed for all of the content issues on a random 20% of articles extracted and coded by the other author. For Cohen’s kappa (κ), values of 0.75 or greater may be taken to represent excellent interrater agreement beyond chance, values less than 0.4 may be taken to represent poor interrater agreement beyond chance and values between 0.4 and 0.75 represent fair to good agreement beyond chance (11).

Currency
The period elapsing between the original publication of the article and its appearance in the local newspapers was used to index currency. A random sample of 20% of articles citing an original source was analyzed for their currency.

Coverage
Coverage was assessed by noting the number of newspapers carrying the particular article. Estimates suggest a daily readership of approximately 188 000 persons with the Express emerging in the number one position with 43% of the daily newspapers’ readership compared to 36% daily newspapers’ readership for the Newsday and 21% daily newspapers’ readership for the Guardian (12–14).

Prominence
This feature referred to the frequency and manner in which the particular article is presented in the newspaper. In this study, size of headline, position of the page, length, frequency of publication, and presence or absence of accompanying graphics were use to assess prominence (15).

Relevancy
This referred to the nature of the article with respect to the major health issues facing the country. Articles were classified into one or more categories based on the predominant issue(s) contained in the report. For example, the article “Fats from olive oil safer than mayonnaise” published by the Express was classified under the category of Nutrition while “Breast cancer drug could treat infertility” published by the Newsday was classified under the categories of Cancer, Drug Therapy, Women’s Health and Reproductive Health. Relevancy was also assessed by taking into consideration the socio-economic context (industrialized or developing country) in which the research was conducted (16, 17).

Congruency
Congruency referred to the degree of agreement between the newspaper report and the original report of the particular health research issue. In this study, congruency was assessed by comparing a random sample of 20% of the articles with
the original report with respect to the subject of the article, author, affiliated institution, characteristics of participants, number of participants, results, study objective(s), conclusion, limitation of findings, study procedure, study setting and outcome of interest. Both percentage and Cohen’s kappa (κ) were computed to determine the degree of agreement on points of congruency between the newspapers and the published articles (18). Articles having similarities in ninety per cent or more of congruent features and kappa values greater than 0.75 were deemed to have a high degree of congruency and accurately replicated the original report.

**Health Model Perspective**

This feature refers to the predominant apparent model of health displayed by the report (ie preventative model or medical model). Public health articles for the purposes of this study included health promotion and primary healthcare as major components. Newspaper articles in this category included factors conducive to health, amelioration of preventable conditions and rehabilitation such as life-style (behavioural and environmental adaptations), nutrition, consumption of alcohol and tobacco products (16). The medical model on the other hand is based on the germ theory of disease and assumes that all disease is caused by specific aetiological agents (16). In this model, the patient tends to be seen as the passive target of medical intervention rather than part of a complex social environment. Newspaper items included under the medical model were those which featured as their main theme, medical intervention or treatment, scientifically based procedures, technology and institutionally based care founded on laboratory based research about disease processes.

**Tone and Orientation**

This referred to the emotive nature of the article. Articles were classified as positive, negative, or neutral. In addition, articles were classified according to whether they addressed persons or issues (16).

**Statistical Analysis**

Overall, summary simple statistics such as mean, percentages and frequencies were computed. Odds ratios were determined for variables of interest using logistic regression. All data were analyzed using Stata (Stata Statistical Software: Release 7.0. Texas, Stata Corporation, 2001) and SPSS (SPSS Statistical software: Release 11.0 for windows, Chicago, Illinois, 2003). Both percentage agreement as well as the more conservative Cohen’s kappa (κ) were calculated to determine the degree of agreement between investigators as well as the degree of agreement between the newspaper article and original publication. A kappa value greater than 0.75 was taken to represent excellent agreement beyond that expected by chance.

**RESULTS**

Of the 321 eligible articles, 108 were collected from the Express, 100 from the Guardian and 113 from the Newsday. These represented 88 (22.2%) publication days per year for the Express, 58 (15.9%) publication days per year for the Guardian and 79 (21.6%) publication days per year for the Newsday. Cohen’s kappa (κ) for interrater agreement for the classification of variables ranged from 0.86 to 1.00.

**Currency**

Approximately 98% (63 out of the 64 randomly selected articles) were originally published during 2003 and over 90% of these reports appeared in the newspapers within two weeks of their original publication date.

**Coverage**

Thirty articles (9.3%) were reported by two or more newspapers as follows; four articles by all three daily newspapers (100% readership coverage), nine articles reported by the Express and Newday (79% readership coverage), eight articles by Guardian and Newday (64% readership coverage) and nine articles by the Express and Guardian (57% readership coverage). The Express published the majority of its health research articles on Thursdays (27%), Mondays (25.2%), Wednesdays (20.9%) and Saturdays (18.3%) while Mondays (51.5%) and Sundays (37.7%) were the preferred days for the Guardian. Wednesdays (28.3%), Tuesdays (18.6%) and Thursdays (18.6%) were the preferred publication days for the Newsday.

**Table 1: Examples of headlines of articles published in the daily newspapers**

<table>
<thead>
<tr>
<th>The Trinidad Express</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem cells help patients recover from heart disease</td>
</tr>
<tr>
<td>Fats from olive oil safer than mayonnaise</td>
</tr>
<tr>
<td>Obesity linked to cancer</td>
</tr>
<tr>
<td>Sex at least once a day helps to keep the doctor away</td>
</tr>
<tr>
<td>For long life drink red wine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Trinidad Guardian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin women more prone to morning sickness</td>
</tr>
<tr>
<td>Caffeine alcohol mix protects against brain damage</td>
</tr>
<tr>
<td>Health effects of second hand smoke questioned</td>
</tr>
<tr>
<td>Infertility more common among lesbians</td>
</tr>
<tr>
<td>Fat has no effect on stroke risk</td>
</tr>
<tr>
<td>Pap smears not needed every year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Trinidad and Tobago Newsday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer drug could treat infertility</td>
</tr>
<tr>
<td>Women pregnant with boys eat more</td>
</tr>
<tr>
<td>Red wine good for your lungs</td>
</tr>
<tr>
<td>Smoking increases risk of multiple sclerosis</td>
</tr>
<tr>
<td>Painkillers during pregnancy increase miscarriage risk</td>
</tr>
<tr>
<td>A tomato a day keeps heart disease away</td>
</tr>
</tbody>
</table>
Prominence
Table 2 shows the frequency of several key features related to prominence. Two-thirds of the headlines were at least one centimetre in height. The majority of articles (85.6%) were displayed in the top right and left quadrants of the relevant pages. The majority of articles (78.7%) were generally less than 500 words in length and most (63.6%) were devoid of graphics. Articles were equally likely to be published on left or right pages. A significantly larger proportion of health research articles focussing on the major cause of morbidity and mortality in the adult population (ie heart disease, cancer, high blood pressure and diabetes mellitus) was found in the Express (53.7%) and Newsday (41.3%) as compared to the Guardian (14.7%).

Relevance
The top ten most frequently reported issues in order of decreasing importance were as follows; Nutrition (24.3%), Cancer (18.2%), Women’s Health (17.6%), Heart Disease (14.2%), Mental Health (10.3%), Obesity (8.1%), Infant and Child Health (7.8%), Exercise and Fitness (7.8%), Diabetes Mellitus (5.9%), and Drug therapy (5.9%). Noticeably, few articles were devoted to research on HIV/AIDS (2.5%). In addition, the majority of the research work (97.5%) was conducted on populations in developed countries.

Congruency
Overall, the percentages of randomly selected articles reporting methodological components consistent with the original report were as follows: objective(s) (100%, κ = 1.00), study design (80.0%, κ = 0.53), study procedure (95.0%, κ = 0.86), description of participants (88.0%, κ = 0.65), number of participants (77.5%, κ = 0.55), outcome variables (97.5%, κ = 1.00), authorship (100.0%, κ = 1.00), authors’ affiliation (95.0%, κ = 0.86), results (80.0%, κ = 0.56), conclusion (77.5%, κ = 0.50), and limitations (82.0%, κ = 0.61), and study setting (100%, κ = 1.00) (Table 4).

Health Model Perspective
Articles categorized as public health were significantly more likely to be published than those of the medical model (69.2 versus 30.8, p < 0.0001). The major stakeholders addressed by the articles were the public (56.7%), women (20.7), men (7.8), infant and children (5.3) and professionals (practitioners, researchers and policy makers) (9.5%). Articles classified under the medical model were significantly more likely (OR = 2.27, 95% CI: 1.42, 3.62; p < 0.0001) to contain limitations than those classified as positive.

Table 2: Issues relating prominence of health research reporting by the daily newspapers

<table>
<thead>
<tr>
<th>Features of article layout</th>
<th>n = 321</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size of headline</strong></td>
<td></td>
</tr>
<tr>
<td>Small (&lt; 9 mm)</td>
<td>96 (30.0)</td>
</tr>
<tr>
<td>Medium (9–11 mm)</td>
<td>185 (57.9)</td>
</tr>
<tr>
<td>Large &gt;11 mm</td>
<td>40 (12.1)</td>
</tr>
<tr>
<td><strong>Location on Page</strong></td>
<td></td>
</tr>
<tr>
<td>Top left quadrant</td>
<td>101 (31.6)</td>
</tr>
<tr>
<td>Top right quadrant</td>
<td>77 (24.0)</td>
</tr>
<tr>
<td>Top left and right quadrants</td>
<td>97 (30.1)</td>
</tr>
<tr>
<td>Bottom left quadrant</td>
<td>17 (5.4)</td>
</tr>
<tr>
<td>Bottom right quadrant</td>
<td>24 (7.5)</td>
</tr>
<tr>
<td>Bottom left and right quadrants</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Whole page</td>
<td>5 (1.4)</td>
</tr>
<tr>
<td><strong>Location in the newspaper</strong></td>
<td></td>
</tr>
<tr>
<td>Left page</td>
<td>169 (52.7)</td>
</tr>
<tr>
<td>Right page</td>
<td>145 (45.2)</td>
</tr>
<tr>
<td>Both pages</td>
<td>7 (2.1)</td>
</tr>
<tr>
<td><strong>Accompanying graphics</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>117 (36.4)</td>
</tr>
<tr>
<td>No</td>
<td>204 (63.6)</td>
</tr>
<tr>
<td><strong>Article length</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 500 words</td>
<td>253 (78.8)</td>
</tr>
<tr>
<td>500–1000 words</td>
<td>65 (20.2)</td>
</tr>
<tr>
<td>&gt; 1000 words</td>
<td>3 (1.0)</td>
</tr>
</tbody>
</table>

Table 3: Shows a summary of the frequencies of the predominant issues addressed by the daily newspapers.

<table>
<thead>
<tr>
<th>Predominant issues</th>
<th>n = 321</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Health</td>
<td>6 (1.7)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>12 (3.4)</td>
</tr>
<tr>
<td>Blood Pressure (Hypertension)/ Stroke</td>
<td>23 (6.4)</td>
</tr>
<tr>
<td>Cancer</td>
<td>65 (18.2)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>21 (5.9)</td>
</tr>
<tr>
<td>Drug Therapy</td>
<td>25 (5.9)</td>
</tr>
<tr>
<td>Exercise /Fitness and Health</td>
<td>28 (7.8)</td>
</tr>
<tr>
<td>Genetics</td>
<td>5 (1.40</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>51 (14.2)</td>
</tr>
<tr>
<td>Herbal Medicine</td>
<td>6 (1.7)</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>10 (2.8)</td>
</tr>
<tr>
<td>Infant/Children Health</td>
<td>28 (7.8)</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>3 (0.8)</td>
</tr>
<tr>
<td>Kidney disease</td>
<td>3 (0.8)</td>
</tr>
<tr>
<td>Men’s health</td>
<td>14 (3.9)</td>
</tr>
<tr>
<td>Mental health</td>
<td>37 (10.3)</td>
</tr>
<tr>
<td>Nutrition</td>
<td>87 (24.3)</td>
</tr>
<tr>
<td>Obesity</td>
<td>29 (8.1)</td>
</tr>
<tr>
<td>Pain</td>
<td>5 (1.4)</td>
</tr>
<tr>
<td>Reproductive Health</td>
<td>9 (2.5)</td>
</tr>
<tr>
<td>Smoking</td>
<td>14 (3.9)</td>
</tr>
<tr>
<td>Stress</td>
<td>16 (1.7)</td>
</tr>
<tr>
<td>Women’s Health</td>
<td>63 (17.6)</td>
</tr>
</tbody>
</table>

Tone and Orientation
Positive and negative articles were equally prevalent (45% vs 47%) in the newspaper reporting of health issues. In addition, the majority (64.8%) of articles addressed persons rather than issues. Articles classified as negative were significantly more likely (OR = 2.27, 95% CI: 1.42, 3.62; p < 0.0001) to contain limitations than those classified as positive.
DISCUSSION

In this study, we examined the content of health research reported by the three daily newspapers in Trinidad and Tobago using an objective, quantitative and systematic approach. Overall, the results suggest that journalists and editors of these newspapers make a good effort to present relevant health information in an attractive and timely manner. However, more attention needs to be paid to the congruency of the important aspects of the reports in order to ensure that these reflect accurately the contents of the original publication. In fact, the analyses reveal major deficiencies in study design, number of participants, results, conclusion, and study limitations all of which are crucial to the correct interpretation of findings emanating from the particular research. Failure to address adequately these important methodological issues can influence the public perception of underlying risks associated with the particular phenomenon as well as its understanding of the aetiology of disease and consequent health behaviour. Compounding this is the finding that articles classified as negative were significantly more likely to contain limitations than those classified as positive. This creates a dangerous scenario by implying that the findings in those studies classified as positive are unequivocal (3, 4). Such presentations are misleading and pose a serious concern in situations where the newspaper report of health issues are the primary source of information of particular health issues. Clearly, journalists and editors need to collaborate with those health professionals who are trained in the interpretation of health research, since many of the skills and competencies needed to translate complex research into a language that lay persons can understand might not be part of their formal training (5).

Relevance and the manner of presentation are two features of any form of printed material that help to generate interest in articles. It is thought by many in the industry that the articles in the newsprint medium reflect the issues that are of interest to the society. This being the case, we might assume that there is a high level of public interest in issues related to Nutrition, Cancer, Women’s Health, Heart Disease, and Mental Health. Yet, we know of no research by the newspapers to suggest that these are the prime health issues that would generate public interest. Most disappointing though was the scant attention being given to issues such as high blood pressure, diabetes mellitus and HIV/AIDS research despite the fact that high blood pressure and diabetes mellitus and their sequelae account for over 50% of attendance at healthcare facilities nationwide as well as the massive monetary commitment by government following approval of a $20 million loan from the World Bank on June 26, 2003, for treatment and prevention of HIV/AIDS (19, 20). Notwithstanding, this journalist and editors of the Express and Guardian maintain an excellent periodicity for the publication of diseases most rampant in the adult population. It appears that the newsprint medium not only reflects the health concerns of the population but also dictates the health issues for consideration by society (21, 22). Another important aspect of relevancy is similarity of context. The majority of health research issues reported was conducted in developed countries such as the United States of America, Canada, and some of the more wealthy countries comprising the European Union. This might reflect a true paucity of relevant research from developing countries. However, within the Caribbean, there has been important and relevant health research with serious policy implications that seem not to be deemed newsworthy. We believe that the time has come for journalist and health research scientists in the Caribbean to collaborate in a manner that exposes populations of the Caribbean, especially policy makers and planners to important contextual health research. This might be achieved by devoting a proportion of the health research articles to research done with the Caribbean. Assistance in identifying such research might be from institutions such as The University of the West Indies and the Caribbean Health Research Council (CHRC). Regular press releases from

<table>
<thead>
<tr>
<th>Methodological features</th>
<th>Feature present and identical in both articles</th>
<th>Feature absent in both articles</th>
<th>Feature present in one article and absent in the other</th>
<th>Percentage agreement</th>
<th>Cohen’s kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorship</td>
<td>32</td>
<td>14</td>
<td>0</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>Author’s affiliation</td>
<td>36</td>
<td>8</td>
<td>2</td>
<td>95</td>
<td>0.86</td>
</tr>
<tr>
<td>Objective</td>
<td>45</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>Study design</td>
<td>29</td>
<td>8</td>
<td>9</td>
<td>80</td>
<td>0.53</td>
</tr>
<tr>
<td>Study procedure</td>
<td>36</td>
<td>8</td>
<td>2</td>
<td>95</td>
<td>0.86</td>
</tr>
<tr>
<td><em>Description of study population</em></td>
<td>38</td>
<td>3</td>
<td>5</td>
<td>88</td>
<td>0.65</td>
</tr>
<tr>
<td>No of participants</td>
<td>25</td>
<td>11</td>
<td>10</td>
<td>77.5</td>
<td>0.55</td>
</tr>
<tr>
<td>Study setting</td>
<td>35</td>
<td>11</td>
<td>0</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>Outcome variable</td>
<td>45</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>Results</td>
<td>27</td>
<td>10</td>
<td>9</td>
<td>80</td>
<td>0.56</td>
</tr>
<tr>
<td>Conclusion</td>
<td>28</td>
<td>8</td>
<td>10</td>
<td>77.5</td>
<td>0.50</td>
</tr>
</tbody>
</table>
journals such as the West Indian Medical Journal, Caribbean Health and the Pan American Journal of Public Health to local and regional newspapers can contribute significantly to the issue of news relevancy.

The findings of a two-fold likelihood of health research articles being of the public health model rather than the medical model is contrary to the findings of a similar study (5). This might reflect the fact that the majority of these studies were conducted in countries where research into basic medical research and technology to improve the quality of healthcare delivery are at the forefront of their respective healthcare system reform. This is different from the situation in Trinidad and Tobago and many of the English-speaking Caribbean countries that are in the throes of healthcare reform where the patient/client are being asked to take a more proactive role in the maintenance of their health. This focus on health research with a preventative purview is encouraging and suggests an acute awareness on the part of journalist and editors to reflect the overall patient-centred trust of the health sector reform programme (23). This coupled with the fact that two-thirds of the articles focused on persons rather than issues reinforces the need for journalists and editors to focus their attention on presenting health research in an accurate manner. The analyses were carried out for one year only and might not reflect the content pattern of previous years. Clearly, there is need for such a study to reveal the underlying pattern of choice for reported studies.

Content analysis is an objective technique that is heavily influenced by interrater reliability (24, 25). Thus poor interrater reliability would render data and their concomitant interpretations at best misleading (26). There are many different measures, or indices, of intercoder reliability; however, only a small proportion (Percent agreement, Holsti’s method, Scott’s pi (p), Cohen’s kappa (k), and Krippendorff’s alpha) is widely used to analyse content analysis in communication (26). We used Cohen’s kappa to estimate agreement between observers for several reasons. First, most of the variables collected were nominal and quite suited to assumptions for Cohen Analyses. Secondly, the Cohen’s procedure for calculating agreement takes into consideration coding agreement that can occur by chance and represents, unlike percentage agreement, a highly conservative estimate of intercoder agreement. Finally, Cohen’s kappa can be estimated easily in SPSS using the cross tabulation feature (27). Thus the high kappa values (0.86 to 1.00) for interrater reliability suggest excellent agreement between the investigators on all variables collected and improves the interpretation of the results.

This study has several limitations. First, it looked only at the content of the newspapers and did not address the question of the percentage of regular readers who peruse these health research articles nor the effectiveness and impact of the information on readers. Secondly, there are other features of the text that could have been considered in its context analysis such as the reading level of the article, font size and type. Thirdly, there are other approaches to analyzing article content each with its own particular strengths and limitations (28, 29). Fourthly, the analyses were carried out for one calendar year and might not reflect the general long-term content pattern of the various newspapers. Notwithstanding these limitations, the current study represents the first quantitative assessment of the content of health research articles published in the Trinidad and Tobago daily newspapers. In this respect, the study provides fundamental information on the nature of the content of health research reporting in the local newspapers in Trinidad and Tobago and provides a template upon which content analysis of other health research issues in the print media might be assessed.

To summarize, journalists and editors succeeded in presenting relevant health research in an interesting and timely manner; however, they need to ensure that it is congruent with the original publication. This might be by summarizing accurately each section of the original publication in a manner similar to the structured abstract format used by many peer-reviewed journals.

REFERENCES
ABSTRACT

Objective: To determine the characteristics of patients with severe uncontrolled hypertension, in a Jamaican specialist practice; the level of blood pressure control achieved in routine clinical practice, and the number/type of antihypertensive medications required for blood pressure control.

Design: This was a retrospective analysis of the medical records of 500 consecutive patients presenting to a consultant physician private group-practice between January and December 2000. Data were extracted from the records of the 48 patients with severe (Grade III) hypertension (WHO/ISH).

Results: Fifty per cent (252) were found to be hypertensive, 19% (48) had Grade III hypertension. The patients with severe uncontrolled hypertension were of mixed ethnicity, predominantly African. Most were less than 65 years old, never smoked cigarettes and were overweight/obese. Nearly one-half had LDL cholesterol >3.4 mg/dL. Diabetes (31%) and congestive heart failure (21%) were the most common comorbid conditions. Nearly one-half had no illnesses other than severe hypertension. Cardiovascular symptoms were predominant, followed by dizziness. Only 19% of patients were asymptomatic. More than half of the patients achieved blood pressure > 140/90 mm Hg during the study period. Most patients received four drugs and the number of drugs prescribed increased with duration of follow-up. The antihypertensive medications most prescribed at one year were – angiotensin converting enzyme inhibitors (87%), diuretics (78%), calcium channel blockers (63%) and β-blockers (69%).

Conclusion: Severe hypertension was a common problem in the specialist private practice in Jamaica. Most patients had cardiovascular symptoms, were dyslipidaemic and required four or more antihypertensive drugs for adequate long-term control.

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INTRODUCTION
Current hypertension treatment guidelines advocate lower targets for blood pressure control, ie < 130/85 mm Hg (1–3). Randomized clinical trials have demonstrated that these targets can be achieved in more than 90% of patients using a rational combination of drugs (4–6). Practising physicians are, however, sceptical that ‘real world’ patients (without inclusion or exclusion criteria) can achieve similar goals or adhere to the required multi-drug regimens. In addition, severe hypertensives may represent a specific subset of patients who require more intensive therapy. Few studies have been devoted to this high-risk group.

The aim in this study was to determine the characteristics of patients with severe hypertension, in a Jamaican population; the level and durability of blood pressure control achieved in routine clinical practice, and the number and type of antihypertensive medications required for blood pressure control.

METHODS
The medical records of 500 consecutive patients presenting to the authors’ private group-practice (internal medicine/cardiology) between January and December 2000 were retrospectively analyzed. Hypertension was defined as blood pressure > 140/90 mm Hg. Data were extracted from the charts of the 48 patients with severe (Grade III) hypertension (1). The World Health Organization criteria which define Grade III hypertension as systolic blood pressure > 180 mm Hg and/or diastolic blood pressure > 110 mm Hg were used. The patients were self-referred or referred by general practitioners. All patients were seen by the same physician fortnightly, on the average, until reasonable blood pressure control was achieved, and then monthly. At each visit, history and physical examination including height, weight, body mass index, blood pressure and blood glucose were obtained. In addition, patients were counselled with regard to low sodium diet, weight reduction where appropriate, appropriate exercise and medication adherence. Secondary causes of hypertension were ruled out by history, physical examination and laboratory investigations at the discretion of the physician. At intervals of three months, one year and two years after presentation, data on blood pressure control were extracted. Patients who were no longer in the practice were excluded from the analysis. Control rates at each interval were expressed as a percentage of the patients still in the practice.

RESULTS
Of the 500 charts reviewed, 50% (252) were hypertensive and 19% (48) of these had Grade III hypertension. The patients with severe hypertension were of mixed ethnicity, predominantly African. The number of patients who remained in the practice at 2 years was only 50% (24) of the original (48). There were no cases of secondary hypertension in the group.

Table 1 presents characteristics of the 48 patients with Grade III hypertension. Most patients were less than 65 years old, never smoked cigarettes and were overweight or obese. Table 2 presents the predominant comorbidities of the pa-
Table 3: Predominant presenting symptoms of patients with Grade III hypertension

<table>
<thead>
<tr>
<th>Presenting symptoms</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortness of breath</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Chest pain</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Palpitations</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Leg swelling</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Dizziness</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>None</td>
<td>9</td>
<td>19</td>
</tr>
</tbody>
</table>

The number of antihypertensive medications required increased with duration of follow-up. The medications most prescribed at one year were: angiotensin converting enzyme inhibitors (ACEI) (87%), diuretics (78%), calcium channel blockers (63%) and β-blockers (69%).

DISCUSSION

The results of this study lend support to those of randomized trials which showed that the majority of hypertensive patients can be controlled to BP < 140/90 mmHg with combination therapy, moreso since this analysis involved only patients with Grade III hypertension (5–8). The relatively high control rates, compared to published data, may not only be a physician factor but also a willingness of symptomatic patients with severe hypertension to adhere to multidrug therapy. Further study is required in this area.

The results in this study contrast with those of Wilks et al (9) who showed that only 18% of all hypertensives were controlled to BP 140/90 mmHg in a private group general practice, a specialist hypertension clinic and a public general clinic, with no differences between the practices. This may represent the use of non-synergistic combinations (diuretic and alpha methyldopa were the most common medications used) and physician unwillingness to prescribe multiple medications, in addition to patient factors. The results also contrast with those of Banegas et al (10) who studied patients in hospital-based hypertension units in Spain. They found that 42% achieved blood pressure < 140/90 mmHg. Of their uncontrolled patients, approximately 30% were still on monotherapy and they concluded that more aggressive behaviour of physicians was needed.

The number of antihypertensive medications required is again consistent with data from randomized trials such as UKPDS(6), HOT(4), AASK(11), and ABCD(12) (> 66% required three or more drugs) and reflects the severity of hypertension in the study population, but contrasts with those of Amar et al (13) who looked at 1,423 and 2,596 patients respectively recruited by general practice and cardiologists in France. Among the uncontrolled patients, 17.5% (general practice) and 26.6% (cardiology practice) received at least three drugs. They concluded that underuse of combination therapy contributed to poor blood pressure control. In the present study, the number of antihypertensive medications increased over the study period and may be due to tolerance to medications, progression of hypertensive vascular disease, and/or the increasing age of the patients and underscores the need for constant surveillance and close follow-up.

The most commonly prescribed agents (ACEIs and diuretics) reflect current treatment guidelines. However, compared to the report of Wilks et al (9), where only 38% of patients in the private group general clinic were prescribed ACEIs, in the present study a much higher number (87%) received ACEIs, reflecting prescribing patterns resulting from recent clinical trial data (14–16).

The present study found that most patients with severe hypertension appeared to have cardiovascular symptoms attributable to their hypertension (80%). However, most medical textbooks describe hypertension as an asymptomatic disease. Kjellgren et al (17) reported that 57% of hypertensive patients spontaneously reported having symptoms – headache and dizziness being the most frequent. The difference in symptoms, cardiovascular (in the present study) versus CNS (Kjellgren et al) may reflect the fact that patients in the former study had Grade III hypertension while in the latter the patients had the full spectrum of hypertension, mild to severe. It is also possible that some of the symptoms of patients in the present study may have been due to previously prescribed antihypertensive medications.

This study is limited by its retrospective nature and small number of patients. In addition, patients were classified as Grade III hypertension based on blood pressure at presentation, not when newly diagnosed, and therefore do not represent a ‘pure’ sample. The number of patients who remained in the practice at two years was only 50% of the original. This may represent the natural migration pattern of patients and may contribute to loss of control with time. As control rates were expressed as a per cent of patients still in the practice, these may be overestimated.
In summary, this study found that severe hypertension was a common problem in a specialist private practice in Jamaica. Most patients had cardiovascular symptoms and were dyslipidaemic. More than 50% of patients were controlled with multidrug regimens. Most patients required four or more antihypertensive drugs for adequate long-term control with the number of antihypertensive medications increasing with time.

REFERENCES
Variation of Homicidal and Suicidal Behaviour within Trinidad and Tobago and the Associated Ecological Risk Factors

G Hutchinson 1

ABSTRACT

Self destructive behaviour may not occur consistently across a population. Identification of variations in homicidal and suicidal behaviour within a country can enable specific prevention and public health strategies to be adopted. This is significant because morbidity and mortality associated with these behaviour patterns is preventable and the affected population is increasingly young adults with potentially productive lives. The author sought to identify some of the associated risk factors with the behaviours in Trinidad and Tobago, a developing island-state in the English-speaking Caribbean, by disaggregating the homicide and suicide data available from Police records for distinct geographical regions. Spearman rank correlation was used to determine whether any of the variations observed could be attributed to social or demographic factors. Homicide and suicide were inversely related in many areas of the country. They were both low in Tobago. Homicide was positively associated with high population density, low marriage rates, African ethnicity and showed a trend toward association with school drop-out rates. For suicide, low population density, low income, East Indian ethnicity and alcohol consumption were significantly correlated. These findings underline the benefit of disaggregating national data and suggest specific interventions to diminish the occurrence of these harmful behaviour patterns in Trinidad and Tobago with possible extension to other similar developing countries.

Variación del Comportamiento Homicida y Suicida en Trinidad-Tobago, y Factores Ecológicos de Riesgo Asociados

G Hutchinson 1

RESUMEN

Puede que los comportamientos auto-destructivos no ocurran de forma sistemáticamente en una población. La identificación de variaciones en el comportamiento homicida y suicida dentro de un país puede hacer posible la adopción de estrategias específicas tanto con respecto a la prevención como en relación con la salud pública. Esto es significativo porque la morbilidad y la mortalidad asociadas con estos patrones de conducta son prevenibles y la población afectada consiste cada vez más de adultos jóvenes con vidas potencialmente productivas. Desagregando los datos sobre suicidios y homicidios a su disposición en los archivos de la policía en diferentes regiones geográficas, el autor se dio a la tarea de identificar algunos de los factores de riesgo asociados con los comportamientos en Trinidad-Tobago – una Isla-Estado en vías de desarrollo en el Caribe anglofóno. A fin de determinar si alguna de las variables observadas podía atribuirse a factores sociales o demográficos, se recurrió al coeficiente de correlación por rangos de Spearman. El homicidio y el suicidio se hallaban en relación de proporcionalidad inversa en muchas áreas del país. En Tobago, ambos resultaron ser bajos. El homicidio estuvo positivamente asociado con una alta densidad de población, tasas de matrimonio, etnicidad africana y mostró una tendencia hacia la asociación con las tasas de deserción escolar. Por su parte, el suicidio presentó una correlación significativa con una baja densidad de población, ingresos bajos, etnicidad indo-oriental, y consumo de alcohol. Estos hallazgos destacan el
INTRODUCTION
The impact of violence on health and healthcare has become an increasing concern of medicine particularly with regard to young adults (1). It is therefore incumbent upon the medical profession to lend attention to these forms of morbidity and mortality as they contribute significantly to demands on health services, particularly in environments of limited resources. This is so because deaths due to violence are most likely among young adolescents and adults (2) and those of lower socioeconomic status (3). The World Health Organization (WHO) estimates that violence is the sixth leading cause of disability among males aged 15–44 years and tenth overall for both genders (4). In 1990, an estimated 1,851,000 people in the world died from violence, giving a rate of 35.3/100,000. Since these deaths are preventable, understanding the distribution and determinants of this behavior becomes an important domain of public health strategy (5). This is critical for developing countries because their development is primarily related to their human resources. Morbidity and mortality associated with violence has therefore become a major cause for concern among health planners and policy makers.

The study of regional variation of violent deaths within a country is useful in the determination of specific risk factors that can be addressed by preventive measures in specific populations. These include urban rural differences, population density, ethnicity, social and economic status, crime rates, drug consumption and mental illness (6). Other demographics such as employment levels, income equality and education are also likely to affect these behaviors (7). In addition to the demands placed on health and other social services, the wider societal impact on productivity, family disruption and community perceptions make this form of injury very significant in any society. It can also serve to provide fairly accurate representations of community vulnerability.

Trinidad and Tobago is an English-speaking Caribbean country at the southernmost tip of the Caribbean chain. Paradoxically, while being the home and host of the now pan-Caribbean images of calypso, steel band and carnival (8) it also has the highest suicide rates per capita in the English-speaking region (9). There is also increasing concern about its homicide rate as well which has increased dramatically during the decade of the nineties. It is a multi-ethnic country, with approximately equal proportions of people of African descent 39%, and those of Indian origin (40%). The remaining 21% of the population are of mixed ethnicity, European (15%), Asian and Middle Eastern, approximately 2% each (10).

Since homicide, suicide and other deaths by violence are likely to arise out of social pathology, even when distilled through the presence of psychopathology, it is important to analyze them in the context of the societies where they occur.

This analysis provides the basis of addressing the problem and can then be applied to other countries where similar social forces may be operating. In addition, morbidity and mortality due to violence ranks very highly in the young adult age-group with worldwide trends of increasing rates of both homicide and suicide (11).

Suicide in Trinidad and Tobago exhibited a 300% increase between 1978 and 1994 and perhaps this was attributable to the economic recession which succeeded the economic boom arising out of the world oil crisis of the seventies (10). Trinidad and Tobago is also somewhat unique in the Caribbean as its main economic activity revolves around the oil and gas industry although Tobago’s economy is primarily derived from tourism (10). The use of national statistics to follow these trends is therefore very useful but can be made even moreso by deconstructing the national statistics into regional or other smaller units. This can have the benefit of identifying specific aetiological factors that would have been hitherto hidden in the broader national reporting (5). This becomes even more significant in the planning and implementation of public policy (12).

Understanding the pattern of violent deaths may therefore also resonate with mental health service provision. This also applies to suicide rates, which have been shown to be sensitive to better and more sensitive detection of mental health problems such as depression. Homicide and accidents may both be related to the problem of substance abuse, and increasingly to the presence of depression (13). The study of homicide is relevant as it is also a reflection of criminal behaviour which in turn is associated with crime rates and the general sense of order or disorder and chaos in a society. These rates have been increasing in the Americas over the past two decades and have been suggested to be due to a general social decline in this part of the world (14). Early research suggested that there might be an inverse relationship between homicide and suicide as well as the social forces that influence these harmful behaviours. Homicide has been postulated to be associated with low external restraint and low socio-economic status while suicide is thought to vary with these variables in the opposite direction. These postulates were derived from work in the United States of America (USA) and may reflect specific realities in that country, particularly with regard to the racial inequalities that exist between Caucasian and African-Americans (15). These relationships may be additionally confounded by issues such
as inner city overcrowding, employment and perceptions of inequality (16). Urban – rural comparisons have yielded contradictory findings but clearly underline the need to assess intra – country variations in order to better understand the behaviour, particularly where they may be ethnic or racial differences. Access to the means of suicide and homicide has also been implicated, particularly where there are preferred methods for the commission of these acts in a given country (17).

Other reasons postulated for the inverse relationship between homicide and suicide suggest that it occurs as a result of a population’s tendency to either internalize or externalize violence (18). This is however not consistently seen, and in some countries this inverse relationship is not seen at all and in this context, homicidal and suicidal behaviour are thought to perpetuate each other.

We therefore sought to test the hypothesis that suicide and homicide are inversely related within a country, even as high rates are reported for both behaviours nationally, and to seek explanations using the demographic data available in Trinidad and Tobago.

METHODS

Homicide and suicide data are routinely recorded by the police and broken down into geographic regions of the country as defined by the location of police divisions. These cases reported are those which are confirmed after Coroner’s Inquests. Inquests take variable lengths of time depending on the circumstances of the suicide and the ease with which supporting evidence can be obtained, however an average of two to three months is usual. There are no dedicated courts or magistrates for this process and they can be handled by any magistrate in the various divisions.

Trinidad and Tobago has an estimated population of 1.3 million people who inhabit a land space of approximately 5128 square kilometers with a population density of 255 per square kilometer. The annual per capita income is approximately US$9 000 and 21% of the population are thought to be living below the poverty line with an annual per capita income of less than US$1000. There are two major cities, Port-of-Spain and San Fernando, in and around which 40% of the population live (19).

There are nine police divisions. The Port-of-Spain Division covers the capital city, Port-of-Spain, and is predominantly urban with inner city residents and a smaller number of peri-urban high income residents. The Western division is predominantly suburban and residential, populated largely by middle to upper income residents. The Northern division is also suburban but here the residents are of middle to lower income. The North Eastern division extends toward the Eastern tip of the country and is semi-urban rather than suburban as in the Northern region with a large business community engaged in manufacturing and engineering-based industries and with residents of lower to middle income. In the four aforementioned divisions, the predominant ethnicity is African (60%). The Eastern division is rural, with more agricultural activity and greater mix of ethnicity. The South Western and Southern regions are a mix of industrial and agricultural activity as it is here the oil and gas industries are mainly located, there is also marked agricultural activity and the population is largely of Indian ethnicity (63%). There is also a predominantly urban area in the Southern division which is the second major city in the country, San Fernando. The other division in Trinidad is Central which is the division with the largest Indian population (74%) and engages primarily in agricultural activity with sugar cane harvesting as its mainstay. There are also pockets of urban areas and suburban residents of middle to upper income but the majority of residents are of lower income. The Tobago division covers the island of Tobago which has a population of 50 000 that is predominantly of African origin (87%) and rural with tourism as its main source of economic activity (19).

Records were obtained from the police and tabulated, by region, the number of deaths accorded to homicide and suicide over a ten-year period (1991–2000) were tabulated by region. These were then compared statistically to test for significance to determine the differences between the regions. These were then broken down into age specific rates per 100 000 population to determine any age trends within the regions. Then, using data from the Central Statistical Office, the mean suicide rate over the ten year period for the regions was calculated and then compared with variables such as population density, ethnicity, religion, income, school drop-outs and alcohol consumption. Income was used as a measure of socio-economic status. The regions were ranked by percentage of individuals earning less than US$1000 per month as low income.

Spearman’s Rank Correlation was used to establish the significant correlations. While homicide rates are likely to be relatively accurate from police statistics, the suicide rates may be somewhat less so as the police would record those cases reported to them and confirmed after a Coroner’s inquest.

This might exclude those victims who either died in hospital of the medical complications of their suicidal attempt and those who may have died long after the attempt and were not reported.

RESULTS

Over the ten-year period, there were a total of 1093 homicides with an annual mean (standard deviation) 109.3 (7.1). The mean for suicide was 113.3 (1.2) arising from 1 133 suicides for the period.

Gender ratio:
Homicide: Male to Female 3.2:1
Suicide: Male to Female 3.8:1
Ethnicity (as recorded in Police files)
Suicide is more likely in the 55+ age group (Table 2: Illustrates that high population density, low marriage rates and represented for both homicide and suicide. (For homicide, the 35 to 44-year age group was significantly

**Methods Used (Percentage Distribution)**

Homicide: Firearm 60.5%; Chops/Stabs 38.2%; Other 1.3%
Suicide: Poisoning 64.2%; Hanging 30.3%; Other – including jumping from heights, self-wounding, firearms 4.5%.

Table 1 shows that there is an inverse relationship between homicide and suicide particularly in the Central and Port-of-Spain divisions.

Table 1: Mean homicide and suicide (1991–2000) by region per 100 000 population and population density (1995 mid-period estimate, Central Statistical Office, 2000)

<table>
<thead>
<tr>
<th>Region</th>
<th>Mean Homicide (sd)</th>
<th>Density</th>
<th>Mean Suicide (sd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Western</td>
<td>5.2 (1.3)</td>
<td>222</td>
<td>11.8 (1.6)</td>
</tr>
<tr>
<td>Central</td>
<td>5.9 (1.1)</td>
<td>324</td>
<td>12.2 (2.4)</td>
</tr>
<tr>
<td>Eastern</td>
<td>8.6 (1.8)</td>
<td>38</td>
<td>12.0 (2.1)</td>
</tr>
<tr>
<td>North Eastern</td>
<td>14.3 (2.4)</td>
<td>1001</td>
<td>3.7 (0.6)</td>
</tr>
<tr>
<td>Tobago</td>
<td>6.0 (1.7)</td>
<td>67</td>
<td>4.8 (0.7)</td>
</tr>
<tr>
<td>Western</td>
<td>8.2 (1.6)</td>
<td>1446</td>
<td>3.4 (2.1)</td>
</tr>
<tr>
<td>Northern</td>
<td>8.6 (2.2)</td>
<td>888</td>
<td>7.1 (0.5)</td>
</tr>
<tr>
<td>Port of Spain</td>
<td>22.0 (2.9)</td>
<td>2317</td>
<td>5.0 (1.8)</td>
</tr>
<tr>
<td>Southern</td>
<td>6.8 (1.6)</td>
<td>814</td>
<td>12.4 (2.5)</td>
</tr>
</tbody>
</table>

For homicide, the 35 to 44-year age group was significantly represented for both homicide and suicide. (p = 0.003). Suicide is more likely in the 55+ age group (p = 0.04).

Table 2: Illustrates that high population density, low marriage rates and African ethnicity are associated with homicide while alcohol consumption, low income and East Indian ethnicity are associated with suicide.

**Spearman Rank**

<table>
<thead>
<tr>
<th>Homicide</th>
<th>Population Variable</th>
<th>Suicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>R = 0.61</td>
<td><em>High Population Density</em></td>
<td>R = -0.60</td>
</tr>
<tr>
<td>R = -0.62</td>
<td>Low Population Density*</td>
<td>R = 0.60</td>
</tr>
<tr>
<td>R = -0.50</td>
<td>% Low Income**</td>
<td>R = 0.84</td>
</tr>
<tr>
<td>R = 0.40</td>
<td>#School Dropouts</td>
<td>R = 0.15</td>
</tr>
<tr>
<td>R = -0.40</td>
<td>Alcohol Consumption*</td>
<td>R = 0.43</td>
</tr>
<tr>
<td>R = -0.16</td>
<td>Divorce Rates</td>
<td>R = 0.15</td>
</tr>
<tr>
<td>R = -0.74</td>
<td>**Marriage Rates</td>
<td>R = 0.06</td>
</tr>
<tr>
<td>R = -0.33</td>
<td>% East Indian**</td>
<td>R = 0.72</td>
</tr>
</tbody>
</table>
* p < 0.05
** p < 0.02
# p = 0.08

In younger age groups (0–24 years), homicide is significantly more common than suicide (p = 0.03) (Table 3).

**DISCUSSION**

An inverse relationship has been reported between homicide and suicide in Germany and this was attributed to cultural differences in mediating aggression (20), however in

**Table 3:** Age Group Adjusted rates per 100 000 population (using Population mid-period estimate) (Central Statistical Office, 1995)

<table>
<thead>
<tr>
<th></th>
<th>0–14</th>
<th>15–24</th>
<th>25–34</th>
<th>35–44</th>
<th>45–54</th>
<th>55+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suicide</td>
<td>2.8</td>
<td>108.1</td>
<td>147.5</td>
<td>224.8</td>
<td>164.2</td>
<td>138.7</td>
</tr>
<tr>
<td>Homicide</td>
<td>12.5</td>
<td>124.8</td>
<td>154.5</td>
<td>205.7</td>
<td>133.7</td>
<td>84.7</td>
</tr>
</tbody>
</table>

Trinidad and Tobago, there are relatively high rates of both homicide and suicide. However, there tend to be inverse relationships when the country is divided regionally so where there are high rates of homicide, there tend to be low rates of suicide and vice versa. The inverse relationship is particularly striking for the South Western and Central regions where the suicide rates are twice that of the homicide rate and in the North East and Port-of-Spain where the homicide rates are three and four times respectively that of the suicide rates.

This is interesting because this relationship is reflected in many of the social variables that affect these behaviours. It also illustrates the importance of regionalizing data because national reporting would overlook this phenomenon. The variables which significantly show this inverse relationship are population density and alcohol consumption. Therefore, it appears that there are two distinct patterns occurring in the country with different determinants. Within this relatively small population (19), there are two concurrent but opposing models of coping with aggressive impulses and presumably difficult situations.

The correlations for suicide include low population density, poverty as measured by low income, alcohol consumption and East Indian ethnicity. For homicide, high population density and lower marriage rates seem to be associated with higher rates. There is also a trend for school drop-outs to be more strongly associated with homicide rates supporting the notion that education may well be a crucial deterrent to this form of violence (11).

The inverse relationship demonstrated for variables such as alcohol consumption and population density suggests that the variation within the country of homicide and suicide is likely to be mediated by socio-cultural factors. This has been demonstrated in Britain using population density (17) but this is the first study that can point to this divergence in multiple cultural domains. Alcohol being associated with suicide rather than homicide is also somewhat inconsistent with previous reports (21). However, it has been shown that a history of violent behaviour increases the risk of suicide in the context of alcohol use (22).

There were no data to identify previous individual behaviour but this may be an interesting parallel investigation to consider. In Trinidad, it is apparent that people of East Indian origin have greater problems with alcohol use as evidenced by disproportionately high rates of admission for alcohol related psychiatric complaints among this group (23). Ethnicity may therefore be significant only because of its association with residence in low population density ie rural
environments and alcohol consumption. These findings warrant further exploration; low income in the context of a more rural lifestyle presumably with a more agricultural type economic activity seems to be more predictive of completed suicide among this population. On the other hand, homicide is associated with a more urban environment where there is less social cohesion and a greater propensity to not complete basic primary and secondary education.

The proliferation of suicide in more rural, agricultural communities and homicide in the urban areas would also invite specific means of intervention.

Poisoning as the main means of suicide might lend itself to the high rates because of easy availability and lax control and supervision in rural communities. More information on lethality of poisons, better economic opportunities and better conflict resolution skills would be useful preventive measures because most suicides occur because of relationship difficulties either between spouses or parents and children. On the other hand, better follow-up of children who are drop-outs from school, improved educational opportunities and diminished overcrowding should improve the homicide rates. Conflict resolution skills also need to be taught because altercations seem to be a major cause of homicidal behaviour suggesting a parallel for the two apparently disparate communities. Homicide and suicide are likely to be valid indices of risk as they reflect fundamental differences between communities yet are closely related because of their impact on mortality and morbidity (17). These have significance for the development policies that many nations engage in as increased urbanization would inevitably lead to high population densities and problems with control of young people. This is reflected in the higher homicide rates among the young. However for suicide, it is relevant for the older adult population which might have similar needs of social support and the need for improved services. Improved social cohesion is therefore indicated in both rural and urban communities.

On the other hand, social cohesion whose absence is manifested in statistics such as high school drop-out rates and low marriage rates may be the key factors for homicide in the areas where the most episodes of this behaviour occur.

The findings on the age-range largely reflect those of the international literature with men in young to middle-adult age group accounting for most of the homicide and the bimodal age distribution of suicide victims (5).

It would be interesting to find proxies to measure the drug use as this has been shown to be the highest risk predictor for death by homicide and suicide among the mentally ill (13). Alcohol consumption may also be a proxy for mental illness.

Ecological studies are always difficult to interpret and draw firm conclusions from because they rely on the reliability of the source data. The Police statistics are certainly the most reliable source available for homicide but the population data used to establish the correlations may not always reflect the reality of individual cases. A major handicap is the absence of mental health related statistics which would certainly be greatly contributory to an understanding of the differences in suicide and homicide as well as point to a role for mental health services in dealing with these problems.

The collected data do not distinguish among age groups greater than 55 years and therefore do not allow a consideration of the effects of older age on suicide.

The strength of the correlations observed suggest that notwithstanding the limitations, there are strong relationships between certain social characteristics and deaths due to homicide and suicide in a developing country that could be used to identify ways and means of intervention. This recalls Durkheim’s hypothesis that measures of social cohesion and identity can influence suicide rates suggesting that the collective reality can determine mortality outcomes that might seem to arise solely from individual action (24). The need to regionalize and disaggregate data is important in clarifying these social and demographic associations as national reporting will hide these trends so that social policy can impact directly on mortality and health-related behaviour. Improved social cohesion, alcohol abuse prevention, better education and urban planning might be useful strategies in the efforts to reduce homicide and suicide which are both preventable sources of mortality particularly in the younger age groups for the former and the older age groups for the latter. The growing disparity between gender life expectancy might also be addressed through this means as this may be one factor that is contributing to a higher life expectancy for females worldwide. Social and economic disadvantage and relative inequality could be tackled through more equitable distribution of resources perhaps at the community level. There should also be careful development planning to avoid overcrowding in urban areas with concomitant provision of adequate housing. Social isolation in the more rural areas must also be addressed in community planning.

Interpretation of available statistics and accurate collection of data is also important in the process of development planning and should receive prioritization both in terms of resources and attention.

REFERENCES
INTRODUCTION

The aim of maxillofacial surgeries is to eradicate active diseases and to prevent recurrence or complications. Maxillofacial trauma (1–3) and tumours (4,5) with their attendant morbidity constitute some of the major problems with which the maxillofacial surgeon in this environment is confronted. Therefore facial disfigurement (6,7) is one of the main reasons for presentation at the maxillofacial clinics.

Successful accomplishment of restoration of function and aesthetics usually depends on the experience and dexterity of the surgeon and the facilities available. The purpose of this paper is to review the scope of maxillofacial surgical procedures and complications of such procedures during a two-year period (2001–2003) of practice by the authors at the Dental and Maxillofacial Surgery Department, Aminu Kano Teaching Hospital, Kano, Nigeria. The centre serves four of eight states in Nigeria’s northwest geopolitical region.

MATERIALS AND METHODS

This is a retrospective study conducted at the Department of Dental and Maxillofacial Surgery, Aminu Kano Teaching Hospital, Kano, Nigeria, over a two-year period between May 2001 and April 2003. All patients who had maxillofacial surgical procedures were identified from the record file of the unit and their case notes were retrieved and reviewed.

A total of eighty-seven patients had various surgical procedures during the period under review. All cases were managed by the authors. Apart from the trauma and congenital cases, all other patients with swellings, cysts and tumours were histopathologically diagnosed. The demographic data, surgical procedures and complications were then analyzed using Microsoft Excel.

RESULTS

Eighty-seven patients representing 77.7% of total patients presenting with maxillofacial surgical diseases during the period under review had 98 (90 primary and 8 secondary) surgical procedures. There were 56 males and 31 females, a male- female ratio of 1.9:1. The age range was from three days to 90 years (mean = 34.5 years) (Table 1) and the majority (n = 30, 34.5%) were in the third decade of life.

The socio-demographic characteristics are shown in Table 1. Based on the type of anaesthesia employed, 77 (88.5%) were classified as major while the remaining 10 (11.5%) were classified as minor procedures. Socio-economic stratification of the patients was carried out using occupation according to the assessment of Oyedeji (8) with a modification. Class I were senior public servants, professionals, managers, contractors, businessmen, large scale traders and farmers; class II – intermediate grade public ser-
vants and senior school teachers; class III – junior grade public servants, artisans, drivers and small scale businessmen; class IV – labourers, messengers, petty traders and similar grades; class V – students, unemployed, full time housewife, subsistence farmers. Thirty-two (36.8%) were in social class V while 4 (4.6%) were in social class I.

Table 2 shows the diagnosis/indications for surgery with mandibular fracture (n = 24, 27.6%) being the commonest. The surgical procedures included reduction and immobilization (n = 21, 23.3%), trans-osseous wiring (n = 12, 13.33%), resection (n = 7, 6.73%) and others (Table 3). Less common procedures were C-shaped ostectomy, inverted L-ostectomy, bicornal flap, grafts and correction of ectropion. The most common complication was malocclusion (n = 14, 29.8%), followed by facial defects (n = 12, 25.5%) and others (Table 4). Seven (58.3%) of the 12 facial defects were observed following resection with disarticulation. Secondary surgical procedures (n = 8) were carried out to correct some of these complications.

**DISCUSSION**

This study showed a wide variation in the scope of maxillofacial surgical procedures encountered during the period under review in a new tertiary hospital. In this study, among the cysts, tumours and tumour-like lesions of the jaws, the odontogenic tumours, led by ameloblastoma, remain the commonest. This trend is in line with global reports (5, 9). Regarding the non-tumour lesions, trauma (n = 46, 55.2) was the commonest with mandibular fracture being the leading indication in that group. Facial trauma in Nigerian Africans are common (1, 2, 10, 11). The age range in this study is in conformity with publications on maxillofacial surgical diseases (1, 3, 9). There were two very young patients with congenital cleft lip and palate. The various surgical procedures in this study were in line with prescribed procedures employed for maxillofacial surgical diseases.

The commonest post-operative morbidity were facial defects, malocclusion and drooling of saliva. These occurred
following surgical ablation of the mandible with resultant loss of sulcus depth. This is similar to the report of Adekeye and Apapa (12). Reconstruction of the lost segments usually alleviates these (13–15). Unfortunately, because of the low economic empowerment of most of the patients (Table 1), only two of them had reconstruction of mandibular defects, one with autogenous iliac crest bone graft and the other insertion of Steinmann’s pin (Table 5). Most Nigerian patients attending tertiary institutions are usually in the lower and intermediate socio-economic group (16–19). Ameloblastoma is notorious for its high recurrence rate (20–22).

In this study, recurrence was post-surgical shaving of a fibrous dysplasia.

Our experience has shown that fibro-osseous lesions in indigenous Africans are unrelentless in their growth, hence excision of lesion is recommended. Two years is a short period to comment on recurrence of odontogenic tumours as some are reported to have recurred 30 years post operatively (22). Facial nerve weakness post-parotidectomy recovered about six weeks post-operatively following physiotherapy and neurobion/Vit. B complex therapy in two cases except where it was sacrificed during radical parotidectomy. Post-traumatic headache is usually one of the components of post-concussional syndrome (22) which usually resolves with time.

**CONCLUSION**

This study has highlighted the various surgical procedures carried out at the Department of Dental and Maxillofacial Surgery, Aminu Kano Teaching Hospital, Kano, Nigeria. Reduction and immobilization and tumour surgery of the jaws seem to be the most common surgical procedures while osteotomy was the least. Reduction and immobilization with simple arch bars appeared to be very effective, more so when the patients could not afford more modern methods of treatment which are relatively expensive. Reconstructive surgeries of ablated jaws are advocated in view of the devastating aesthetic and psychosocial effects that these have on the patients.

**REFERENCES**


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**Table 3: Primary surgical procedures**

<table>
<thead>
<tr>
<th>Surgical procedures</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enucleation</td>
<td>2</td>
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</tr>
<tr>
<td>Resection with disarticulation</td>
<td>7</td>
<td>7.7</td>
</tr>
<tr>
<td>Repair</td>
<td>8</td>
<td>8.8</td>
</tr>
<tr>
<td>Excision</td>
<td>6</td>
<td>6.6</td>
</tr>
<tr>
<td>Surgical shaving</td>
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</tr>
<tr>
<td>Release of contracture</td>
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<td>1.1</td>
</tr>
<tr>
<td>Reduction and immobilization</td>
<td>21</td>
<td>23.3</td>
</tr>
<tr>
<td>Suturing</td>
<td>7</td>
<td>7.7</td>
</tr>
<tr>
<td>Debridement</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>Parotidectomy</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td>Trans-osseous wiring</td>
<td>12</td>
<td>13.3</td>
</tr>
<tr>
<td>Percutaneous approach</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Sequestrectomy</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Release of ectropion and skin grafting</td>
<td>4</td>
<td>4.4</td>
</tr>
<tr>
<td>Coronoidectomy</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Acrylic cap splint</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Release of ankyloglosia</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Onlay graft (alloplastic)</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Removal of foreign body</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>C-shaped osteotomy</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Inverted L-shaped osteotomy</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Bicoronal flap</td>
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<td>1.1</td>
</tr>
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</table>

Total 90 100%

**Table 4: Post-Operative complication**

<table>
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<tr>
<th>Complications</th>
<th>No</th>
<th>%</th>
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<tr>
<td>Facial nerve weakness/paralysis</td>
<td>3</td>
<td>6.4</td>
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<tr>
<td>Parotid fistula</td>
<td>2</td>
<td>4.3</td>
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<tr>
<td>Oro-nasal fistula</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Wound breakdown</td>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>Malunion</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Post-traumatic headache</td>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>Trauma (burns) to lip from surgical drill</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Drooling of saliva</td>
<td>4</td>
<td>8.5</td>
</tr>
<tr>
<td>Speech difficulty</td>
<td>3</td>
<td>6.4</td>
</tr>
<tr>
<td>Immobility of tongue</td>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>Facial defects</td>
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<td>25.5</td>
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<tr>
<td>Malocclusion</td>
<td>14</td>
<td>29.8</td>
</tr>
</tbody>
</table>

Total 47 100%

**Table 5: Secondary surgical procedures**

<table>
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<th>Indications</th>
<th>Secondary surgical procedures</th>
<th>No</th>
<th>%</th>
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</thead>
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<tr>
<td>Loss of mandibular segments</td>
<td>autogenous iliac bone crest graft</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Loss of mandibular segments</td>
<td>insertion of Steinmann’s pin</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Wound breakdown</td>
<td>secondary suturing</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Wound breakdown</td>
<td>skin grafting</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Malunion with aperognathia</td>
<td>refracture with trans-osseous wiring</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Oronasal fistula</td>
<td>repair</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Parotid fistula</td>
<td>cannulation of the duct</td>
<td>2</td>
<td>25.0</td>
</tr>
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</table>

Total 8 100%
Blood Pressure, Heart Rate and Temperature
Variability during Periodontal Surgery
RG Gedik, I Marakoglu, S Demirer

ABSTRACT

The aim of the present study is to investigate changes in blood pressure, pulse rate and temperature before and after periodontal surgery. The study included 127 normal healthy patients (43 males, 84 females) with age range 9 to 65 years (mean age: 26 ± 12 years) who underwent periodontal surgery. After administration of a local anaesthetic agent (Ultracain DS®) containing 0.06 mg adrenaline, the blood pressure, pulse rate, and temperature were measured. Based on the type of operation, the patients were divided into four groups. Statistically significant changes (as decreasing) in all parameters were observed (blood pressure: systolic 111.3 ± 20.1, diastolic 67.7 ± 13.1, pulse rate: 87.8 ± 14.9, temperature: 36.3 ± 0.3) but these changes were significantly decreased after operations (blood pressure: systolic 105.9 ± 19.7, diastolic 62.6 ± 11.3, pulse rate: 84.01 ± 13.1, temperature: 36.2 ± 0.3). And without age group differentiation in all parameters, statistically significant decreases were found among females (p ≤ 0.05).

INTRODUCTION

Most dental treatments are conducted under local anaesthesia and it is well known that dental surgery causes increase in blood pressure, even in normotensive patients (1). The factors influencing this increase are not yet fully understood. It is important to determine factors causing the blood pressure response during dental surgery because fatal subarachnoid haemorrhage and massive bleeding related to dental surgery and high blood pressure have been reported (1). Previous studies have demonstrated that increases in blood pressure during tooth extraction are related to difficulties in tooth extraction and the volume of local anaesthetic used (1–5). The role of the autonomic nervous system in the blood pressure response induced by dental surgery has not yet been resolved. Studies have shown that an increase in blood pressure during dental surgery seems to be mediated primarily by an activation of the sympathetic nervous system (6–11).

METHODS

The study included 127 patients (43 males, 84 females), 9 to 65 years of age (mean age 26 ± 12) who underwent periodontal surgery at the Faculty of Dentistry, Cumhuriyet University, Turkey. The details of the procedure and clinical trials were explained to all patients and written informed consent was obtained from each. All patients were asked to complete a questionnaire on medical history and current medical therapy. According to the type of operation, the patients were divided into four groups (gingivectomy, periodontal flap, surgery, frenectomy and curettage). After administration of local anaesthetic (Ultracain DS®) containing 0.06 mg of adrenaline, baseline blood pressure, pulse rate and temperature were measured and recorded before and after periodontal operation. Also, the patients were divided into subgroups according to their education, age and gender. Statistical analysis (impaired t-test) was applied.

RESULTS

The changes in blood pressure, pulse rate and temperature during periodontal surgery under local anaesthesia were analyzed. The blood pressure (systolic and diastolic), pulse rate and temperature of the first group were decreased after operation (p ≤ 0.05). The blood pressure (systolic and diastolic), pulse rate of the second group were decreased (p > 0.05) but the temperature did not change (p > 0.05) (Table 1). In the third and fourth groups, the blood pressure and pulse rate did not change (p > 0.05), but the temperature was significantly decreased (p ≤ 0.05) after operation (Table 1).

According to the level of education, the patients were studied in four categories (Ignorant = 0, Basic education = 1, High school = 2, University = 3). Statistically all parameters were found to have significantly decreased among the patients who had basic and high school education after operation. There was no significant change observed in temperature (p > 0.05) among the patients who had university degrees; other parameters were significantly decreased (p ≤ 0.05) (Table 2).

Regardless of age group differentiation, there was statistically significant decrease in all parameters among females (p ≤ 0.05). Excluding systolic blood pressure, the other parameters were decreased in males (p ≤ 0.05) (Table 3).

According to gender and age, the patients were subdivided into four groups (1 = 9-19, 2 = 20-29, 3 = 30-39, 4 = 40-60). In the first age group, statistically significant changes in pulse rate and temperature were observed (p ≤ 0.05) but no such significant change in blood pressure (systolic and diastolic) was observed among females. In all parameters, no significant changes were observed among
Tables 1 & 2
Tables 3 & 4
males (p > 0.05). In the second age-group, excluding temperature, the other parameters were significantly decreased among females. Excluding temperature and pulse rate, the other parameters were decreased (p ≤ 0.05) among males. In the third group, the only significant decrease was observed in pulse rate among females but no significant decreases were observed among males in all parameters. In the fourth group, statistical changes were observed among females in systolic blood pressure. No statistically significant changes were observed among males in all parameters (Table 4).

DISCUSSION
It is well known that blood pressure and pulse rate increase during tooth extraction. The contribution of the sympathetic nervous system in this increase is not well understood (2–5). Because the administration of local anaesthetics without dental treatment fails to increase plasma noradrenaline concentrations, the blood pressure response seem to be dependent on the dental treatment itself (2). Recent study observed that peak plasma adrenaline concentrations are reached just after the administration of local anaesthetics with adrenaline, while the peak plasma noradrenaline concentrations are obtained during tooth extraction. This difference in time-course of plasma catecholamines suggests that the adrenaline present in the local anaesthetic leaks into the systemic circulation instead of an activation of the sympathetic nervous system being the primary factor affecting the increase in blood pressure during tooth extraction (2–6).

In this study, the blood pressure, pulse rate and temperature were significantly decreased after gingivectomy operation (p ≤ 0.05). The blood pressure and pulse rate were significantly decreased (p ≤ 0.05) but the temperature did not change after flap operation (p > 0.05) The blood pressure and pulse rate did not change (p > 0.05), but the temperature was significantly increased (p > 0.05) after frenectomy and curettage operation.

Some studies revealed that the systolic blood pressure significantly increased above the preoperative control, throughout surgery, but diastolic pressure did not change significantly throughout surgery when compared with the preoperative control. The pulse rate increased just after the local anaesthesia and lowered afterward (2, 12). Increases in systolic blood pressure induced by tooth extraction correlated significantly with the age of the patient.

In this study, according to the level of education, the systolic blood pressure did not show any statistically significant changes (p > 0.05) but in the other parameters changes were found to be statistically significant in the patients who had basic education. Statistically important changes were found in all parameters among the patients who had high school education and significant changes were found only in temperature among the patients who had a university degree.

Many studies, in different age groups, showed that middle-aged and older patients have greater increases in blood pressure during dental surgery than younger patients (4). Another study suggests that the maximum blood pressure changes were more intense during surgery in boys than in girls (6).

In this study, important changes in pulse rate and temperature were observed between 9 and 19 years of age in female patients but these changes were not observed among males. In another group (aged 4 – 40 years) the only important change was observed in temperature. A change in systolic blood pressure was observed among females but no such change was observed among males of this group.

CONCLUSION
Many factors such as patient age, gender, education, the volume of local anaesthetic, the length of the treatment and the difficulty of the procedure may be strong determinants of the extent of the increase in blood pressure. All the parameters that showed statistically significant changes may only increase more in medically compromised patients and such patients may warrant more precaution and routine monitoring during periodontal and implant surgery.

ACKNOWLEDGEMENT
We would like to thank Nurse Nevin Acar for her assistance in this study.

REFERENCES
Non-Syndromal Multiple Buried Supernumerary Teeth
Report of Two Cases from the English-speaking Caribbean and a Review of the Literature

AS Ramsaran, S Barclay, E Scipio, C Ogunsalu

ABSTRACT

Multiple supernumerary teeth affecting all four quadrants of the jaw are a rare dental anomaly which has become a chance finding on routine dental panoramic tomography (DPT). In this paper, two cases from the English-speaking Caribbean are reported. The role of radiography in the diagnosis and management of this rare developmental dental anomaly is emphasized. The paper stresses the importance of ruling out associated syndromes such as Gardner’s Syndrome, cleidocranial dysostosis and cleft lip and palates, as multiple supernumerary teeth are usually related to such conditions. There is a review of the literature as it relates to supernumerary teeth.

INTRODUCTION

Teeth or tooth substance in excess of the usual configuration of 20 deciduous and 32 permanent teeth would be designated supernumerary teeth. Supernumerary teeth may occur singly, multiply, unilaterally or bilaterally and in one or both jaws. Rarely it can occur in all the four quadrants of the jawbone as in the index cases. The classification of supernumerary teeth is shown in Table 1.

Cases involving one or two supernumerary teeth most commonly involve the anterior maxilla followed by the mandibular premolar region (1, 2). The most commonly affected site of multiple supernumeraries (> 5) is the mandibular premolar region (3). Various studies have been conducted regarding the prevalence and significance of supernumerary teeth. However, most studies and publications are deficient in that they lack definite management of multiple (buried) supernumerary teeth when such are not related to a syndrome or symptom.

It is the intention of this paper to stress the importance of non-treatment and appropriate radiological follow-up for asymptomatic, non-syndromic multiple buried supernumerary teeth and to review the literature on this topic.

Table 1: Classification of supernumerary

<table>
<thead>
<tr>
<th>Classification based on form</th>
<th>Classification based on position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conical supernumerary</td>
<td>Mesiodens</td>
</tr>
<tr>
<td>Tuberculate type</td>
<td>Paramolar</td>
</tr>
<tr>
<td>Supplemental type</td>
<td>Distomolar</td>
</tr>
<tr>
<td>Odontome</td>
<td>Parapremolar</td>
</tr>
</tbody>
</table>

A total of ten supernumerary teeth were seen, nine of which were unerupted supernumeraries (SUE). The DPT (Fig. 2) showed no other abnormality or evidence of cystic degeneration around any of the unerupted supernumeraries.

The palatally erupted parapremolar of the left maxilla was surgically extracted revealing two roots (Fig. 3). The mother was reassured that the unerupted asymptomatic supernumeraries were best left alone as attempts at surgical removal might result in damage to vital anatomical structures such as inferior dental nerve or mental nerve. It was suggested that a follow-up DPT be taken every three years to enable early detection of any cystic degeneration associated with the unerupted teeth. The patient was further clinically

Case Report 1 - Jamaica

A 13-year-old Jamaican female of African descent presented to the Cornwall Dental Centre in Jamaica with a complaint from the mother of over-retained deciduous teeth and a palatally erupted upper left premolar tooth. The clinical examination confirmed such complaints. The dental panoramic tomogram (DPT) which was required as a compulsory investigation prior to treatment and advice revealed supernumeraries in the location designated in Figure 1.

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examined and assessed to rule out syndromes such as basal cell nevus syndrome and cleidocranial dysostosis. Gardner’s Syndrome was also ruled out.

Case Report 2 – Trinidad

A 32-year-old Trinidadian male of East Indian descent presented to the Dental Polyclinic at the School of Dentistry, The University of the West Indies, St Augustine, Trinidad and Tobago, with pain in the left mandibular region due to a grossly carious tooth #37. There was nothing of significance in his medical history. However, the clinical examination revealed left submandibular lymphadenopathy extra- and intra-orally.

The patient showed poor oral hygiene, multiple carious lesions, multiple supplemental/supernumeraries in the upper left and lower right premolar regions (3 on the upper left and 2 on the lower right), distal rotation of 11, and mesiodens in the upper anterior region with absence of tooth #21 clinically. Radiographically the DPT (Fig. 4) revealed 11 asymptomatic supernumeraries: 6 erupted (S^E) and 5 unerupted (S^UE) (Fig. 5).

DISCUSSION

Prior to the discussion on the management of multiple unerupted supernumerary teeth, it is important to mention the effect of supernumerary teeth on the developing dentition. These effects are as follows: no effect, crowding, failure of eruption of adjacent permanent teeth, dis-placement and ectopic eruption, formation of diastema, root resorption of adjacent dentition, dilaceration of adjacent dentition and loss of vitality.

In a recent study in Jamaica of 478 dental panoramic tomograms, Hayes (4) reported an incidence of 3.14% for supernumerary teeth occurrence with no statistically significant difference between the males and females (4). Of these, 53.33% were distomolars (4th molar). Two cases, both males, involved the presence of distomolars in all the four quadrants of the jaw. Equal numbers of first and second premolars were found as well as two lower incisors. However, only two mesiodens were found and involved a female and a male patient. Additionally, a male patient with distomolar (4th molar) in each quadrant also exhibited evidence of a 5th molar or tubercle in the upper left tuberosity region.

The classification of supernumerary teeth is seen in Table 1. They vary from a simple odontome through a conical type to a supplemental type. The incidence of supernumerary teeth varies according to published studies. They are less common in the deciduous dentition with a reported incidence of 0.3% to 1.7% of the population (5). The overall prevalence of supernumerary teeth however varies between 0.1 and 3.6 per cent of the population (3). Fuss and Sampson (2) reported an incidence of 2.3% in Australia (2). Luten (6) reported an incidence of 2% (however this would be more as his radiographic method included the use of the bitewing and periapical radiographs, without the use of DPT, hence the exclusion of deeply buried supernumerary teeth and distomolars). The relative frequency of different supernumerary teeth as reported in the

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Table 2: Chart showing location of unerupted supernumeraries S^UE in case 1

<table>
<thead>
<tr>
<th>S^UE</th>
<th>S^UE</th>
<th>S^UE</th>
<th>S^UE</th>
<th>S^UE</th>
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<td>55</td>
<td>56</td>
<td>57</td>
<td>58</td>
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</table>

Table 3: Chart showing the location of erupted and unerupted supernumeraries.

<table>
<thead>
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<th>ER</th>
<th>ER</th>
<th>ER</th>
<th>ER</th>
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<tbody>
<tr>
<td>28</td>
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</table>

examinied and assessed to rule out syndromes such as basal cell nevus syndrome and cleidocranial dysostosis. Gardner’s Syndrome was also ruled out.
literature seems to differ. Luten’s study (6) suggested a decreasing order of frequency of 50% for upper lateral incisors, 36% for mesiodens, 11% for upper central incisors and 3% for the bicuspid. Shapira and Kuffinec (7) reported an order of decreasing frequency as being upper central incisors, molars (especially upper molars) premolars followed by lateral incisors and canines. The incidence of multiple supernumeraries is lower than that of single and double supernumeraries. In their study, Fuss and Sampson reported 68.6% for single supernumeraries, 20.3% for double and 11.1% for multiple supernumeraries.

Most authors have reported a male: female ratio of 2:1 (2, 8). A much higher male : female ratio has been reported for Japanese children (5.5:1) and children from Hong Kong (6.5:1) in a study of supernumerary teeth in Asian school children.

Definitive diagnosis and elucidation of a treatment plan can only be formulated after appropriate clinical and radiological assessment. The assessment should also be capable of including or excluding a syndrome in association with the multiple unerupted supernumeraries. Observation and follow-up radiographs may be the only treatment necessary if buried teeth are asymptomatic and show no evidence of cyst formation. Radiological assessment should be periodical.

Symptomatic multiple buried supernumerary (MBS) may have to be surgically removed after appropriate education of the patient and parent about the risk of damage to adjacent teeth and vital anatomical structures. On the other hand, surgical removal of some MBS may be indicated for orthodontic reasons. Distraction osteogenesis with or without orthodontic treatment may also play a role in the definitive treatment of MBS.

The two cases in this report did not require any definitive treatment other than the extraction of the parapremolar in Case 1. Long-term radiological follow-up is suggested for early detection of cystic degeneration of the buried teeth. This is best carried out by periodic dental panoramic tomogram.

CONCLUSION
Multiple buried supernumerary teeth are rare dental developmental anomalies, usually a chance finding on radiographs. Controversy continues with regards to optimal treatment. Because of the increasing use of DPT in the Caribbean, it is important for the general dental practitioner to appreciate the radiological presentation of MBS teeth and also the need for no treatment in most cases except the long-term clinical or radiological follow-up of the affected patient.

ACKNOWLEDGEMENTS
The authors wish to thank Kathy-Ann Hercules-Wilson for her secretarial role in the production of this manuscript.

REFERENCES
Aggressive Infantile (Desmoid-type) Fibromatosis of the Maxilla
A Case Report and New Classification
C Ogunsalu, S Barclay

ABSTRACT
This paper describes the clinical, radiographic and histologic findings of an aggressive infantile (desmoid-type) fibromatosis of the face in a seven-year-old black Jamaican male. This condition is rare in the head and neck region and its occurrence in the maxilla is exceptional. The differential diagnosis, management and long term follow-up of this case are also mentioned. The need for a less aggressive surgical management in this child and long-term follow–up is stressed. Also, its occurrence in someone of African descent has not been reported previously. The absence of recurrence, eight years after surgery is significant. This paper discusses the differential diagnosis and treatment of aggressive infantile fibromatosis and suggests a classification of the condition.

INTRODUCTION
Aggressive fibromatosis is a non-metastasizing tumour-like fibroblastic growth of unknown pathogenesis involving voluntary muscle as well as aponeurotic and facial structures. Histologically, it is indistinguishable from an abdominal fibromatosis. The lesion has a strong tendency for local recurrence and aggressive infiltrating growth. It is most common in the shoulder girdle, the thigh and gluteal region of growing adults (1).

Aggressive fibromatosis of the oral or para-oral structures is a very uncommon finding. Melrose and Abram (2) reported three cases involving the jaws of children. They discussed the protean nature of this lesion. Our case presented as a rapidly enlarging lesion post-trauma, although some cases may be quite slow in growth; pain may or may not be a finding. Most cases of aggressive infantile fibromatosis were clinically misdiagnosed as fibroma, fibrous histiocytoma, granuloma, cyst, ameloblastoma, fibrous dysplasia or sarcoma. Sarcoma was the initial diagnosis in this case; however, the histopathological confirmation as aggressive fibromatosis was prompt and management was appropriate.

It is said that some childhood lesions proliferate very rapidly and histologically can be very cellular and active so that a diagnosis of sarcoma is seriously entertained and radical treatment carried out. Occasionally, the histomorphology may fail to reflect the biological behaviour of the lesions which can occasionally be localized, such as myofibromatosis, and as such be amenable to conservative surgery. On the other hand, some childhood fibrous lesions such as infantile fibromatosis may grow in a persistent and infiltrative manner. These lesions continue to present a difficult diagnostic problem, especially to pathologists (3–5). The two lesions commonly confused with infantile fibromatosis are myofibromatosis and fibrosarcoma. It is very important to distinguish between these conditions as they may display quite different clinical behaviour. The distinction between infantile fibromatosis and fibrosarcoma is a problem for pathologists as well as being of academic interest. Fortunately, the infantile fibrosarcoma may display attenuated behaviour compared to its adult counterpart. They have reduced metastatic potential but may recur locally much like the fibromatosis (5). It is claimed that the treatment for both should be complete excision.

Case Report
A seven-year-old black Jamaican boy presented to us on February 11, 1995, with a painless firm swelling of the left cheek and infra-orbital region. The swelling was not attached to the skin but clinically appeared to be bony hard. It measured about 2 cm in the longest diameter. The mother associated the occurrence of the lesion to a previous trauma following an alleged assault. She claims that the lesion has increased rapidly in size over a short period.

Radiographic Findings
Radiologically, the occipitomental view (standard) showed an extensive radiopaque lesion of the left zygomatic bone, extending up to the region of the zygomatico-frontal suture line (Fig. 1). No bony destruction of the orbital or antral wall was noted. On initial examination, a diagnosis of facial osteoma was made; however, malignant tumours such as osteosarcoma and fibrosarcoma were also considered based on the history of recent onset of swelling and rapid growth thereafter.

Treatment – excisional biopsy
The treatment was that of a total excision of the lesion – with nibbling of bone at the base in all areas. At surgery, the lesion was found to consist of soft (fibrous) tissue essentially

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and not osseous tissue as was suggested by the clinical and radiological examination. All the tissues obtained at surgery were submitted for histopathology.

Sections of tumour, or histology, showed a diffuse growth of mature appearing fibroblasts arranged in distinct bundles and fascicles associated with variable amount of collagen. It appeared that the growth began in relation to fascia or periostium and small foci of ossification were noted at the periphery (Fig. 2 a & b). Also vascular spaces are seen. The overall picture is that of infantile (desmoid-type) fibromatosis.

Aggressive infantile fibromatosis may cause destruction of the bone when in apposition with such. Fortunately, this lesion did not destroy the underlying bone.

The microscopic appearance of these lesions is quite uniform, however, consisting of cellular interlacing bundles of elongated fibroblasts showing no pleomorphism, little or no mitotic activity and no giant cells (1). Typically, it shows numerous slit-like vascular spaces not associated with inflammation.

The treatment of this patient was that of complete surgical excision with generous margin, without any residual facial disfiguration even though the diagnosis had not been confirmed at the time of surgery. There has been no evidence of recurrence, after eight years but we recommended long-term follow-up.

Clinically and radiologically, it is almost impossible to make a diagnosis of infantile fibromatosis, a condition which may or may not be aggressive. When aggressive, a diagnosis of malignant neoplasm is usually suggested until the result of histopathology is available. Interesting but quite disturbing is the widely accepted fact that it can be difficult to differentiate it from low-grade fibrosarcoma and as such eventuate in mismanagement of the cases.

The consideration of the clinical course, radiological finding and histopathology finding can assist in making a

**DISCUSSION**

Aggressive fibromatosis belongs to a sizeable group of the so-called “miscellaneous locally aggressive fibrous lesions”. They are non-metastasizing and must always be differentiated from fibrosarcoma, particularly the well-differentiated type. In the past, many of these benign but locally aggressive lesions have been confused with sarcoma and it is only in recent years that the pathologists have been able to separate these lesions with any assurance (1).

The group consists chiefly of the following: nodular fasciitis (psuedosarcomatous fibromatosis); aggressive fibromatosis (extra-abdominal desmoid); proliferative myositis; fibrous histocytoma (fibroxanthoma); atypical fibroxanthoma (and malignant variant) and desmoplastic fibroma of the bone.

It is unclear whether or not trauma played a role in the aetiology of this case, or whether it was co-incidental. All these lesions are quite uncommon in the oral cavity.

Intensive palliative radiation therapy may cause severe destruction of the bone when in apposition with such. Fortunately, this lesion did not destroy the underlying bone.

The microscopic appearance of these lesions is quite uniform, however, consisting of cellular interlacing bundles of elongated fibroblasts showing no pleomorphism, little or no mitotic activity and no giant cells (1). Typically, it shows numerous slit-like vascular spaces not associated with inflammation.

The treatment of this patient was that of complete surgical excision with generous margin, without any residual facial disfiguration even though the diagnosis had not been confirmed at the time of surgery. There has been no evidence of recurrence, after eight years but we recommended long-term follow-up.

Clinically and radiologically, it is almost impossible to make a diagnosis of infantile fibromatosis, a condition which may or may not be aggressive. When aggressive, a diagnosis of malignant neoplasm is usually suggested until the result of histopathology is available. Interesting but quite disturbing is the widely accepted fact that it can be difficult to differentiate it from low-grade fibrosarcoma and as such eventuate in mismanagement of the cases.

The consideration of the clinical course, radiological finding and histopathology finding can assist in making a
definitive diagnosis. Unlike fibrosarcoma, the aggressive infantile fibromatoses never metastasize (3), although they have a potential to produce fatal outcome from extension into vital organs.

In the early 1950s, Stout (4) reported on the state of confusion around the term fibromatosis and noted that there was nothing to gain by retaining the older names such as non-metastasizing fibrosarcoma.

A review of 241 cases of juvenile fibromatosis by Stout (5) distinguished it from fibrosarcoma by identifying features that would be indicative of potentially metastatic behaviour. The description ‘aggressive’ is based on the invasive characteristic of the lesion and the rate of growth. It is our opinion that, to avoid further confusion, other synonyms such as extra-abdominal desmoid, juvenile fibromatosis, congenital fibrosarcoma should be discontinued and the term aggressive or non-aggressive infantile fibromatosis retained based on the rate of growth and clinical course with or without treatment, as it is documented that this tumour has been known to regress without any form of treatment.

Bridget et al (6) observed chromosomal abnormalities in their analysis of 26 cases of desmoid tumour (6). We suggest that trauma, such as birth trauma and childhood trauma, is probably necessary to initiate the condition in those with genetic predisposition. It is for this reason that we suggest that a complete paediatric history be an important aspect in the investigation of these patients. None of the published cases indicated that paediatric history including perinatal and postnatal history was taken. We reviewed 12 published cases of aggressive infantile fibromatosis (7–15) of the jaws as shown in Table 1. The male: female ratio was 1:1, with an average age of 4.94. The age range was 2 – 9.5 years. The maxilla was more involved (nine cases) than the mandible (three cases). The radiographic finding was that of radiolucencies of the affected jaw mainly. However, the index case herein reported presented with radiopacification of the maxilla, a reason for favouring the diagnosis of osteogenic sarcoma initially.

In their classical paper of 1992, Carr et al (12) described the clinicopathological finding of two unusual cases of infantile fibromatosis of the mandible of two-year-old children. These tumours, though highly aggressive initially, underwent spontaneous regression in the absence of definitive treatment. These authors avoided the term aggressive in the title of their classical article. In the light of our current clarification of terms, they should have called these two cases atypical aggressive infantile (desmoid-type) fibromatosis. Further, we suggest that if the term atypical or non-aggressive is not found desirable, then aggressive infantile fibromatosis should be retained and classified as

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### Table 1: Summary of literature review for cases of aggressive infantile fibromatosis – (1974 – 2000)

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Author(s)</th>
<th>Year</th>
<th>Age</th>
<th>Gender</th>
<th>Anatomic area central = c, peripheral = p, no precise detail =?</th>
<th>Preliminary diagnosis</th>
<th>Time of diagnosis</th>
<th>Radiographic findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pindborg and Hjirting-Hanson</td>
<td>1974</td>
<td>3 years</td>
<td>Male</td>
<td>Left inferior border of the orbit</td>
<td>-</td>
<td>-</td>
<td>Radiolucenty</td>
</tr>
<tr>
<td>2</td>
<td>Wilkins et al</td>
<td>1975</td>
<td>3 years</td>
<td>Anterior palate?</td>
<td>-</td>
<td>-</td>
<td>Radiolucenty</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Melrose and Abram</td>
<td>1980</td>
<td>5 years</td>
<td>Female</td>
<td>Palate, right maxillary ridge (p)</td>
<td>-</td>
<td>1 month</td>
<td>Loss of interdental bone</td>
</tr>
<tr>
<td>4</td>
<td>Melrose and Abram</td>
<td>1980</td>
<td>3 years</td>
<td>Female</td>
<td>Mandible and floor of mouth</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Bertrand et al</td>
<td>1981</td>
<td>9 ½ years</td>
<td>Female</td>
<td>Right maxilla (?)</td>
<td>-</td>
<td>6 months</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Goopfert et al</td>
<td>1982</td>
<td>2 years and 9 months</td>
<td>Male</td>
<td>Right upper gingival (p)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Tagwa et al</td>
<td>1989</td>
<td>3 years</td>
<td>Female</td>
<td>Submandibular region</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Carr et al</td>
<td>1992</td>
<td>2 years</td>
<td>Male</td>
<td>Left mandible (c)</td>
<td>-</td>
<td>2 years</td>
<td>Radiolucenty</td>
</tr>
<tr>
<td>9</td>
<td>Carr et al</td>
<td>1992</td>
<td>2 years</td>
<td>Male</td>
<td>Left mandible (c)</td>
<td>-</td>
<td>1 year</td>
<td>Radiolucenty</td>
</tr>
<tr>
<td>10</td>
<td>Ramanathan and Thomas</td>
<td>1997</td>
<td>7 years</td>
<td>Female</td>
<td>Parotid gland</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Sato et al</td>
<td>2000</td>
<td>3 years</td>
<td>Male</td>
<td>Mandible (c)</td>
<td>Malignancy</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Donohue et al</td>
<td>1990</td>
<td>14 years</td>
<td>Male</td>
<td>Maxilla (left palate) (c)</td>
<td>Fibroma</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Ogunsalu and Barclay</td>
<td>2003</td>
<td>7 years</td>
<td>Male</td>
<td>Left cheek and infraorbital region</td>
<td>Fibrousarcoma and osteosarcoma</td>
<td>-</td>
<td>Radiopacification</td>
</tr>
</tbody>
</table>
grades A, B, C and D: grade A – clinically aggressive, histologically confirmed tumour and clinically recurrent after aggressive surgical treatment; grade B – clinically aggressive, histologically confirmed tumour and clinically non-recurrent after aggressive surgical treatment; grade C – clinically aggressive, histologically confirmed tumour and clinically non-recurrent after non-aggressive surgical treatment; grade D – clinically aggressive, histologically confirmed tumour and clinically regressive after no definitive surgical treatment.

This classification is as such retrospective and best done after at least two years post surgical follow-up. Table 2 shows the type of treatment and our new retrospective grading for aggressive infantile fibromatosis. From a review of the English-speaking literature, it is obvious that despite the variability in the clinico-pathological behaviour and progression of all pathologies ascribed “aggressive infantile fibromatosis”, no classification has been developed. It is for this reason that we favour our new classification.

<table>
<thead>
<tr>
<th>Case</th>
<th>Type of Treatment</th>
<th>Recurrence</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aggressive surgical resection</td>
<td>none</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>Aggressive surgical resection</td>
<td>yes – after one month</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>Aggressive surgical resection</td>
<td>no</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Not sure</td>
<td>none</td>
<td>?</td>
</tr>
<tr>
<td>5</td>
<td>Aggressive surgical resection</td>
<td>lost to follow-up</td>
<td>?</td>
</tr>
<tr>
<td>6</td>
<td>Not sure</td>
<td>none</td>
<td>?</td>
</tr>
<tr>
<td>7</td>
<td>Resection</td>
<td>none</td>
<td>B</td>
</tr>
<tr>
<td>8</td>
<td>No definite treatment</td>
<td>regression</td>
<td>D</td>
</tr>
<tr>
<td>9</td>
<td>No definite treatment</td>
<td>regression</td>
<td>D</td>
</tr>
<tr>
<td>10</td>
<td>Complete surgical excess of the patol gland</td>
<td>none</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>Marginal mandibulectomy</td>
<td>- reconstruction with iliac crest bone.</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>Excision of lesion</td>
<td>recurrence</td>
<td>B</td>
</tr>
<tr>
<td>13</td>
<td>Excision of lesion (conservative but total)</td>
<td>none</td>
<td>C</td>
</tr>
</tbody>
</table>

**CONCLUSION**

Aggressive infantile (desmoid-type) fibromatosis of the face may appear to be malignant in nature based on the clinical presentation and radiographic findings, particularly when it has caused destruction of bone. Pathologists are now able to separate this lesion from sarcomas with much greater certainty and assurance. Local excision is the treatment of choice with much emphasis on long-term follow-up. The clinical features and radiographic findings should at least point to the diagnosis of aggressive fibromatosis or low grade fibrosarcoma. Subsequently, the absence of features that would be indicative of potentially metastatic behaviour should allow a definitive diagnosis of aggressive infantile fibromatosis to be made without the use of the previously utilized multitude of diagnostic terms. Finally, we suggest that the aetiology is likely trauma (perinatal, postnatal, or early childhood trauma) in a rare group of genetically predisposed patients.

**ACKNOWLEDGEMENTS**

The author thanks Professor NJD Smith of the Department of Dental Radiology, King’s College School of Medicine and Dentistry for editing the manuscript, and also Professor Newell W Johnson of the RCS Department of Dental Studies/Department of Oral Medicine and Pathology King’s College School of Medicine and Dentistry for providing the photomicrographs. Also my thanks to my two secretaries Mrs Kathy-Ann Hercules-Wilson and Isabel La Roach for preparing this manuscript.

**REFERENCES**

**Streptococcus intermedius** Liver Abscesses and Colon Cancer
A Case Report
JJ Millichap¹, Al McKendrick², VS Drelichman³

**ABSTRACT**

Certain species of bacteria are known to be associated with colorectal cancer. We report a case of adenocarcinoma of the colon with bacteraemia and liver abscesses due to *Streptococcus intermedius*. The isolation of this organism should prompt investigation for colorectal neoplasm, which may be present but asymptomatic, without metastases, and therefore at a curative stage.

**CASE REPORT**

A 55 year-old Caucasian male presented with a four-week history of night sweats and one week of reported subjective fever and chills. He also complained of one week of right-sided abdominal tenderness with no prandial association. Over the past two months, he lost approximately ten pounds, with a diminished appetite and weakness. He denied recent cough, chest pain, diarrhoea, bloody stool, change in bowel habits or trauma.

Physical examination revealed right upper quadrant tenderness with guarding and hepatomegaly. Laboratory studies of the blood showed: white blood cell count, 15.4 x 10⁹/L (3.8–9.8 x 10⁹/L) (elevated neutrophils); haemoglobin, 5.7 mmol/L (8.56–10.70 mmol/L); haematocrit, 0.28 (0.407–0.503); platelets, 250 x 10⁹/L (140–440 x 10⁹/L); mean corpuscular volume, 68 fl (80.0–97.6 fl); red cell distribution width, 0.175 (0.118–0.146); total iron, 0.9 µmol/L (8.1–31.3 µmol/L); iron binding capacity, 27.6 µmol/L (39.4–75.2 µmol/L); transferrin saturation, 0.03 (0.2–0.5); ferritin, 1307 pmol/L (45–727 pmol/L); alkaline phosphatase, 301 IU/L (38–126 IU/L); alanine aminotransferase, 108 IU/L (7–53.

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enter the systemic circulation, 120 IU/L (11–47 IU/L). The patient’s stool was haemoglobin positive and four blood cultures drawn as two sets on separate days were all positive for viridans streptococci, after incubation for less than 24 hours. Cardiac examination did not reveal a murmur and the transthoracic echocardiogram was normal. Chest X-ray revealed minimal right lower lobe infiltrate with a small right-sided pleural effusion. The initial findings of microcytic hypochromic anaemia prompted the work-up for colorectal malignancy. Colonoscopy identified an 8 cm long lesion of the splenic flexure and a 1 cm sessile polyp of the sigmoid colon. Histopathology of the splenic flexure lesion showed invasive, moderately differentiated adenocarcinoma. No diverticulitis or other colonic pathology was present.

A computed tomography scan of the abdomen and pelvis showed innumerable hypo-densities within the liver. Computed tomography guided aspiration of one area of hypo-density obtained approximately 30 mL of blood-tinged cloudy fluid with positive culture for \textit{S. intermedius}. Core needle biopsy samples were taken from the periphery of a hepatic lesion in the right lobe and cytology revealed no evidence of metastasis. The largest abscess was drained of approximately 110 mL of pus and the catheter left to dependent drainage. The patient was given intravenous ampicillin/sulbactam and gentamicin, and an elective sigmoid resection with intra-operative drainage of liver abscesses was performed the following week. Local lymph nodes were not involved. The patient recovered following the surgery, with resolution of the infection.

**DISCUSSION**

No clear link between \textit{S. intermedius} liver abscess and colon cancer is previously described (8), though the association between intestinal malignancy and hepatic abscess due to other organisms is well known (9, 10). Biliary system pathology is the most commonly described cause of hepatic abscess due to any organism (11).

In this case, an occult adenocarcinoma of the colon was discovered following investigations of anaemia in a patient with \textit{S. intermedius} bacteraemia and multiple \textit{S. intermedius} liver abscesses. At present, examination for colorectal neoplasm is recommended for patients with bacteraemia due to \textit{Streptococcus bovis}, \textit{Streptococcus sanguis} or \textit{Clostridium septicum} (12). Since intestinal organisms enter the systemic circulation \textit{via} the portal system, those species with a propensity for abscess formation will likely affect the liver. \textit{S. intermedius} hepatic abscesses and associated bacteraemia should arouse suspicion for possible underlying colorectal malignancy. Clinicians are encouraged to initiate a prompt and extensive search for the source of pyogenic liver abscesses because of the benefits of early diagnosis of colorectal neoplasm, a condition that may be present but asymptomatic, without metastases, and therefore at a curative stage.

**REFERENCES**

INTRODUCTION
Historically, the most common aetiology of psoas abscesses was mycobacterium tuberculosi. However, non-tuberculous causes are more common today (1). Ninety per cent of infection with calymmatobacterium granulomatis is confined to the genitals, and 5% – 10% at the anal region (2). The disease, which is called granuloma inguinale or donovanosis, may involve the local lymphatics; haematogenous spread is uncommon. Donovanosis has been reported to involve bones, urinary bladder, bowel, spleen, liver, uterus and ovaries but only in 1% to 5% of cases (2). This case is unusual, for apart from the dissemination of the disease and the presence of osteomyelitis, to our knowledge, it is only the third reported case of psoas abscess in donovanosis.

Case Report
A 22-year-old (para 2 gravida 2) was referred from a rural hospital to the University Hospital of the West Indies (UHWI) with weight loss, weakness, oedema and vaginal bleeding. On examination, she was ill looking and cachectic with facial and pedal oedema. She had masses in both iliac fossae, shallow vulval ulcers and a fungating mass replacing the cervix. The only significant findings on blood investigations were anaemia, Hb 6.3g/dl and a high white cell count of 31.7 x 10^9/L with a neutrophilia of 83%. Serology was negative for VDRL and HIV. On ultrasound, there were large lymph nodes in both iliac fossae. The nodes were biopsied under ultrasound guidance and the cervical lesion biopsied under colposcopic guidance. Both biopsies were reported as granulomatous tissue.

The patient was treated with amoxycillin-clavulanic acid and transfused with whole blood. She improved and was discharged from hospital for follow-up in the outpatients’ department. On a visit two months later, her condition had deteriorated; she was cachectic with tender swelling of both wrists, knees and right elbow. The nodes in the right iliac fossa were smaller but still palpable; those on the left were no longer palpable. The cervix was hyperaemic and friable.

X-rays of her wrists and elbow revealed destructive lesions in the ulnae that were interpreted as osteomyelitis. X-rays of her knees were normal. Abdominal computed tomography (CT) scan revealed enlargement of both psoas muscles in the pelvis. They were hyperdense peripherally with irregular water density components centrally; the right measured 6.1 cm x 5.7 cm at maximum diameter and the left 5 cm x 3.4 cm (Fig. 1). The abnormalities in the psoas muscles extended distally for approximately 6 cm from L5.
Above the level of L5, the psoas muscles were normal. A diagnosis of psoas abscesses was made based on the general clinical features and the CT appearance. A nodular hyperdense mass was noted immediately anterior to the right psoas muscle in the right iliac fossa. The nodules in the mass each measured less than 1 cm and were hyperdense peripherally and of relatively low density centrally. This appearance was consistent with lymphadenopathy. The orthopaedic surgeons obtained pus from the wrists and straw-coloured fluid from the knee. The swabs from these materials showed gram-negative bacteria but there was no growth on culture. Colposcopy was repeated and this time Donovan bodies typical of granuloma inguinale were identified (Fig. 2). The patient was started on tetracycline and trimethoprim-sulphamethoxazole and she made a gradual recovery. Two months later, she had returned to her normal lifestyle but had post-coital bleeding. She defaulted from the out-patient’s clinic.

DISCUSSION

Psoas abscesses may be seen in several conditions but to our knowledge this is only the third reported case of psoas abscess in donovanosis. The two previous cases were reported by Mein et al (3). Their patients had intra-pelvic donovanosis, which presented as psoas abscesses. This patient had no specific clinical features of psoas abscesses; the diagnosis was an incidental finding on CT scan. This case was published highlighting the presence of osteomyelitis; the psoas abscesses were overlooked in the previous report and the rarity of psoas abscesses in donovanosis was not appreciated until a subsequent review of the literature (4).

Donovanosis is a chronic, progressive granulomatous infection of the genital region usually considered a sexually transmitted disease. The infectious agent is *calymmatobacterium granulomatis* (2). The organism was discovered by Donovan and subsequently renamed to reflect its capsulated appearance in tissues (kalymma is Greek for “hood” or “veil” however using genomic, clinical and pathologic criteria it has recently been placed in the genus *Klebsiella*) (5). The disease is rare in developed countries but is endemic in some developing countries as well as the aborigines of Australia (6).

Musculoskeletal involvement in donovanosis is rare. In 1998, Patterson presented a case report of spinal cord compression secondary to vertebral destruction (7) and his review of the literature for bony involvement revealed a total of 18 cases one of these was a Jamaican patient reported by Kirkpatrick (8). Patterson’s patient had clinical and radiological features which were clinically and radiologically indistinguishable from tuberculosis.

The index case had lytic lesions in the ulna similar to those of the patient in Kirkpatrick’s report but with the additional feature of psoas abscesses. Small psoas abscesses may be treated with antibiotics but larger lesions require incision and drainage; this is usually done as an open surgical procedure. Several articles have described image guide intervention as an alternative (9, 10). This patient was treated with antibiotics. It was not possible to determine the long-term response to treatment as she defaulted from clinic.

REFERENCES


Spontaneous Haemo-pneumothorax
A Rare but Life-threatening Phenomenon

The Editor

Sir,

Spontaneous haemo-pneumothorax (SHP), although a well documented entity, is encountered infrequently in clinical practice. It is reported to occur in 1%–12% of all cases of spontaneous pneumothorax (1, 2). This condition is characterized by the accumulation of air and blood in the pleural cavity, not preceded by trauma. The clinical picture is of a dramatic progression of symptoms that may be life-threatening. Whittaker was the first to report a patient who was successfully treated by aspiration (3). This case illustrates the importance of early recognition, close monitoring and resuscitation, as well as early thoracotomy.

A 59 year-old man presented with a two day history of sudden onset of left pleuritic chest pain. On physical examination the patient was alert but dyspnoeic. The blood pressure was 140/100 mmHg; pulse rate was 130/min and oxygen saturation was 97% on room air. There was decreased air entry and breath sounds, as well as a resonant percussion note over the entire left chest. Chest X-ray demonstrated a left-sided pneumothorax with a shift of the mediastinal structures to the right side, suggesting an element of tension despite the absence of other clinical signs of tension pneumothorax. The left costophrenic angle was blunted, indicating the presence of an intra-pleural fluid collection (Figure). A basal tube thoracostomy drained 300 ml of fresh blood. The chest X-ray taken after the insertion of the chest drain showed partial re-expansion of the left lung.

Within the next 24 hours, the tube drained a total of 1500 mls of blood and there was a fall in his haemoglobin from 14.3 g/dl to 11.8 g/dl. In view of the sustained haemorrhage, thoracotomy was performed.

During the operation, 900 ml of clotted blood was found inside the left pleural cavity. The entire left lung was emphysematous with multiple small and medium size bullae. There was a 6 cm x 3 cm ruptured bullae in the anterior segment of the left upper lobe. This was partially excised and oversewn with 2/0 chromic suture. Abrasive pleurodesis was performed. The postoperative period was uneventful.

Spontaneous haemo-pneumothorax, although a well documented disorder, is a condition that is rarely encountered in clinical practice (4). In a review by Fry, the incidence of SHP was found to be thirty times higher for male than for female patients, a difference in incidence between men and women for spontaneous pneumothorax (5). Primary spontaneous pneumothorax has an estimated incidence of between 7.4 and 18 cases per 1000 population per year among men and between 1.2 and 6 cases per 100 000 population per year among women (6). In the Jamaican population, 2% to 6% of cases of spontaneous pneumothorax in females of reproductive age may have an associated spontaneous haemothorax due to pleural endometriosis (7).

The need for vigilance and early recognition is crucial. Early intervention not only leads to shorter hospitalization but also confers better long term results.

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REFERENCES


The Editor,

Sir,

The association of metastatic gastric adenocarcinoma of the stomach to the ovary has been known since Krukenberg’s first description of the problem in 1896 (1). The authors recently observed a case of a Krukenberg tumour associated with pregnancy in an Afro-Caribbean woman in Antigua. A 29-year-old woman presented to Holberton Hospital in St John’s, Antigua, with vomiting, abdominal pain and distension. She was pregnant with a menstrual history consistent with 27-week gestation confirmed by ultrasound. Eleven months prior to admission, she had undergone partial gastric resection and chemotherapy for gastric adenocarcinoma. Abnormal findings included pallor, abdominal distension and upper abdominal tenderness with dehydration and emaciation. Fetal movements were detected.

An abdominal ultrasound examination revealed normal liver, gall bladder, pancreas, spleen and kidneys, and marked ascites. There was a gravid uterus with live intrauterine normal fetus, biparietal diameter 6.2 cm, femur length 5.7 cm consistent with a 27-week gestational age. Both the right and left inferior quadrants adjacent to the uterus showed large, oval hypoechoic masses with heterogeneous echo pattern, the left measuring 9.4 by 5.6 centimetres, the right 12.8 by 8.6 centimetres (Figure).

The patient underwent elective Caesarean section, with the delivery of a 30-week estimated gestational age infant weighing 2 lb, 12 oz with Apgar score of seven at one minute and eight at five minutes. Surgical exploration confirmed Krukenburg tumour. Over the next four months, she had paracentesis to relieve symptoms of ascites. The infant is growing well with normal development.

An adnexal mass in pregnancy is a malignant tumour in 2% to 5% of cases (2). Ovarian cancer occurs in one in 8000 to one in 25000 pregnancies (3, 4). In one series of 90 ovarian tumours complicating pregnancy, 54% were diagnosed in the first trimester (4). Uterine death was seen in 3% of cases, neonatal death in 8% (4). General management suggestions include serial sonograms with emergent surgery for torsion, rupture or haemorrhage (2). Ascites and metastatic disease are relative indications (2). For tumours associated with stomach cancer, curative resection of localized cancer is possible only 30% of the time, so gastric surgery should not be delayed (5).

Several cases of Krukenberg tumour complicated by pregnancy have been reported (6–13). The diagnosis of Krukenberg tumours requires a high index of suspicion and careful assessment. The increasing availability of ultrasound in the Caribbean (14, 15) makes early diagnosis more likely and aggressive management may lead to increased survival. Although newer modalities such as transvaginal sonography and Doppler are available, use of these techniques for ovarian cancer are considered experimental (16).

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REFERENCES
Defibrillation is so taken for granted that physicians and paramedics are unaware of its relatively recent advent and its revolutionary life-saving ability in many patients who would previously have died from ventricular arrhythmias caused by cardiac ischaemia or hypoxia.

In 1887, MacWilliam (1) of Aberdeen and London used electricity to induce fibrillation in experimental animals and went on to show that a further shock could restore normal rhythm. In 1899, MacWilliam (2) then suggested that ventricular fibrillation not cardiac standstill, as previously thought, was a major cause of cardiac death in man. He postulated that a strong electric shock could restore cardiac functions in such patients. In 1899, Prevost and Betelli (3) in Geneva also induced fibrillation in an exposed dog’s heart and reversed this arrhythmia by a direct current shock. The invention of the electrocardiogram confirmed ventricular fibrillation in man. Sadly, 48 years then elapsed before defibrillation was used in man.

In 1947, Beck (4) of Cleveland first used an alternating current (AC) defibrillator successfully on an exposed heart in the operating theatre. It then came into routine use in theatres. In 1956, Zoll (5) of Boston used AC defibrillation on the closed chest. However, poor efficiency of the AC was due to its low power and long duration of the shock, 0.25 seconds. These drawbacks were overcome by Lown in Boston in 1962 (6) who developed a capacitance discharge (DC) defibrillator that could deliver a much more powerful shock to the closed chest in a shorter time, 0.0025 seconds. The strength of shock could be adjusted from 20 to 400 Joules (watts/sec). Lown also used this short shock to map the ECG QRST complex in dogs. He found the peak of the T wave was a vulnerable period when a shock could induce ventricular arrhythmias. In patients with acute myocardial infarction, ectopic beats on the T wave can also provoke ventricular arrhythmias (Figure).

A further result of ECG mapping in dogs was the discovery that a shock on the downstroke of the R wave could terminate atrial arrhythmias. This ‘triggered’ the use of defibrillation routinely (7) in patients to restore normal rhythm in atrial flutter, atrial fibrillation and atrial tachycardia. ‘Triggered’ means that when the operator switches on the defibrillator paddle it is not discharged until the next R wave of the patient’s ECG occurs. Electric shock depolarizes the heart’s conducting system to cause cardiac arrest; subsequent recovery should then restore normal conduction in the heart. Using triggered impulses, 20–40 Joules may suffice for flutter, 150–300 Joules for atrial fibrillation. For ventricular arrhythmias, non-triggered shocks of 200–400 Joules are used.

Lown helped to develop acute coronary care units where his defibrillator was life saving. Monitoring the ECG taught us warning signs of impending ventricular arrhythmias that could often be prevented by medical therapy. I spent a week with Lown in 1962 and then introduced the DC defibrillator to St Mary’s Hospital in London. It was initially on our ‘crash’ trolley and by 1966 we opened a coronary care unit (CCU) with monitors and defibrillators. After one year in service, we found that acute coronary mortality in the CCU was 18% whereas infarct mortality on the general wards was 28%. It was then agreed that all suspected myocardial infarct patients were admitted by fast track to the CCU. Coronary care units worldwide provided the same benefits largely due to Lown’s invention. Advances in electronics have now produced implantable, miniaturized defibrillators that are automatically triggered by attacks of ventricular tachycardia in patients who cannot be controlled by drugs. The first was implanted in 1980 (8) but they are expensive.
In a totally different field, Bernie Lown is equally famous. With a Russian colleague, he was awarded the Nobel Peace Prize in 1985. This recognized their worldwide organization of 200,000 physicians (including the author) for Prevention of Nuclear War. Lown also received the Ghandi peace prize.

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1. MacWilliam JA. Fibrillator contraction of the heart, J Physiol 1887; 8: 296–310.
### FORTHCOMING MEETINGS 2005

#### October

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277 EDITORIAL
Developments with Regard to End-of-life Decisions in Newborns
AAE Verhagen
End-of-life decisions in newborns are among the most difficult decisions in paediatric practice. Especially when they concern newborns with untreatable diseases. An open discussion about the dilemmas regarding such decisions may help to develop a coherent and integrated approach.

279 ORIGINAL ARTICLES
Human Immunodeficiency Virus Type-1 (HIV-1) Subtypes in Jamaica
OD Heslop, MF Smikle, D Deer, NA Christian, IE Vickers, KM Harvey, JP Figueroa, CDC Christie, B Bain, EN Barton
The majority of strains of HIV-1 isolated from HIV-1 infected individuals in Jamaica were found to be HIV-1 subtype B. The less frequently found HIV-1 subtypes were C, D and E and some strains were untypable by the methods used.

283 Field Trial to Test and Evaluate Primary Tobacco Prevention Methods in Clusters of Elementary Schools in Barbados
A Lwegaba
Tobacco control efforts presently focus on late adolescence and adulthood. The intervention in children aged 9 – 11 years reduced experimental smoking by 87% at US$2 per child, cost-effectiveness akin to immunization.

292 Iron Deficiency Anaemia in Jamaican Children, Aged 1-5 Years, with Sickle Cell Disease
L King, M Reid, T Forrester
Iron deficiency anaemia (IDA) occurs in children with sickle cell disease (SCD) in Jamaica. Further studies are needed to determine whether treatment of IDA in children with SCD reduces morbidity and is associated with clinical benefits such as improvement in neurocognitive function.

297 The Impact of the Establishment of a Neonatal Intensive Care Unit on the Outcome of Very Low Birthweight Infants at the University Hospital of the West Indies
H Trotman, M Barton
The establishment of a neonatal intensive care unit has resulted in improved survival of very low birthweight infants. Further improvement in survival of these infants will be dependent on increased accessibility to surfactant therapy, initiation of total parenteral nutrition and the availability of trained personnel.
Continued from front cover

302 The Quality of Health Research Reporting by the Daily Newspapers in Trinidad and Tobago
S Nichols, N Chase

Health research published by the newsprint media might influence the public’s perception of the aetiologies of important diseases. Consequently, stakeholders must analyze the quality of such articles for scientific accuracy.

308 A Content Analysis of Health Research Reported by the Daily Newspapers of Trinidad and Tobago
S Nichols, N Chase

The increasing importance of patient-centred healthcare systems coupled with the ease of availability of health research findings necessitate continuous analyses of reported health information for credibility, accuracy, relevancy and coverage.

315 Characteristics and Control of Severe Hypertension in a Specialist, Private Practice in Jamaica
GR Lalljie, SE Lalljie

The authors propose that patients with severe hypertension will require four or more antihypertensives for adequate long-term control. Most are symptomatic at presentation.

319 Variation of Homicidal and Suicidal Behaviour within Trinidad and Tobago and the Associated Ecological Risk Factors
G Hutchinson

Regional disaggregating of national statistics regarding homicide and suicide reveal geographic and ethnic variation of these mortality related behaviours. This suggests that victims of homicide and suicide have a different set of risk factors that are in part explained by where they are located geographically and prevention and analysis can only be addressed if the regional variations are understood and explained.

Continued on Inside Back Cover

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Spectrum of Oral and Maxillofacial Surgical Procedures in Kano, Nigeria
SO Ajike, JT Arotiba, RA Adebola, A Ladehinde, IO Amole
A retrospective study of patients with maxillofacial surgical diseases seen and treated at a new tertiary teaching hospital in Nigeria, between 2001 and 2003, is presented. A total of 87 patients had 90 primary and 8 secondary surgical procedures. The various surgical procedures, complications and the socio-economic status of the patients were analyzed and discussed.

Blood Pressure, Heart Rate and Temperature Variability during Periodontal Surgery
RG Gedik, I Marakoglu, S Demirer
Many factors such as patient age, gender, amount of anaesthesia may be strong determinants of the increase in blood pressure. All parameters that showed significant changes may increase more in medically compromised patients; such patients need more precaution.

Non-syndromal Multiple Buried Supernumerary Teeth: Report of Two Cases from the English-speaking Caribbean and a Review of the Literature
AS Ramsaran, S Barclay, E Scipio, C Ogunsalu

Aggressive Infantile (Desmoid-type) Fibromatosis of the Maxilla: A Case Report and New Classification
C Ogunsalu, S Barclay

Streptococcus intermedius Liver Abscesses and Colon Cancer: A Case Report
JJ Millichap, AI McKendrick, VS Drellichman

Bilateral Psoas Abscess in a Case of Granuloma Inguinale
W West, H Fletcher, B Hanchard, C Rattray, K Vaughan

Spontaneous Haemo-Pneumothorax: A Rare but Life-threatening Phenomenon
EW Williams

Bilateral Krukenberg Ovarian Tumours Complicated by Pregnancy in an Antiguan Woman of African Ethnicity
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