noted that babies developing TTNB had significantly low one minute Apgar score as compared to the normal ones. This suggests that TTNB is more prevalent in neonates who are born depressed or asphyxiated.

Contrary to the popular belief, we noted that antepartum maternal factors like age, height, weight, body mass index gravidity and parity have no influence on the occurrence of TTNB.

We expected TTNB to be more common with prolonged labor and use of narcotic agents, as both are prone to cause fetal distress leading to asphyxia. We noted higher incidence of TTNB in neonates who were exposed to narcotics during labor, but we found no effect of duration of labor on the incidence of TTNB. As far as the role of mode of delivery in TTNB is concerned, Cesarean section has been implicated with the increase incidence of TTNB in previous reports, but we noted no difference in the incidence of TTNB in infants delivered either vaginally or by C-section.

With regards to the postpartum factors, the male sex and preterm delivery were noted to have increased rates of TTNB as compared to control. In that aspect, our study have duplicated the findings of previous reports by Gross et al and Rawlings et al. Our study is a small study of a population of Omani infants delivered in a University hospital. This may not portray the exact picture of Oman. A larger study will be able to detect more factors associated with TTNB. However, in conclusion, we may summarize that TTNB is a benign and self-limiting disease of unknown etiology. Not many of the perinatal factors associated with occurrence of TTNB. Quest to look for the etiology, pathogenesis and factors associated with TTNB should continue.

Shabih Manzar
Division of Neonatology
Department of Child Health
Sultan Qaboos University Hospital
P.O. Box 38, Postal Code 123
Al-Khoud, Muscat
Sultanate of Oman

References

Clinical and epidemiological features of *Pseudomonas aeruginosa* infections at the Libyan Hospitals

Sir,

The prevalence of *Pseudomonas aeruginosa* as a major cause of nosocomial infection necessitates a surveillance program to identify and control such organism. It is the third most common pathogen responsible for hospital-acquired infections. Further, the lethality of infection caused by *P. aeruginosa* surpassed that of other pathogens in many centers. Several investigators have called attention to the danger of the changed conditions. The questions arose when and to what extent this change takes place. The emergence of *P. aeruginosa* as a major cause of nosocomial infection among Libyan hospitals prompted a prospective study over 5 year period (1994-1998). The study was designed to determine the magnitude of *P. aeruginosa* as a nosocomial problem among the Libyan hospitals in terms of its prevalence and its resistance to the used antimicrobials. Further more to assess the clinical and the epidemiological values of pyocin typing combined with antimicrobial resistance patterns in studying such a notorious pathogen.

A variety of typing methods has been extensively used to type *P. aeruginosa* and to trace the routes of infection within hospitals. They include serotyping, phage typing, pyocin typing, SDS-PAGE, PFGE electrophoresis, plasmid profile patterns and ribotyping. Each of these methods, however, has its merits and limitations. Convenience criteria may be important for the selection of appropriate typing methods depending on number of factors such as rapidity, accessibility, and ease of use. Pyocin typing has been found to be the most popular and successful in typing *P. aeruginosa* particularly when the implementation of other typing methods were not visible.

One thousand one hundred, and twenty six isolates of *P. aeruginosa* collected from 3 hospitals. Each hospital composed of different departments including general medicine, surgery and pediatric. All the isolates were obtained from routine specimens received during the last 5 years as shown in Table 1. *P. aeruginosa* was identified according to the morphology and biochemical criteria. A single
colony of each isolate was inoculated on nutrient agar slope and stored at room temperature. These cultures were regarded as strains, when different cultures were isolated from a patient and a subsequent typing showed that different pyocin types were present indicating multiple infections, or when same pyocin types were present indicating persistent infection. Two epidemiological typing schemes were applied including: antibiogram typing using disc diffusion test for carbenicillin (100 μg) piperacillin (20 μg) ceftazidime (30 μg), gentamicin (20 μg), tobramycin (20 μg) and amikacin (20 μg). Pyocin typing; using active pyocin typing method as previously described.2,3 Daw's published criteria,3,4 was used for following up patients and determining the cross-infection among the hospitals studied.

Prevalence of Pseudomonas infection among Libyan hospitals was variable. The isolation rate rose steeply in 1994 and 1995 (4.2 and 5.9%), subsequently they decreased in 1996 (2.1%) and rose again in the last 2 years (3.8 and 5.1%). The incidence of P aeruginosa from surgical specimens and non-surgical specimens was also studied. There was a significant difference in the positivity rate between the surgical and non-surgical swabs. The occurrence of P aeruginosa was very high in the cultures from the surgical swabs particularly in the early 1994 (15.6%). The rate rose further until 1997 (23.4%), then it decreased slowly but constantly in 1998; 13.2%. In contrast, in the non-surgical specimens the rate of P aeruginosa positive cultures was very low in 1994 (1.4%). Then it started rising rapidly and reached the highest peak in 1997; 2.1%. There was no statistically significant correlation between the isolation of P aeruginosa from the other specific sites such as urine, sputum, throat, ear and blood. On the contrary, when surveillance culture were applied to study the P aeruginosa infection among neutropenic patients, the patients were colonized after 3 to 7 days of hospitalization and the organism was usually isolated firstly from fecal samples.

When strains classified on the basis of their antibiogram profiles 3 patterns were evident. The first pattern was defined as A-multiresistant strains, which were resistant to at least 5 of the 6 antibiotics, tested. This was accounted for 22% of the all strains. The second pattern B-resistant strains, which were resistant to at least 3 of the used antibiotics and this accounted for 27% of the typable strains. The third profile C-susceptible strains-resistant to less than 3 antibiotics and this accounted for 51%.

According to Pyocin typing studies 1048 (93%) isolates were typable and assigned for 66 different inhibition patterns. Nine hundred and seventy three strains could be grouped into 27 different pyocin types, 15 of these were represented by less than 10 strains. Seventy-five (6.7%) were shown to have different inhibition profiles reported by the scheme used. The numbers of strains in each of the types were grouped as “other types”. The most common pyocin type encountered was type 1 comprising 370 (32.9%) strains. The strains were distributed as 163 (44.1%) strains from hospital II, hospital I, 114

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**Table 1**: Clinical sources of P aeruginosa

<table>
<thead>
<tr>
<th>Sites of isolation</th>
<th>Hospitals</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hospital I</td>
<td>Hospital II</td>
</tr>
<tr>
<td>Surgical wounds</td>
<td>130 (46.4)</td>
<td>102 (31.6)</td>
</tr>
<tr>
<td>Urine</td>
<td>76 (40.2)</td>
<td>63 (33.3)</td>
</tr>
<tr>
<td>Sputum</td>
<td>90 (51.7)</td>
<td>50 (28.7)</td>
</tr>
<tr>
<td>Throat swab</td>
<td>110 (40)</td>
<td>30 (30.0)</td>
</tr>
<tr>
<td>Ear swab</td>
<td>14 (13.4)</td>
<td>50 (65.8)</td>
</tr>
<tr>
<td>Blood</td>
<td>17 (43)</td>
<td>10 (25.0)</td>
</tr>
<tr>
<td>Vaginal swab</td>
<td>13 (32)</td>
<td>21 (51.2)</td>
</tr>
<tr>
<td>Others</td>
<td>53 (29)</td>
<td>63 (34.4)</td>
</tr>
</tbody>
</table>

**Table 2**: The episodes of cross infection due to P aeruginosa

<table>
<thead>
<tr>
<th>Hospital/Unit Underlying Disease</th>
<th>Patient</th>
<th>Site (isolates)</th>
<th>Time from - to</th>
<th>Pyocin type</th>
<th>MIC (ug/ml) Ge* Carb**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital I</td>
<td>A</td>
<td>F(5),S'(4),B(2)</td>
<td>03-18.V.95</td>
<td>P:1</td>
<td>8.5-67.2</td>
</tr>
<tr>
<td>Cancer unit &quot;Leukemia&quot;</td>
<td>B</td>
<td>F(3),U''(1),B(2)</td>
<td>12-24.V.95</td>
<td>P:1</td>
<td>8.5-67.2</td>
</tr>
<tr>
<td>Hospital II</td>
<td>G</td>
<td>S(4),S''(3),B(1)</td>
<td>11-23.1.96</td>
<td>P:10</td>
<td>0.3-14.5</td>
</tr>
<tr>
<td>Surgical unit &quot;Trauma&quot;</td>
<td>H</td>
<td>S(2),B(1),others(3)</td>
<td>17-24.1.96</td>
<td>P:10</td>
<td>0.3-14.5</td>
</tr>
</tbody>
</table>

*gentamicin **Carbenicillin "fees" sputum "urine" "surgical swabs

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Saudia Medical Journal 1999; Vol. 20 (8) 647
(30.8%) strains and hospital III, 93 (25%) strains. The strains of pyocin type 1 also subdivided into eight different subtypes, 1a to 1h. Subtype 1c (36.1%) was the most common one followed by subtype 1h (27.8%) subtype 1d (15.3%), and subtype 1b (10.7%). The second common pyocin type was type 3, which is represented by 205 (18.2%) strains. Eighty (39%) strain from hospital III, 73 (36%) strains from hospital I and 52 (25.4%) from hospital II. All the 66 inhibition patterns were represented in hospital I, while 97 patterns in hospital II and only 41 at hospital III. Seventy-eight strains (6.9%) did not inhibit any indicator strains and were grouped as non-typable (NT). The proportion of non-typable strains was higher among strains of hospital I, in which they were accounted for 37 (47.4%) strains comparison to hospital II. 23 (29.5%) and hospital III, 18 (28.1%) strains. The remaining 67 (6%) strains were unclassifiable (UC) into the pyocin types reported. They produced 39 different pyocin types with different inhibition profiles to the eight indicator strains, ranging from one inhibition pattern to some clinical strains to three inhibition patterns to the others.

No specific type was associated with a certain specimen. Type 1 was found among all the different specimens, although it was higher among the urine specimens (24%). Type 3 was the most common among the surgical swabs (46.2%), followed by urine (27%) and none of non-typable strains were reported among the septicemic strains. The distribution of other pyocin types was variable among the clinical specimens though, some pyocin types were not reported among certain specimens.

Both pyocin and antibiogram typing methods were combined to detect cross infection in these hospitals. These were appeared to be due frequent isolation of P. aeruginosa from the patients. Hospital procedures were examined for any evidence of any break down in a septic routine that might provided source of infection or lead to transmission. The details of these two episodes were shown in Table 2. The first episode occurred in oncology unit, hospital I. The strain (pyocin type 1) was isolated from different surveillance sites including feces, urine, throat, sputum and blood of a patient (A) with acute leukemia, who was colonized and infected with same strain. A week later the same strain (pyocin type 1) was isolated from blood culture, fecal sample and another surveillance sites of another patient (B) who also had an acute leukemia adjacent to patient (A). The second episode occurred at intensive care unit, hospital II. A traumatized patient was heavily colonized with P. aeruginosa (pyocin type 10), later on the same strain (pyocin type 10) was isolated from another patient in the same ICU who were operated for bone fracture. The strain involved was isolated from ventilator that has been used in both patients. There was an overlapping between the period of colonization and infection. The strains involved in the first episode were resistant to both carbenicillin and gentamicin and they were related to antibiogram no. 3, while those involved in the second episode were sensitive to both carbenicillin and gentamicin and they were related to pattern no 2. The strains involved in the cross infection at the oncology unit were acquired after one week of hospitalization and it was primarily isolated from the fecal samples. On the other hand the strain involved at ICU acquired only after 3 days of admission and it was isolated primarily from the tracheal aspirate.

The prevalence of P. aeruginosa collected from Libyan hospitals was variable during this study. The rate of isolation started to increase at the start of the study and it reached its maximum at 1995 (5.9%) and decline immediately in the consecutive year. The dynamism of such changes was clearly mirrored by the number of isolates collected from the surgical and non-surgical specimens. The isolation rate of P. aeruginosa was high at the first 3 years of the study and reached state of equilibrium at the end of the study, contrary to the number of isolates from the non-surgical specimens. This may be contributed to the awareness of hygienic measures among the medical staff, despite that there is no firm regulations concerning hospital-acquired infection control in these hospitals.

Here in we showed that following up infection of P. aeruginosa on a regular bases and application of antimicrobial resistance pattern combined with pyocin finger printing can be very useful for the epidemiological surveillance of P. aeruginosa infection since they are more rapid. Despite the limitations of antimicrobial susceptibility patterns and pyocin typing methods in relation to reproducibility and discrimination power. They were technically less demanding and inexpensive for a countries who have no budget for hospital infection programs. Further more, they were of great importance in guiding the change of antimicrobial therapy particularly among the septicemic strains who were resistant to commonly applied regimens and hence a proper guide lines for antimicrobials and disinfectant uses could be established.

Mohamed A. Daw

Department of Medical Microbiology
Faculty of Medicine
PO Box 82668
Tripoli
Libya
References


Correspondence

Health Education in schools - The Tabuk Experience

Sir,

Dr Waleed Mila't's and Dr Hussain Al Bar's study “Education of female students in reproductive health issues in Jeddah: the role of school workers” was instructive and informative.

Here in Tabuk, we decided to introduce health education in schools through our school health service, which is a unit of the Preventive Medicine Department at King Khalid Military Hospital. The unit is headed by a school Health Physician, with 2 public Health Nurses, a full time Military Nurse, an RN3, 2 Nurse Assistant Interpreters and a Clerk. In addition, there are often military student nurses with an interest in community health. The school population is comprised of 28 schools - 16 elementaries, 8 intermediates and 4 secondaries, plus one kindergarten, all are situated within the military cantonment. There are just under 15,500 pupils in total.

As part of an improved school health service, it was agreed that a proactive approach to health education in schools should be an important element. We thought that the WHO International Health Day in April with this year’s theme “Issues in Women's Health” would be an ideal starting point. We began planning about 2 months before the date just how this could be put into action. With such a large number of pupils, there was a real danger of a very dilute program - an audience of 250 girls is bound to benefit less from a health education session than a group of 30. We decided that a random allocation of a girls’ secondary/intermediate school for each public health nurse and our RN3 would produce some balance. It was felt that a bottom up rather than a top down approach would be more beneficial and so we asked the selected schools to provide us with a list of issues which were of concern to them and which they would appreciate as topics for discussion. Initially we intended it as a program for the pupils, but as there was considerable interest shown by teachers, they were also included.

The response was overwhelming. Questions ranged from specialist gynaecological and obstetrical to adolescence, caring for skin and hair, diet exercise and keeping fit. In short, the concerns were similar to those of females in most parts of the world. We coopted the assistance of a Saudi female oby/gyne registrar with an interest in community work and arranged a series of sessions in the selected schools. These were very well attended and question time on every occasion was lively. The registrar addressed the oby/gyne topics and the PHN's and the RN3 the general ones. An evaluation questionnaire randomly handed out at each session indicated a 71% approval, 20% disapproval and 9% who were not sure. On further assessment, poor acoustics and overcrowding were significant factors among those who disapproved.

From this initial start, schools have requested health education sessions on specific topics for some classes and in smaller groups (40 to 50 pupils). These sessions are very informal, with nurses and pupils sitting on the floor in a circle and active participation by all. The students appear to enjoy this.

More recently, we have used our male military