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## *Selected Summaries*

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### **Blood Cultures in Children with Cellulitis**

[Sadow KB, Chamberlain JM, Dagger. *Blood cultures in the evaluation of children with cellulitis. Pediatrics 1998; 101: e4*].

A retrospective case study was recently conducted to evaluate the yield of blood cultures obtained from immunocompetent children admitted for cellulitis in the post *Haemophilus influenzae* type-b vaccine era and to determine whether these cultures are cost effective. Patients 2 days to 22 years of age admitted with cellulitis during two years of study period were considered for inclusion in the study. Hospital records were reviewed, and patients were excluded if records could not be located or if the patient developed cellulitis after hospital admission. Data record included demographics, immunization status, initial clinical appearance, antibiotic pretreatment, preexisting illnesses, location and precipitating cause of cellulitis, white blood cell count, and band to neutrophil ratio (BNR). Blood cultures were categorized as positive, negative or contaminant. Of the 381 patients identified, 266 (70%) had blood cultures available and 243 of these children were enrolled. Mean age of patients was  $6.2 \pm 5.0$  years, and 57% were females. Sixty seven per cent were African Americans, 16% white, and 11% Hispanic. Immunization was current for 94% of the patients, and only 22% were pretreated with antibiotics before admission. Majority (91%) had no or noncontributory underlying disease. Ninety seven per cent of the patients were described as being non toxic and 30% of the patients had cellulitis involving an extrem-

ity. Most (72%) of the cases were uncomplicated, 60 (24%) had an abscess and 7 (2.8%) had associated osteomyelitis, septic arthritis or mastoiditis. Blood culture was positive in 5 (2.1%) and contaminated in 13 (5.4%). The positive blood culture grew streptococcus (n = 4) and staphylococcus organisms (n = 1). None of the patients with positive blood cultures had an underlying medical condition. All the patients bacteremic with Group A beta hemolytic streptococci (GABHS) had active infection with varicella. There were no positive blood cultures in the 53 pretreated patients. The mean age in patients with positive blood cultures was lower (25 vs 75 months,  $p = 0.01$ ) and mean BNR higher (0.32 vs 0.07) than in non bacteremic patients. Mean temperature was also significantly higher ( $39.3$  vs  $38.0^{\circ}\text{C}$ ). However, the mean WBC count was not significantly different. The length of stay in the hospital for bacteremic patients ( $14.6 \pm 9.8$  days) was also significantly longer than that for non bacteremic patients ( $4.5 \pm 4.2$  days).

It was concluded that the blood cultures are not cost effective and are more frequently contaminated than positive in the evaluation of a patient with uncomplicated cellulitis. The most common organism isolated from the blood cultures was GABHS. Using a threshold of  $\text{BNR} = 0.20$  for sending blood cultures, only one blood culture would have been missed but 213 (88%) could have been avoided with an estimated savings of \$42,850.

#### **Comments**

Cellulitis, an infection of the skin and subcutaneous tissue, occurs commonly among children. Children are prone to

develop cellulitis because they frequently sustain minor traumatic injuries such as insect or animal bites, lacerations, and abrasions. Standard pediatric textbooks do not provide the relative frequencies of isolation of pathogens or correlate the bacteriologic findings with clinical and laboratory features. The present study is probably the first to define the yield of blood cultures in children admitted for all types of cellulitis in the post Hib vaccine era. This is also the first attempt to determine the cost effectiveness of routine blood cultures in the management of these patients.

The low yield (2%) of positive blood cultures in this study is consistent with earlier work(1,2). As expected, *H influenzae* was not isolated in any of the blood cultures, in contrast to the studies in pre Hib vaccine era when it was the commonest organism isolated in cases of cellulitis(3). The association of GABHS with varicella is of interest and has been observed previously(2,3). Invasive GABHS disease, including toxic shock like syndrome is a serious complication of varicella and must be considered in children with varicella and fever on or beyond the third day of illness(3,4). The loss of the negative predictive value of a normal WBC(2) in the evaluation of the febrile child with active varicella zoster for GABHS infection is also substantiated by the present study. The present report also corroborates the view that a blood culture which is usually negative and an aspirate culture which is not likely to show unexpected pathogen(3) is apparently not cost effective.

The study however has certain limitations. This is a retrospective study and the reports of clinical appearance and documentation of causes are limited to the patient records. About 22% of the patients

were missed because of pretreatment. Also, about 30% of the patients did not have the blood cultures performed.

It can be safely inferred that positive blood cultures are uncommon in cases of cellulitis and associated with active varicella or underlying tissue infections. Blood cultures were twice as likely to be contaminated than positive. The costs associated with obtaining blood cultures are substantial and must include the emotional aspect (pain) or repeating the cultures in patients with contaminants. As such the results do not alter therapy. Clinicians who wish to obtain blood cultures should limit cultures to toxic-appearing children, patients with varicella or those with another focus of infection such as osteomyelitis or a septic joint.

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## Ambulatory Blood Pressure Monitoring in Pediatrics

[Gellerman }, Kraft S, Ehrlich JHH. Twenty four hour ambulatory blood pressure monitoring in young children. *Pediatr Nephrol* 1997; 11: 707-710].

Casual blood pressure measurement has provided the basis for current knowledge concerning the potential risk associated with hypertension and has guided the management of patients for many years(1). However, casual or intermittent office BP measurements are not representative of the fluctuations of BP during the day, are characterized by high variability and white coat hypertension (disturbing effect of the medical environment(1). Ambulatory Blood Pressure Monitoring (ABPM) has contributed not only to improved accuracy in diagnosis but also more effective monitoring of antihypertensive drug regime(2) in adults. The normal values for adults and children over 6 years of age for ABPM are now available(3). The authors studied the feasibility of this method in children under 6 years.

A total of 61 healthy children and 40 patients with renal disease or arterial hypertension between 6 months to 6 years of age underwent ABPM from 7 a.m. to 5 p.m. in a day care centre and during the evening and at night at home. ABPM was performed with a well established and reliable oscillometric device (spacelabs model No. 90207, Redmond, Wash USA). Cuff sizes appropriate for the non dominant arm were used and the children carried the monitor with a shoulder strap or padded backpack. The monitor was programmed to measure BP every 15 min during the day (6 a.m. to 10 p.m.) or every 30 min during the night (10 p.m. to 6 a.m.) leading to a total of 80 expected readings per day.

Systolic, diastolic, mean arterial pressure and heart rate were recorded and analyzed by space labs software computer programme giving mean values for day-time and night times, total number of valid readings, total number of erroneous readings and reasons of erroneous readings, namely, cuff dislocation, insufficient cuff inflation and movement artefacts.

The authors observed that the device was well tolerated by the healthy children and the number of valid readings increased from  $46 \pm 12$  in 3-4 year olds to  $50 \pm 11$  in 5 year olds and  $58 \pm 11$  in 6 year olds as against an expected 80 readings per child. Sleeping problems during ABPM were reported by 6% of all healthy children. The mean ( $\pm$  SD) day time systolic BP (SBP) was  $110 \pm 5$  mm Hg and diastolic (DBP) was  $67 \pm 5$  mm Hg. The night time SBP and DBP were  $100 \pm 5$  and  $58 \pm 5$  mm Hg, respectively. The mean day to night decline (dip) of mean SBP was 8-10% and that of DBP was 16 to 18%.

The 40 patients tolerated ABPM better than healthy children. The mean BP was higher than that of healthy children (day time =  $119 \pm 14/77 \pm 11$  mmHg and night time  $113 \pm 15/67 \pm 13$  mm Hg). Of the 40 children, 12 were on anti-hypertensive therapy based on casual BP recording and 5 of these had ABPM readings which exceeded two standard deviation of the normal values according to casual BP measurement norms and also according to ABPM of normal healthy children with a disturbed circadian rhythm requiring re-adjustment of anti-hypertensive dosing. Out of ten patients diagnosed as hypertensive on single casual BP monitoring 5 failed to demonstrate sustained rise on ABPM (white coat hypertension) and the remaining 18 normotensive on casual BPM had ABPM profiles which were comparable to the healthy children.

Authors concluded that ABPM is feasible and well tolerated in children below 6 years of age and that ABPM helps in better diagnosis, monitoring and therapy of children with hypertension.

*[Lingus N, Dobos E, Wide K, Busch C, Lemmer B, Klaus G, et al. Twenty four hour ambulatory blood pressure profiles in Pediatric patients after renal transplantation. *Pediatr Nephrol* 1997; 11: 23-26].*

ABPM was applied in 27 pediatric patients aged 6.3 - 24.3 years who were transplanted 1.5 to 8.4 years previously. Day time values of ABPM were compared with the mean of 10 concomitant casual BP recordings. The ABPM confirmed normotension or hypertension determined by casual BP measurements in 63% of the patients.

The physiological nocturnal dip was blunted/attenuated or reversed in 8 of 27 patients. It was reduced in all with renal artery stenosis of the graft, 75% of patients with chronic rejection and in the sole patient with recurrent focal segmental glomerulosclerosis and in one out of six with part acute rejection. Authors concluded that blunted nocturnal dip was related to the presence of renal parenchymal or renovascular disease and correlated well with long term complications like left ventricular hypertrophy which is essentially related to nocturnal hypertension. They recommended the regular use of ABPM in post transplant patients.

#### Comments

All physiological variables by virtue of their dynamic nature need to be monitored continuously and preferably noninvasively to give a complete and true picture in an individual. This is true for blood pressure also because a casual blood pressure measurement neither represents a weighted average of 24 hours value nor a basal or

peak value. It is one random measurement which just represents the state of cardiovascular system at that particular moment in time.

ABPM has come of age and is now a well accepted tool for the evaluation of BP in hypertensive patients of all ages. The major advantage of this technique in the pediatric age group is that it eliminates or significantly limits the so called white coat hypertension. ABPM recordings also have a better correlation with hypertensive end organ damage than incidental BP measurement<sup>(4)</sup>. ABPM alone detects the changes in circadian rhythm which undergoes modification in patients with chronic renal disease and those with renal transplant. ABPM detects patients with labile pattern of BP which is postulated to represent prehypertensive state and is possibly due to excess catecholamine release in response to various stimuli and stress<sup>(4)</sup>.

ABPM also helps detect the BP load, i.e., percentage of readings above the 95th centile for age which is important because a strong correlation between load and the presence of end organ damage has been described. This parameter is taken as a good estimator of stress on the heart and cardiovascular system<sup>(5)</sup>. Lastly ABPM can be used to evaluate new antihypertensive regimens<sup>(5)</sup>.

The main problems with ABPM are movement artefacts, some night time discomfort to the child and its high cost (about 7,000 US \$).

All there are valid considerations for the use of ABPM but is this the need of the hour especially in a country like ours? The probable answer is a restricted use for selected number of patients in specialised pediatric centres, especially in the practice of pediatric nephrology and cardiology. However, the high cost may prove a deterrent.

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