Bacteriological counts of urines in general practice

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DURING recent years it has been realized that urinary tract infections occur much more frequently than was formerly recognized. It has been estimated (Kunin 1968) that five per cent of girls have had a urinary tract infection by the time they leave school. Asymptomatic bacteriuria occurred in about two per cent of five-year-old girls examined by Savage and his co-workers (Savage *et al* 1969) and 80 per cent of these had radiological abnormalities. Infants and children may present with only vague symptoms which may be so mild as to be disregarded. Antenatal patients with asymptomatic bacteriuria developed an acute pyelonephritis in 23.3 per cent of untreated cases (Condie *et al* 1968) and some workers have found an association between bacteriuria and prematurity (Condie *et al* 1968) and increased foetal mortality (Kass 1962, Kincaid-Smith and Bullen 1965, Brumfit *et al* 1966, Savage *et al* 1967).

Our aim was to develop a reliable method which could be used in general practice for the detection and follow-up of urinary infections without being too time consuming for the doctor. It is usually much easier for the patient or their relative to bring a clean catch, mid-stream urine to the surgery, within one to two hours of voiding, than to take it to the hospital laboratory. Furthermore, we are often called to a patient, especially a child, with a possible urinary infection late in the day or at weekends when the hospital laboratory is closed. The sooner treatment is started the better the results, but unless an MSU is collected first, the true diagnosis may not be verified.

Method

Originally, the method described by Bradley *et al* (1967), using disposable swabs to inoculate MacConkey plates, was used. Although this method was useful in identifying infections, there were many border-line results and to follow patients up after treatment, a more accurate method was required. The method employed was to culture diluted urine and count the colonies grown. Thus the number of bacteria per ml of urine was determined.

All patients were instructed to collect a clean catch, mid-stream urine in the sterile bottle provided and to hand it in at the surgery within one to two hours of voiding. All women were given an instruction card supplied by Bayer Products Company. They were requested to wash with soap and water and separate the labia during collection. The men were verbally instructed to wash the penis before micturition. It was difficult to obtain clean-catch MSU's from infants. Mothers were advised to attempt to collect the mid-stream in a small, boiled basin and then transfer it to the sterile bottle. If the specimen could not be tested immediately it was placed in the refrigerator. Occasionally it was kept over-night.

Media used

Initially, MacConkey agar was used for culturing. This was changed to a Cystine-

Lactose-Electrolyte Deficient (CLED) medium obtainable from Oxoid Limited and modified (Bevis 1968) by the addition of 1 per cent Andrade indicator.

Colonial appearances

Using the modified CLED medium, the appearance of colonies are:

Eserichia coli:	Bright pink semi-translucent colonies with a surrounding pink halo.
Proteus mirabilis:	Blue-green translucent colonies.
Klebsiella pneumoniae aerogenes:	Grey-green mucoid colonies. Lactose fermenting varieties are large pink-mucoid.
Staphylococcus aureus:	Smooth, opaque, bright golden-yellow colonies. Lactose fermenting varieties having a surrounding pink halo.
Staphylococcus albus:	Smooth, opaque, porcelain, white or very pale pink colonies.
Streptococcus faecalis:	Opaque, deep orange-yellow colour.
Streptococcus pyogenes:	Small, opaque, grey-green colonies.

The above descriptions are a guide only. No attempt was made to positively identify the organisms but it was useful to record the appearances of a probable organism.

For the sensitivity tests a diagnostic-sensitivity test (DST) agar obtainable from Oxoid Limited was used.

Equipment and materials used

The equipment used for culturing was:

1 incubator
1 sterilizer
1 plastic gallipot
1 10 ml glass syringe
1 fine Pasteur pipette graduated to 0.1 ml
1 rubber teat for the pipette
1 glass rod angled at the base for spreading
1 Petri dish containing the culture medium
1 chinagraph pencil

In addition the following were required for the sensitivity test:—

1 Petri dish containing sensitivity agar
1 nickel-chrome loop
1 Bunsen burner or spirit lamp
1 sensitivity multodisk
1 pair of forceps

The incubator used was a simple home-made one constructed from details supplied by Oxoid Limited and cost approximately £3 to make.

Procedure

Culture. 9.9 ml of water from the cold water tap was measured in the sterilized 10 ml glass syringe and put in the sterilized gallipot. 0.1 ml of urine was then drawn into the sterile pipette using the rubber teat. This was well mixed in the 9.9 ml of water.

Then 0.1 ml of the mixture was drawn into the same pipette (having previously drawn the mixture in and out a few times to avoid any undiluted urine remaining in the pipette) and dropped onto the culture medium in the Petri dish. With a sterile glass rod the diluted urine was spread evenly over the medium. The Petri dish was then placed upside down on to its cover, the name added and incubated at approximately 37°C for about 24 hours.

The next day the number of colonies on the medium were counted and the different types of colonies noted. If the diluted urine was evenly spread it was assumed that each bacterium developed into one colony. The number of bacteria per ml was therefore 1,000 × colony count.

Microscopy and routine testing. All MSU's were tested for reaction, albumin, and sugar using Albustix, Clinistix and litmus paper. Haemocombistix was used instead when testing for blood.

All MSU's were examined microscopically except, occasionally, when we were very busy. The method employed was that described by Hilson (1964). Two coverslips were placed on a microslide about 1 cm apart. Then a large drop of uncentrifuged urine (which had previously been stirred) was placed on the slide between the two coverslips. A third coverslip was then placed over the drop of urine and resting on the edges of the two previous coverslips. There was always then a constant depth of urine to microscope. The average number of pus cells per high power field (HPF) was counted and recorded. The urines were always examined as soon as possible because pus cells can rapidly breakdown in the urine, even when stored in the refrigerator.

Sensitivity tests. When a culture produced a high colony count with a predominance of one or two types of colonies, a sensitivity test was performed. Alternatively the culture could be sent to the hospital laboratory for identification and sensitivity tests.

Part of a representative colony was transferred from the culture medium to a DST agar plate using the nickel-chrome loop and spread evenly. An Oxoid sensitivity multodisk Ref. No. 1788E was placed with forceps on to the agar and the plate incubated over-night at 37°C.

The sensitivity disc used included:-

Triple sulphonamide, streptomycin, ampicillin, colistin, nalidixic acid, nitrofurantoin, septrin and tetracycline.

Which antibacterial agent had inhibited the growth was easily seen by the zone of inhibition around the individual disc.

Precautions in the method of collection and culture

Collection of MSU's. A few women produced a high bacterial count of very mixed growth. On repeating this after further instruction about collection, the count usually dropped considerably. But one woman, a bank clerk, had three highly contaminated cultures before it was found that she was not following the instructions on the card. She was given treatment for her vaginal discharge and further MSU's correctly collected resulted in 15,000 and 20,000 bact/ml.

Some male urines grew contaminated cultures of mixed colonies. After more instruction on washing, retracting the foreskin during micturition and taking care not to touch the top of the bottle, normal results were obtained.

Sterilization of equipment. The pipettes, spreaders, syringes and gallipots were boiled for at least five minutes immediately before use. The instruments were removed from the sterilizer using Cheatle's forceps. The latter were kept in a Cheatle's jar containing diluted Roccal and sodium nitrite 1 gm per 500 ml. The Roccal was changed weekly and the water in the sterilizer three times per week to avoid a concentration of Roccal building up.

The water used for dilution. The water used for diluting the urine was obtained straight from the cold tap and was not boiled. This was checked for bacterial growth on eight different occasions. 0.1 ml of cold tap water was spread on the culture medium and incubated. On five occasions no growth developed and three times only one colony after 24 hours. So cold tap water was considered quite satisfactory for use.

The culture should be prepared before the Albustix and Clinistix are dipped into the urine. Alternatively, the urine can be poured over the tips of the sticks over the sink to avoid contamination.

Wet plates. The culture medium in the Petri dishes was dried before use, otherwise the bacteria multiplied in the moisture and spread over the surface giving false high counts. However, if the agar is too dry and the surface appears wrinkled, then bacterial

growth can be inhibited. The plates can be dried by placing them inverted with one edge raised in the incubator for about two hours until the surface appears dry.

The time required

The complete investigations of the MSU's were performed by two part-time nurses and one receptionist-secretary. They prepared the slides for microscopy, cultured the urine and tested for albumin, sugar and reaction, counted the colonies, performed the sensitivity tests and recorded the results. The doctors microscoped the urines and checked the results of the cultures and sensitivity tests.

Each culture could be prepared in 1½–2 minutes and the slide for microscopy in 2 minutes. The time spent in counting the colonies varied. Estimates over 100 were guessed. The average time involved was ½–1 minute per plate.

The strip tests for albumin and sugar took approximately 45 seconds. The preparation of the sensitivity tests usually took 2 minutes and the reading and recording about ½ minute.

The doctors' time spent in checking the nurses' results was usually about 15–30 seconds per plate. The microscopy took longer, but on the average approximately 2 minutes.

In addition to this the equipment had to be sterilized and the micro-slides cleaned and dried and the discarded plates burnt. The agar was obtained in bottles, melted in the sterilizer and poured into the Petri dishes. This took very little time, especially when batches of about 20 plates were prepared together. The nurses and receptionist had no experience of bacteriology but soon learnt the technique.

Results

The results were obtained from specimens collected from January up to 2 May, 1969. The MSU's were collected from patients suspected of having a urinary tract infection, for follow-up purposes and routinely from maternity patients.

Relationship of albuminuria to infected urines

Males. 27 MSU's were obtained from 17 males. Infected urine in males was regarded as a pure or almost pure growth over 20,000 bact/ml. Urines containing only a trace of albumin are placed in the No albumin column (Table I).

TABLE I

RELATIONSHIP OF ALBUMINURIA TO INFECTION IN MALES

Urine	*Alb+*	*No Alb*
Infected	4	4
Not infected	0	19

Infected urines: 20,000+ bact/ml of pure growth.

TABLE II

RELATIONSHIP OF ALBUMINURIA TO INFECTION IN FEMALES

Urine	*Alb+*	*No Alb*
Infected	9	23
Not infected	8	72

Infected urines: 100,000+ bact/ml of pure growth.

Females. In this series 112 specimens were obtained from 55 females including maternity patients. With the help of subsequent MSU's to show if a doubtful urine was infected or not, the results shown in table II were obtained.

Of the eight with albuminuria not infected, one was a child with a pyrexia, one a diabetic, five maternity patients and one had a vaginal discharge.

These results clearly indicate that a urine without albumin can still be infected. In

the women with a urinary infection only 36 per cent had albuminuria and in the men only 50 per cent. However, the number of male urines is too small for statistical evaluation.

Results of microscopy

The microscopy was performed on unspun MSU specimens as described earlier. The number of pus cells per high power field was recorded.

Females. 98 specimens from 53 females were examined and the results shown in table III.

TABLE III

RELATIONSHIP OF PYURIA TO INFECTED URINE IN FEMALES

Pus cells per HPF	*Nil*	*Occas.*	2–5	5+	*Total*
Infected	13	8	4	4	29
Not infected	44	17	6	2	69

Cultures of pure or almost pure growth above 100,000 bact/ml were regarded as infected and those below 100,000 and mixed growth as probably not infected.

This shows that of the infected urines only 28 per cent contained pus cells. Two specimens contained numerous pus cells but were not considered infected. One of these had a bacterial count of 11,000 and the other a mixed growth over 100,000 bact/ml. The latter had a vaginal discharge and subsequent MSU's showed that the urine was not infected. In three of the specimens obvious motile bacteria were seen. Two of these grew high bacterial counts, but the other, an antenatal patient, grew only 2,000 bact/ml. However, she subsequently developed a urinary infection during her pregnancy.

Males. 24 MSU's were obtained from 16 males. Pure or almost pure growths above 20,000 bact/ml were regarded as infected. The results are shown in table IV.

TABLE IV

RELATIONSHIP OF PYURIA TO INFECTED URINE IN MALES

Pus cells per HPF	*Nil*	*Occas.*	2–5	5+	*Total*
Infected	4	1	0	2	7
Not infected	14	3	0	0	17

Pure growths above 20,000 bact/ml being regarded as infected. Those below 20,000 and mixed growths being regarded as not infected.

This again shows that only 29 per cent of the infected urines had a significant pyuria. Although the number is small it corresponds with results obtained from the females.

Nine urines on microscopy contained numerous very clear cells. They were usually large, oval or round, but some were small and irregular. Small flattened nuclei were seen at the periphery. They were not easily identified unless the diaphragm of the microscope was reduced to the minimum. Of 121 MSU's microscoped, eight female and one male urines contained these cells. Three of these had high bacterial counts. Repeat MSU's, even if still infected, did not contain them again. These were probably epithelial cells from the renal tubules.

Analysis of cultures

Females. Ninety-nine clean catch MSU's were obtained from 55 patients, 21 of these were maternity patients from whom 53 urines were cultured routinely. If the result was suspicious it was repeated at the next attendance. The remaining patients all had symptoms which might have been due to urinary infection or were being followed-up after treatment. The results can be seen in table V.

Pure growths

Pure growths above 51,000 bact/ml. The 25 urines with a pure growth over 100,000 bact/ml were all regarded as being definitely infected. One antenatal patient had a pure

growth of 60,000 bact/ml. She had previously been treated for cystitis and was complaining of frequency of micturition. She was treated with nitrofurantoin and a follow-up MSU showed no growth.

Pure growths between 21,000–50,000 bact/ml. Of the ten urines in this group subsequent follow-up revealed:

1. Mrs AD (58 years). Culture—50,000 bact/ml. She had been treated for pyelonephritis and was now asymptomatic. Two repeat MSU's both had more than 100,000 bact/ml of pure growth. After treatment with nalidixic acid an MSU grew 18,000 bact/ml.
2. Mrs JA. An antenatal with 32,000 bact/ml. She had been treated for a urinary infection earlier in the pregnancy. A follow-up MSU grew 13,000 bact/ml of mixed growth without further treatment.
3. Miss HF (age 6) 27,000 bact/ml with slight dysuria. She was treated with sulphadimidine but later had frequency and further counts of 60,000 and 140,000. She was treated with oxytetracycline and later nalidixic. She eventually had normal results.
4. Mrs JL (age 68). A diabetic with chronic rheumatoid arthritis, had dysuria with 37,000 bact/ml. She was treated with urolucosil and had a follow-up of MSU of less than 1,000 bact/ml.
5. Mrs MM (Antenatal). Routine MSU grew 37,000 bact/ml of pure growth. A repeat MSU had a mixed growth of 35,000 bact/ml. However, four months later in her second pregnancy she had a urinary infection with symptoms.
6. Mrs DP (Antenatal). Routine cultures had 25,000 and 50,000 bact/ml. She was not treated. Another
7. MSU grew 100,000 bact/ml of mixed organisms. Later in the pregnancy she had acute pyelonephritis.
8. Mrs PP (Antenatal). Routine culture of 35,000 bact/ml. She had no symptoms and no treatment, and at post-natal had a culture of 7,000 bact/ml.
9. Mrs JS (Antenatal). Routine MSU's grew 28,000 and 43,000 bact/ml of pure growth and she
10. occasionally had slight dysuria. No antibacterial agents were given. Unfortunately, at 36 weeks she had an intrauterine death for no apparent reason. An MSU at postnatal grew 100,000+ bact/ml with one predominant organism and she is being followed-up.

TABLE V
ANALYSIS OF CULTURE OF MSU'S IN FEMALES

Bact/ml × 10^3	100+	51–100	21–50	11–20	0–10
Mixed growth	21	7	15	6	23
Pure growth	25*	1	10	1	

* Includes 1 or 2 types of colonies.

Of the eight patients who produced ten MSU's with pure growths between 21,000–50,000 bact/ml, six had significant bacteriuria. Had Mrs JS received antibacterial agents the IUD may well have been prevented.

Pure growths between 11,000–20,000 bact/ml. The only patient in this group had lost some weight. Her MSU contained pus cells but grew only 11,000 bact/ml. This has not yet been repeated because of her highly anxious temperament.

Mixed growths in females

Mixed growths above 100,000 bact/ml. Of the 21 urines in this group, eleven were shown on repeat MSU's to be almost certainly not infected. Another was a follow-up after pyelonephritis. This has not yet been repeated. The remaining nine specimens were from patients with urinary symptoms and so were regarded as infected and treated. After treatment normal counts were obtained except in one, who is now in a mental hospital.

Mixed growth of 51,000–100,000 bact/ml. The seven MSU's were obtained from different patients, none of whom had definite urinary symptoms at the time. Two were follow-ups after a previous urinary infection, one a routine antenatal and the others were being investigated for vague illness of uncertain cause. Four MSU's were repeated later and all had low counts without having any treatment. None have since developed a urinary infection.

Mixed growths between 21,000–50,000 bact/ml. Of the 15 MSU's obtained from 12 females (7 maternity), none had definite symptoms of a urinary infection but two had abdominal pains. On follow-up, five (including 3 pregnancies) eventually had a urinary infection. Three of these had had previous infections. One, with abdominal pains, was investigated in hospital and found to have a right hydronephrosis.

Mixed growths between 11,000–20,000 bact/ml. The six MSU's were from different patients, four of whom were antenatals. They were all routine follow-ups and five had had previous urinary infections. None had urinary symptoms. One patient later developed a definite recurrence of urinary infection.

Group 0–10,000 bact/ml. The 23 MSU's were from 21 patients (9 pregnancies). Eleven had been treated previously for infection and of these three later developed a recurrence. One antenatal patient in this group had an interuterine death at about 24 weeks gestation for no apparent cause.

Most of the patients had more than one MSU included in the above series, seven being obtained from one woman and six from two others. Consequently the same patient may have results included in the infected group and later in the non-infected and vice versa.

Analysis of cultures from males

The following table shows the results of 31 MSU's from 17 male patients. Most had only vague symptoms and urinary infection was being excluded. The results are seen in table VI.

TABLE VI
ANALYSIS OF CULTURES OF MSU'S IN MALES

Bact/ml × 10^3	100+	51–100	21–50	11–20	0–10
Mixed growth	1	0	1	5	15
Pure growth	5*	3	1	0	

* Includes 1–2 types of predominant organisms.

Pure growths above 100,000 bact/ml. Two in this group had two types of colonies, one of which produced two normal counts after more careful collection of urine. The other had previously been treated for a urinary infection and a repeat MSU grew 10,000 bact/ml.

The remaining three with pure growths over 100,000 bact/ml were treated and follow-up results were later normal.

Pure growths between 51,000–100,000 bact/ml. The three MSU's in this group were from different patients. One had urinary symptoms, a child had malaise and a man with septic fingers was found to have albuminuria on routine testing. All were treated and follow-up results were normal, but one had to have a second course of treatment.

Pure growths between 21,000–50,000 bact/ml. The one MSU in this group had a count of 50,000 bact/ml. He had previously been treated for a urinary infection and was given Septrin for two weeks. A later follow-up MSU was normal.

Mixed growths above 100,000+ bact/ml. The only man in this group had aching in the loins. His father died of renal disease and his mother has a right hydronephrosis. A repeat MSU produced 150,000 bact/ml with two predominant types of colonies. More careful collection of the specimens eventually produced two normal counts. He has now had an IVP and this was normal.

Mixed growths 21,000–50,000 bact/ml. The only urine in this group was from a man who had a previous infection. He later had a recurrence.

Mixed growths 11,000–20,000 bact/ml. The five MSU's in this group were from different males. Three had previously been treated for urinary infections. One was having renal colic and was transferred to hospital. Four have had repeat MSU's of less than

10,000 bact/ml and the fifth has been quite well.

Cultures of less than 10,000 bact/ml. The 15 MSU's in this group were obtained from 14 males. Some had been previously treated for urinary infection and the others had various symptoms not directly related to the urinary tract. All have since been well.

Comparison of cultures with the hospital laboratory

When our staff were accustomed to the technique, a comparison was made with the hospital laboratory. Twenty MSU's collected between 20 May and 14 July 1969 were divided into two portions by pouring approximately half of each into another sterile bottle. This second part was placed in the refrigerator until it could be taken down to the hospital laboratory a few hours later. The comparisons are shown in table VII.

TABLE VII
COMPARISON OF CULTURES OF MSU'S WITH HOSPITAL LABORATORY

No of MSU	1	2	3	4	5	6	7	8	9	10	11
Our culture $\times 10^3$	20* (4)	<1	8	1	10 (3)	17* Mixed	6	24 (1)	9	20 (1)	32 (2)
Hospital culture $\times 10^3$	<1	<5	<1	<1	<1	<1	<1	40 (1)	<1	20 (4)	20 (2)

No of MSU	12	13	14	15	16	17	18	19	20	14 *Rep*	16 *Rep*
Our culture $\times 10^3$	7 (2)	20 (1)	100 (2)	100++ (1)	200 (1)	20 Mixed	18 (1)	1	10	5	214 (2)
Hospital culture $\times 10^3$	<5	<1	10 (2)	>1,000 (1)	60 (2)	<1	<5	<1	<1	—	—

* Indicates plates incubated for 48 hours. Figures in brackets indicate the number of different types of colonies recorded.

Our results compared quite favourably with the laboratory results except Nos 14 and 16. The result of No 14 appears to have been hurriedly recorded on our notes. No comma had been placed between the 0's and with only 2 types of colonies with a count of 100,000 bact/ml we would normally do a sensitivity test. However, on this occasion it was not done. Another MSU obtained a few days later grew 5,000 bact/ml, thus corresponding with the hospital's earlier result.

The differences in specimen No 16 are difficult to account for. The hospital laboratory grew two species of organisms, *Klebsiella* and *E. coli.* We recorded our result as predominately *E. coli.* Both types of organisms can be lactose fermenting so it is possible that we had not appreciated that two different types of colonies were present. However, this would not account for our higher count. The culture was repeated a week later at the surgery and grew 94,000 *E. coli* and 120,000 non-lactose fermenting bact/ml. This patient was given a two weeks' course of nalidixic acid and a follow-up MSU had a mixed growth of 12,000 bact/ml.

The sensitivity results of our own and the hospital laboratory were also compared and found to be similar.

On the whole our culture results are higher than the laboratory. The delay caused in getting the urines to the laboratory might be expected to produce higher hospital results due to bacterial multiplication. At first when no growth was seen on the plates after 18–24 hours, they were incubated for another day. This often showed up more

mixed types of colonies which were either slow-growing or contaminants. However, it is most likely that 'wet plates' allow bacteria, after multiplication, to spread over the surface of the agar. This can be recognized by groups of adjacent identical colonies—large ones at the centre and smaller ones at the periphery. Our plates are now dried more and this effect has been eliminated.

Discussion

From the results, it can be seen that of those MSU's with a pure or almost pure growth above 20,000 bact/ml 82 per cent either had urinary symptoms or became infected later. Furthermore, almost all of these patients had normal counts after treatment. Therefore, one can regard pure growths greater than 20,000 bact/ml as probably infected. If there are no symptoms directly related to the urinary tract, repeat MSU's should be cultured.

Bacterial counts below 10,000 bact/ml are almost certainly not infected. There were not enough patients with pure growths between 11,000–20,000 bact/ml to assess the significance in this range.

Mixed growths greater than 100,000 bact/ml should be repeated after further instruction on collection. Almost half of the females in this group were probably infected and normal counts were obtained after they had been treated. Mixed growths below 100,000 bact/ml are probably not infected. It must be emphasized that careful collection of the clean catch MSU is essential. Time spent on instructing the patient is well worth while.

The presence of pyuria in infected urines was surprisingly low. Only 28 per cent of the females and 29 per cent of males had a significant number of pus cells. The urine of one female with acute pyelonephritis had a complete absence of pus cells when examined microscopically. These results are interesting when compared with those of Savage *et al.* (1969) who found 60 per cent of pyuria in asymptomatic bacteriuric girls. Kunin *et al.* (1964) found pyuria in 44.3 per cent of his cases and in an earlier report only one out of 15 girls with urinary tract infection had WBC's in excess of four per high power field. Eykyn *et al.* (1968) mention that in 59 bacteriuric pregnant women, only two had any white cells. They catheterized a patient to empty the bladder immediately after a suprapubic aspiration. The entire volume of urine was centrifuged and deposit examined for white cells and only an occasional one was present. Therefore, dilution by diuresis was unlikely to explain the low WBC.

Having gained confidence in the technique and results, we are encouraged to obtain MSU's much more frequently. Mid-stream specimens are especially useful in ill children who have no localizing signs and for follow-up of patients who have had previous urinary infections. Later work has shown how often bacteriuria persists despite relief of symptoms from urinary infection, that it often recurs and is common in maternity patients.

The actual identification of the infecting organism is not essential. By using the modified electrolyte deficient medium it is possible to distinguish different types of colonies and if recorded it is usually possible to decide if a recurrent infection is due to the same bacterium or a different one. The sensitivity tests, in any case, are the main guide for the choice of chemotherapy.

Summary

It has been shown that it is possible to do bacterial counts of clean catch MSU's in general practice without expensive equipment and without it being too time consuming for the doctor. The results were analysed and a series compared with the hospital

laboratory. Detection of bacteriuria in general practice should be an important investigation and routine in antenatal clinics.

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Visiting nurse—analysis of one year's work. G. N. MARSH, M.B., B.S., D.C.H., D.Obst.R.C.O.G. *British Medical Journal*. 1969, **4**, 42.

A state-registered nurse employed in a five-doctor practice on Teeside did 1,285 visits in the course of a year, working an eight-hour week. Ninety-six per cent of her visits were follow-ups on patients originally seen by one of the doctors. Over 50 per cent of her work was in chronic routine visiting often alternating with the doctor, or doing two visits out of three for him. Thirty-five per cent of visits were follow-ups after acute illness, and five per cent were to patients convalescent after minor operations in hospital. In the course of these visits 87 venepunctures were performed and 21 ears syringed. Generally speaking patients' acceptance of the scheme was good although the inability of the nurse to sign certificates and prescriptions was an occasional source of annoyance. "It was a fairly common finding that patients who expressed dissatisfaction with the visiting nurse were those who had in the past also expressed dissatisfaction with the visiting doctor". Apart from the reduction in the doctors visiting list, an advantage of the scheme was that the doctor had time to provide a higher standard of care when he did visit.