# Non-fermenters other than *Pseudomonas* species

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This special article aims to present the data regarding the type of non-fermenters other than *Pseudomonas* isolated from eight centres and their antibiotic susceptibility profile. Salient features of most common Non-fermenters that were isolated will be discussed.

Eight centres responded to the request by providing their data in the format sent. The results are tabulated in the tables as below.

As shown in Table 1, except for two centres, which have identified the non-fermenters up to species level, most other centres have been able to identify only up to genus level, reflecting the difficulty in identification of the non-fermenters. Considering the fact that most of these organisms are associated with hospital infection, there is an urgent need to strengthen the capacity of all the clinical microbiology laboratories, particularly those in the tertiary care centres for precise identification of the non-fermenters other than *Pseudomonas* that are isolated from the clinical specimens.

Table 2a and b depict the isolation rate of *Acinetobacter* species and its susceptibility pattern to the indicated antibiotics.

*Acinetobacter* species tops the list of non-fermenters with *Acinetobacter baumannii* as the most common species, reiterating the fact that this globally emerging nosocomial pathogen is easily identifiable in most routine microbiology laboratories. Respiratory specimens have been found to be the predominant source from most centres, followed by pus. It is interesting to note a good number of isolates from blood reported from most centres. These findings suggest a need for strengthening the infection prevention protocols in the hospital.

Few centres have reported the isolation of Acinetobacters from cerebrospinal fluid (CSF). Literature reports them to be clinically insignificant. However, one needs to exercise careful clinical judgment while reporting this isolate from CSF. Acinetobacters are reported to cause clinically significant infections in patients with intra-cerebral haemorrhage, previous central nervous system (CNS) infections, neurosurgical procedures and repeated intensive care unit (ICU) admissions. An elevated protein, neutrophilic pleocytosis, low CSF to serum glucose ratio and repeated isolation of the organism from multiple CSF specimens is highly suggestive of an active Acinetobacter infection.[1]

The association of *A. baumannii* with pneumonia, bacteraemia, blood stream infection, urinary tract infection (UTI) and meningitis has been well described. However, its unusual and unpredictable susceptibility patterns make empiric and therapeutic decisions even more difficult. Acinetobacters are notorious for their multi-drug resistance. As depicted in Table 2b, almost all centres report a high rate of resistance to cephalosporins. Low sensitivity rates reported by most centres to carbapenems and fluoroquinolones are of serious concern. It is also disheartening to note low sensitivity rates reported for Colistin by few centres, which reflects the antibiotic pressure. Considering the ubiquitous nature of the organism and its unique ability to acquire resistance genes, it is imperative that a clinical microbiologist uses clinical judgment to differentiate colonizers from clinically significant isolates. Antibiotic policy needs to be actively implemented.

*Burkholderia* ranks second in the list of non-fermenters isolated from eight centres as presented in Table 1. Only one centre reported *Burkholderia pseudomallei* (centre 8). It is important at this juncture to note that this is a Hazard group 3 pathogen and careful attention to laboratory worker's safety needs to be borne in mind while handling this organism.

Except for three isolates of *B. cepacia* reported from centre 1, most other centres have not been able to identify the species. Most of the isolates have been isolated from blood, followed by pus and respiratory

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**Table 1: Total number of Nonfermenters other than *Pseudomonas* isolated from 8 centres: Year 2012**

| Centre | Acinetobacter | Burkholderia | Chryseobacterium | Achromobacter | Stenotrophomonas | Sphingomonas | Moraxella | Shewanella | Eikenella | Ralstonia | NFGNB | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 115: *A. baumanni* 109 Spp: 6 | 4 *B. cepacia*: 3 *B. vesicularis*: 1 | 9 *C. meningosepticum*: 8 *C. indologenes*: 1 | 2 *xylosoxidans* | 13 *S. maltophilia* | 1 *S. spiritivorum* | — | — | — | 1 *R. picketti* | — | 145 |
| 2 | 24 *A. baumanni*: 21 *A. lowffi*: 3 | — | 1 *meningosepticum* | 1 *A. xylosoxidans* | 3 *S. maltophilia* | 2 *S. paucimobilis* | — | — | — | — | | 31 |
| 3 | 3 | — | — | 1 | — | — | — | — | — | — | 19 | 23 |
| 4 | 331 | 1 | 1 | — | — | — | — | — | — | — | — | 333 |
| 5 | 201 | 2 | 1 | — | — | — | — | — | — | — | — | 204 |
| 6 | 318 *A. baumanni*: 272 A. spp: 46 | 22 | 10 | 5 | 19 | — | 12 | 1 | — | — | 34 | 425 |
| 7 | 256 | 93 | 6 | 1 | 24 | 8 | 5 | — | — | — | — | 393 |
| 8 | 620 | 2 *B. pseudomallei* | 1 *C. meningosepticum* | — | — | — | — | — | — | — | — | 623 |

specimens [Table 3a]. Literature reports nosocomial out breaks of *B. cepacia* due to its high transmissibility especially associated with respiratory care articles. It is therefore essential for the centres to identify *Burkholderia* up to species level in order to avoid the epidemic spread and institute adequate infection control measures. The most active antibiotics for treating Burkholderia infections are Piperacillin/Tazobactum, Cefoperazone/Sulbactum and the Carbapenems. The sensitivity to Carbapenems and to Cephalosporins/ Penicillins seems to be high as reported by the centres and could be used as therapeutic choice [Table 3b].

*Stenotrophomonas* is listed as the third most common non-fermenter from the eight centres. *Stenotrophomonas maltophilia* is the common species as identified by two centres. Other centres have not reported on the species. Most of the isolates have been recovered from the respiratory specimens, followed by pus and blood [Table 4a].

Intrinsic resistance to many antibiotics, particularly Carbapenems and Aminoglycosides and lack of standardised susceptibility tests and their interpretative criteria hinders the therapeutic options for infection caused by Stenotrophomonas. Trimethoprim — Sulphamethoxazole, Fluoroquinolones, Ticarcillin/ Clavulanic acid and Minocycline have been reported to be useful. Only one centre reported all their isolates to be sensitive to Trimethoprim — Sulphamethoxazole, which is the drug of choice. Variable sensitivity rates to Quinolones have been reported [Table 4b].

Chryseobacterium species is reported as the fourth common species of non-fermenters [Table 1]. This nosocomial pathogen is known to cause outbreaks in nurseries with high mortality. The isolates were commonly recovered from respiratory specimens, blood and pus specimens [Table 5]. There was one isolate from CSF. It is important to note that this organism is resistant to all those antibiotics effective against the Gram-negative bacilli and classically sensitive to the ones used for Gram positives. Only one centre reports its correct sensitivity pattern, that is, to Vancomycin. It is important to note that infection caused by this organism carries a high mortality and it is imperative that the laboratories identify the species correctly so that appropriate measures for infection control can be instituted at the right time. Five isolates of *Achromobacter* species have been reported from centre number 6 from blood, sputum and body fluid. Moraxella spp has been reported from centres 6 and 7 and has been isolated from sputum/ET secretions. *Sphingomonas* species have been reported predominantly from centre

**Table 2a: Specimen wise recovery of Acinetobacter spps from 8 centres: Year 2012**

| Centre | Blood | CSF | Pus | Sputum/ET | Other specimens | Total |
|---|---|---|---|---|---|---|
| 1 | 18 | — | 12 | 60 | Urine 12<br>Cannula 10 | 115 |
| 2 | 1 | — | — | 18 | Urine 2 | 21 |
| 3 | — | — | 3 | — | — | 3 |
| 4 | 25 | 2 | 97 | 169 | Urine and fluids 38 | 331 |
| 5 | 56 | 8 | 85 | 31 | Urine 12; central line 6; aspirated fluid: 3 | 201 |
| 6 | 55 | 4 | 54 | 136 | Urine and body fluids; 69 | 318 |
| 7 | 11 | — | 77 | 132 | Urine and central line: 36 | 256 |
| 8 | 220 | 7 | 26 (SSI) 262 (non-SSI) | 84 | Body fluids: 21 | 620 |
| | | | | | | 1865 |

**Table 2b: Antibiotic Sensitivity pattern noted for Acinetobacter species from 8 centres: Year 2012**

| Centre | Sensitive to penicillin and cephalosporins (%) | Resistant to penicillins and cephlosporins only (%) | Sensitive to carbapenems only (%) | Sensitive to quinolones only (%) | Sensitive to colistin only (%) | Total number |
|---|---|---|---|---|---|---|
| 1 | 14 (12.2%) | 31 (26.9%) | 14 (12.2%) | 12 (10.4%) | 44 (38.3%) | 115 |
| 2 | — | — | — | — | — | 24 |
| 3 | Zero | 100% | Not available | 62% | Not available | 3 |
| 4 | Ceftazidime 33 (10%) Cefpirome 37 (11%) Cefoperazone/Sulbactum 97 (29%) Piperacillin 75 (23%) Piperacillin/Tazobactum 102 (31%) | Not declared | Imipenem 157 (47%) Meropenem 124 (37%) | 80 (24%) | Not available | 331 |
| 5 | 15% | 83% | 7% | 2% | 18% | 201 |
| 6 | Am/sulb 41%; Ceftazidime 22% | Amp/sulb: 59% Ceftazidime: 78% | 60% | Ciproflox: 39% Levoflox: 61% | 96% | 318 |
| 7 | 77 (30%) | 10 (4%) | 118 (46%) | nil | 82 (32%) | 256 |
| 8 | 36 (5.8%) | 96 (15.4%) | 9 (1.5%) | 35 (5.6%) | 3 (0.4%) | 620 |

**Table 3a: Specimen wise recovery of Burkholderia species as reported from 8 centres: Year 2012**

| Centre | Blood | CSF | Pus | Sputum/ET | Others | Total |
|---|---|---|---|---|---|---|
| 1 | 3 | 1 | — | — | — | 4 |
| 2 | — | — | — | — | | nil |
| 3 | — | — | — | — | — | nil |
| 4 | — | — | — | 1 | — | 1 |
| 5 | — | — | 2 | — | — | 2 |
| 6 | 14 | — | 2 | 3 | 3 | 22 |
| 7 | 54 | — | 12 | 9 | 18 | 93 |
| 8 | 2 | — | — | — | — | 2 |
| | | | | | | 124 |

**Table 3b: Antibiotic sensitivity pattern noted for Burkholderia species from 8 centres Year: 2012**

| Centre | Sensitive to penicillin and cephalosporins (%) | Resistant to penicillins and cephalosporins (%) | Sensitive to carbapenems only (%) | Sensitive to quinolones only (%) | Sensitive to colistin only (%) | Total numbers |
|---|---|---|---|---|---|---|
| 1 | 1 (33.3%) | Zero | 2 (66.6%) | — | — | 3 |
| 2 | — | — | — | — | — | Nil |
| 3 | — | — | — | — | — | Nil |
| 4 | 1 (100%) | — | 1 (100%) | 1 (100%) | — | 1 |
| 5 | 1 (50%) | 1 (50%) | — | — | — | 2 |
| 6 | 90% | 10% | 100% | Levo 89% | — | 22 |
| 7 | 91 (97%) | — | 9 (10%) | 5 (5.3%) | — | 93 |
| 8 | 2 (100%) | — | — | — | — | 2 |

Centre 6 does not quote the actual numbers

7 (total of eight isolates) chiefly from blood, pus and sputum/ET. Only centre 1 reports a rare isolate of *Ralstonia picketti* from blood specimen.

The above data suggests that it is important to actively look for these organisms, and identify them up to species level.

**Table 4a: Specimen wise recovery of Stenotrophomonas species from 8 centres: Year 2012**

| Centre | Blood | CSF | Pus | Sputum/ET | Others | Total |
|---|---|---|---|---|---|---|
| 1 | 4 | — | — | 8 | | 12 |
| 2 | — | — | — | 3 | | 3 |
| 3 | — | — | — | — | — | Nil |
| 4 | — | — | — | — | — | Nil |
| 5 | — | — | — | — | — | Nil |
| 6 | 6 | — | 2 | 8 | 3 | 19 |
| 7 | 1 | — | 11 | 8 | 4 | 24 |
| 8 | — | — | — | — | — | Nil |
| | | | | | | 58 |

**Table 4b: Antibiotic sensitivity pattern of Stenotrophomonas from 8 centres: Year 2012**

| Centre | Sensitive to penicillin and cephalosporins (%) | Resistant to penicillins and cephalosporins only (%) | Sensitive to carbapenems only (%) | Sensitive to quinolones only (%) | Sensitive to colistin only (%) | Total number |
|---|---|---|---|---|---|---|
| 1 | — | — | — | — | — | 13 sensitive to Cotrimoxazole only |
| 2 | Not reported | — | — | — | — | 3 |
| 3 | — | — | — | — | — | Nil |
| 4 | — | — | — | — | — | Nil |
| 5 | | | | | | Nil |
| 6 | 33% | | | Levoflox 73% | | 19 |
| 7 | 12 (50%) | 5 (20%) | — | 2 (10%) | — | 24 |
| 8 | — | — | — | — | — | Nil |

**Table 5: Specimen wise isolation of Chryseobacterium species from 8 centres**

| Centre | Blood | CSF | Pus | Sputum/ET | others | Total |
|---|---|---|---|---|---|---|
| 1 | 3 | 1 | — | 5 | — | 9 |
| 2 | — | — | 1 | — | — | 1 |
| 3 | — | — | — | — | — | — |
| 4 | — | — | 1 | — | — | 1 |
| 5 | — | — | — | — | 1 (Ascitic fluid) | 1 |
| 6 | 2 | — | 1 | 5 | 2 | 10 |
| 7 | 2 | — | 1 | 2 | 1 | 6 |
| 8 | 1 | | | | | 1 |
| | | | | | | 29 |

## CONCLUSION

Due to reluctance on the part of centres to reveal data, only eight centres, that too from south India only have participated in this survey. It is high time that hospitals in India took up data collection seriously so that they come to terms with reality, which is the first step in setting goals and improving performance.

This small survey may reflect the situation in most of the laboratories and hospitals in developing nations. All clinical microbiology laboratories must be geared to accurately identify the non-fermenters and an isolate's clinical significance must be determined on a case by case basis. Precise identification is important for optimal patient management, prognosis and appropriate infection control intervention. The type of identification system used by the laboratory should be left to the discretion of the clinical microbiologist. However, it is essential to ensure that the quality and the performance of the systems are validated periodically.

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## REFERENCE

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