

# TECHNICAL BULLETIN

# SURVEILLANCE

# & AMU

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## Improving Antimicrobial Use through Point Prevalence Surveys

by *Dr Claire Gordon, Clinical Microbiologist, Mott MacDonald*

To understand how antimicrobials are prescribed and dispensed at healthcare facilities, we need to improve surveillance for antimicrobial use (AMU). Although often used interchangeably with antimicrobial consumption (AMC), the two are in fact quite different: AMC data tell us about volumes of antimicrobials dispensed or used, (e.g. at a hospital or pharmacy) whereas AMU data tell us how antimicrobials are used (e.g. what conditions are being treated, routes of administration). AMU data gives us information about whether antimicrobials are being used appropriately, which can help to inform education and stewardship programmes.

At the hospital level, AMU data is often collected using a Point Prevalence Survey (PPS). There are two PPS protocols in common use: the [Global PPS](#), and the [WHO methodology](#). In both approaches, site staff are trained to review drug charts using a standard questionnaire. The questionnaire records information on the type of ward, the number of inpatients, some basic patient information (age, gender), whether they are on antimicrobials and if so, the dose, duration and indication, and whether the treatment is based on any laboratory testing. Using site staff means there is no need to rely on external consultants for data collection: instead Grantees can provide engagement and

training activities and provide technical assistance for data entry and analysis.

The main difference between the protocols is how the data is stored and analysed. The Global PPS is based at the University of Antwerp and funded by BioMérieux. Data is entered into an online portal, hosted at the University, which provides an automated analysis. The WHO protocol has no central repository and sites must analyse their own data. This may be a preferred option for sites unwilling to share data with international organisations, however, it requires additional time and training.

The main challenge is often getting support from hospital managers and staff. Although the survey itself is usually done on a single day, time is needed for training, data entry, analysis and feedback, which requires considerable site buy-in. Regardless of the method used, it is important to communicate the survey results to site staff and recognise their contribution to the surveillance programme.

The survey can be repeated every 1-2 years, but more focused audit programmes should take place in the interim. For example, if the survey identifies inappropriate use of intravenous drugs, a lead pharmacist could organise additional training and conduct a follow-up evaluation to measure the impact.

Additional information about AMU and AMC measures in humans are provided in the technical pack, [Guidance for Developing Surveillance](#)

for Antimicrobial Use (AMU) in Human Healthcare Facilities.



## In Memoriam: Professor Jacques Fouad Acar

by Professor Timothy Walsh, Cardiff University

Jacques was born in Dakar in 1931 to Lebanese parents. Originally from Deir el-Qamar he lived briefly in Lebanon where he finished his secondary studies at the Notre-Dame de Jamhour College. Jacques left Senegal in 1948 to study at the Faculté de Médecine de Paris. He graduated in 1954 and completed his military service as a field doctor in sub-Saharan Africa. He was appointed head of the clinic for infectious diseases at the Bichat–Claude Bernard Hospital in Paris in 1962.

Jacques was very much part of the “golden era” of medical microbiology and in Paris assumed many roles. From 1966-1999, he became head of the Department of Medical Microbiology and Infectious Diseases at the Hôpital Saint-Joseph in Paris; concurrently, he was head of Medical Microbiology at the Hôpital Broussais and also a professor of medical microbiology at Pierre and Marie Curie University from 1973 until 2000.

Jacques’s vast knowledge and unflappable disposition were very much in demand. He became president of the WHO taskforce on antimicrobial resistance (1992 – 1996); editor-in-chief of Clinical Microbiology and Infection (1995-2000) for the WHO for Animal Health (1999-2020); member of the French Ministry of Health for antimicrobial resistance (2015-2020) and in 2016 was appointed as an expert advisor to the Fleming Fund. Jacques was central to the founding of the European Society of Infectious Diseases and Microbiology (ESCMID), the International Society for Infectious Diseases (ISID), the Alliance for the Prudent Use of Antibiotics (APUA)

and the European Group for Antibiotic Resistance.

Although Jacques to many would appear French, his Lebanese roots were always evident in his discourse – effervescent, passionate and animated but always respectful and polite. His reputation followed his name - Acar (Lebanese Christian surname of Aramaic/Hebrew origin) meaning “one who stirs trouble”. Throughout his vast & impressive career Jacques was known for speaking plainly and passionately and asking the most pertinent questions.

Jacques was author of more than 500 publications and despite his colossal contribution to microbiology he always listened to new ideas and theories and regarded himself as a student as well as a master. Jacques will be dreadfully missed by family, friends, colleagues and students, and in so many ways, is irreplaceable.

## PAPERS & NEWS

### OIE Workshops

OIE conducted several workshops on animal AMU data collection and submission to its database for national veterinary focal points. The presentations can be found on the sub-regional websites: [Africa](#) | [Asia](#)

Additional training presentations can be found on sub-regional websites:

[Africa](#) | [Asia](#)

### World Veterinary Association

Guidelines for responsible use of antimicrobials in Animal Health have been listed by The World Veterinary Association (WVA). The list now includes 120 guidelines on use of antimicrobials, action plans and promotional material on prudent use of antimicrobials, covering large number of countries, languages, veterinary aspects and animal species. National veterinary associations have also produced guidelines on reasonable use of antimicrobials, they can be found

on their respective websites. [Access the guidelines list here](#) | [Additional Resource Library](#)



## East & Southern Africa Technical News

A selection of recent (published in the last year) open-access papers on AMR from East and Southern Africa Fleming Fund Countries:

Kateete DP et al, 2019. [Nasopharyngeal carriage, spa types and antibiotic susceptibility profiles of Staphylococcus aureus from healthy children less than 5 years in Eastern Uganda](#). BMC Infect Dis. 2019 Dec 2;19(1):1023. doi: 10.1186/s12879-019-4652-5.

Hope D et al, 2019. [Antimicrobial resistance in pathogenic aerobic bacteria causing surgical site infections in Mbarara regional referral hospital, Southwestern Uganda](#). Sci Rep. 2019 Nov 21;9(1):17299. doi: 10.1038/s41598-019-53712-2.

Kumburu et al, 2019. [Using WGS to identify antibiotic resistance genes and predict antimicrobial resistance phenotypes in MDR Acinetobacter baumannii in Tanzania](#). J Antimicrob Chemother. 2019 Jun 1;74(6):1484-1493

Momanyi et al, 2019. [Antibiotic Prescribing Patterns at a Leading Referral Hospital in Kenya: A Point Prevalence Survey](#). J Res Pharm Pract. 2019 Oct 16;8(3):149-154.

Maina et al, 2019. [Evaluating the foundations that help avert antimicrobial resistance: Performance of essential water sanitation and hygiene functions in hospitals and requirements for action in Kenya](#). PLoS One. 2019 Oct 9;14(10):e0222922.

Muloi et al, 2019. [Epidemiology of antimicrobial-resistant Escherichia coli carriage in sympatric humans and livestock in a rapidly urbanizing city](#). Int J Antimicrob Agents. 2019 Nov; 54(5): 531–537.

Chanda W et al, 2019. [Evaluation of antibiotic susceptibility patterns of pathogens isolated from routine laboratory specimens at Ndola Teaching Hospital: A retrospective study](#). PLoS One. 2019 Dec 23;14(12):e0226676.



## Professor Jacques Fouad Acar: Most Influential Papers

*by Professor Timothy Walsh, Cardiff University*

We asked fellow EAG member, Prof Tim Walsh, OBE to select 5 of Prof. Acar's most influential papers to highlight his scientific career over and above the many positions of importance that Jacques held. Out of more than 500 publications spanning over 50 years, this was a difficult brief. Here is a selection of some of his most important scientific contributions curated and with commentary by Tim:

Jacques's career spanned five decades but his seminal work was published between the late 1970's and mid-1995. The five papers listed below were chosen for their originality and conceptuality of thought and thus have become seminal cornerstones in our understanding of bacterial infections and antibiotic resistance.

Acar JF, Sabath LD. [Bacterial persistence in vivo: resistance or tolerance to antibiotics](#). Scand J Infect Dis Suppl. 1978;(14):86-91.

Tolerance and bacterial population studies particularly to antibiotics are very much still topical. This synopsis written in 1978, explores persistence of bacteria in spite of "adequate" therapy and that resistance may be due to a variety of factors including heterogeneity of resistance, emergence during treatment or tolerance. Jacques's intuitive thinking is still the subject of many cur-

rent studies.

O'Brien TF, Acar JF, Medeiros AA, Norton RA, Goldstein F, Kent RL. **International comparison of prevalence of resistance to antibiotics.** JAMA. 1978 Apr 14;239(15):1518-23.

Few international AMR surveillance studies were being undertaken in the 1980's let alone in the 1970s. This study compared AMR levels in Paris to those in Boston and showed the Parisian isolates to have higher resistance levels than those in Boston paving the way for deeper analysis and the correlation of resistance to antibiotic stewardship.

Buu-Hoi A, Goldstein FW, Acar JF. **R-factors in gram-positive and gram-negative aerobic bacteria selected by antimicrobial therapy.** Scand J Infect Dis Suppl. 1986;49:46-55.

R-factors carried on plasmids were discovered in the 60's and 70's but this is a critical area of resistance that Jacques also developed. This important review combines factors such as plasmids and transposable elements and their role in coding for resistance to antibiotics that have been the major factors in the spread of resistance and resistant bacteria in humans, agriculture, and environmental sectors – today we know this as “One Health”. Jacques's group describes the cross-class resistance i.e. ampicillin, tetracycline, chloramphenicol, gentamicin, trimethoprim, erythromycin in Gram-negative and Gram-positive bacteria and for the first time combines host-plasmid relationship, enhanced survival and adaptation behaviour – decades ahead of their time.

Kitzis MD, Billot-Klein D, Goldstein FW,

Williamson R, Tran Van Nhieu G, Carlet J, Acar JF, Gutmann L. **Dissemination of the novel plasmid-mediated beta-lactamase CTX-1, which confers resistance to broad-spectrum cephalosporins, and its inhibition by beta-lactamase inhibitors.** Antimicrob Agents Chemother. 1988 Jan;32(1):9-14.

Jacques was part of the Parisian groups that first fully characterised the novel beta-lactamase CTX-1 which was encoded on a transferable 84-kilobase plasmid found in six different bacterial species. It was responsible for a significant decrease in susceptibility towards most penicillins and cephalosporins. CTX-M studies would dominate the next decade and they are now the globally dominant mobile ESBL. Their work was seminal in highlighting the global importance of these enzymes.

Acar JF, Kitzis MD, Gutmann L. **The incidence of beta-lactamase-producing pathogens.** APMIS Suppl. 1989;5:2-8.

This review by Jacques as a lead author was produced at a time when mobile metallo-beta-lactamases were yet to be discovered and understanding of ESBLs was still in its infancy. Jacques postulates that a large number of species may develop beta-lactam resistance through the acquisition of plasmids, or insertion of transposons. He also highlights the importance of beta-lactamase inhibitors (sulbactam and clavulanic acid) and today this battle ground now includes new compounds such as avibactam. This review was seminal and eminent.



The Fleming Fund is a £265 million UK aid programme helping to tackle antimicrobial resistance in low and middle-income countries around the world. The programme is managed by the UK Department of Health and Social Care, in partnership with Mott MacDonald, the Fleming Fund Grants Management Agent.