

among the control strains. The absence of AzR strains suggests that azithromycin can be used successfully for MDA in Vanuatu.

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Pregnancy associated listeriosis in England & Wales: a 21 year review of enhanced surveillance data



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Background: Listeriosis is a severe food-borne disease that rarely occurs in humans and primarily affects the elderly, persons with impaired immunity, pregnant women and unborn or newborn babies. Pregnant women are 18 times more likely to develop the disease following consumption of food contaminated with *Listeria monocytogenes* and this is because during pregnancy, the immune system is modulated. Whilst pregnant women with listeriosis tend to have mild clinical symptoms or be asymptomatic, the infection can have severe outcome for the foetus or newborn infant including miscarriage, still birth, neonatal sepsis and meningitis.

Methods & Materials: We examined cases of pregnancy associated listeriosis reported to the enhanced surveillance system in England and Wales from 1990 to 2010 to identify risk factors that may influence outcome. Cases were defined as pregnancy associated if *L. monocytogenes* was isolated from a pregnant woman or newborn infant aged less than 28 days.

Results: Of the 3088 cases reported, pregnancy associated listeriosis accounted for 462 cases (15%) and 315 of these resulted in a live birth. The presence or absence of maternal symptoms was known for 259 cases and 68% (176/259) reported having symptoms during pregnancy.

Several factors were identified to affect the severity and outcome of listeriosis in pregnancy in both mother and child including: presence or absence of maternal symptoms, gestational age at onset of symptoms, onset of infant illness (early or late) and clinical presentation in the infant (meningitis or septicaemia).

The presence of maternal symptoms halved the likelihood of a live birth and increased the probability of the infant developing a late onset illness.

Gestational age at time of onset significantly affected the outcome of the pregnancy and the probability of infant survival with the odds increasing as the pregnancy progresses. Early onset illness also doubled the chances of infant survival.

Although the clinical presentation could be determined by early or late onset of infant illness, the presentation did not significantly affect the likelihood of survival.

Conclusion: This presentation will report a review of pregnancy related cases over a 21 year period and highlight significant risk factors that should inform the management of listeriosis in pregnancy.

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Taking antimicrobial stewardship initiatives to the next level: Development of a serious prescribing game for acute care



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Background: Increasing antimicrobial resistance has been identified as a global threat to health. Antimicrobial stewardship measures to improve the quality of antimicrobial prescribing have been implemented with varying success. Whilst prescriber knowledge and skills are important, attention to behavioural and social aspects seems essential to sustain improvement initiatives.

Serious games and gamification have been introduced in other settings to maintain engagement with desired behaviours. We report the development of a serious smartphone prescribing game to support the prudent use of antimicrobials in acute care prescribers.

Methods & Materials: In collaboration with a commercial game company, a decision tree of prescribing options was developed for a series of virtual patients. Prescribers iteratively receive clinical information for each patient, prompting diagnosis and treatment decisions for each case (Figure 1). Clinicians can use 1) oral antibiotics, 2) broad- or 3) narrow-spectrum intravenous (IV) antibiotics, 4) request further tests or 5) discharge without treatment.

The game provides immediate feedback on performance, considering clinical accuracy and impact on other professionals and wider hospital environment. To sustain the focus on the game, elements such as timers, scores and leaderboards, together with increasing case difficulty are used.

Delayed consequences of prescribing decisions are made explicit for the players; for example, using broad-spectrum antibiotics too frequently will lead to patients attending with antibiotic-associated diarrhoea, or prolonged use of IV antibiotics will result in cannula-site infection cases.

Results: A multi-method approach will be used to evaluate the game. An interrupted time-series analysing antimicrobial consumption (daily-defined doses per 100 occupied bed-days per year) data before and after game introduction will identify vari-



Figure 1. Screen capture of prototype.

ations in prescribing decisions, including the proportion of broad- and narrow-spectrum antibiotics used; ethnographic approaches will describe prescribers' perceptions on their experience; in-game analytics will report engagement with the game and elicit any dose-effect relations (i.e., increased game time greatly improving prescribing decisions). The influence of prompts by different professionals (doctors, nurses, pharmacists or hospital managers) on prescriber's decisions will be explored.

Conclusion: The sustainability of optimal prescribing behaviours remains a challenge for antimicrobial stewardship initiatives worldwide. Serious games may be an affordable and feasible solution to address behavioural and social influences on prescribing.

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Novel surveillance system demonstrates burden of enteric fever in India



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Background: Indian Academy of Pediatrics (IAP) in collaboration with its Kutch branch has started web based Infectious Disease Surveillance and AEFI (Adverse Event Following Immunization) reporting system. The Objectives of the project are to develop an early warning system for pediatric infectious diseases in India, to generate data on burden of infectious diseases in India and to generate data on serious AEFI. IDSurv relies on registered member pediatricians to contribute case reports for 10 communicable diseases, including enteric fever.

Methods & Materials: At present only registered paediatricians can report cases on IDSurv.org. IDSurv is a voluntary project and passive spontaneous reporting occurs. Once a user registers on website, his identity is verified and then activated by admin. Standard definitions for various diseases are provided on the website. A user can report cases using the web platform, mobile website, IVR reporting system or Text/SMS (short messaging service). All cases reported through various methods are updated in real time to a central database, which can be viewed on the website in tabular format, on a map and as a chart on the website. The data is periodically analyzed by a group of experts from IAP.

Results: A total of 2281 cases of enteric fever were recorded from February 2011 – November 2013, including 41 paratyphi infections and 2240 typhi infections. 74.62% (1702/2281) of reported cases were laboratory confirmed by antibody detection or specimen culture. The age distribution ranged from 3 months – 18 years, with the highest burden among 5–9 year olds (38.14%), followed by 2–5 year olds (28.71%). 34.23% (781/2281) of case reports were female. No fatalities were reported, although 20% (457/2281)

of cases were hospitalized. Reports were received from 17 states, 37.1% of which were from Uttar Pradesh, followed by Madhya Pradesh (30%).

Conclusion: The case reports recorded by IDSurv.org demonstrate a high burden of enteric fever in the 17 states contributing data. IDSurv.org is a useful, accessible, and innovative platform for the timely reporting of infectious diseases in India and can be used to form public health policy and to monitor the progress of ongoing interventions for disease prevention and control.

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ESBL-producing Enterobacteriaceae colonization among pregnant women in community in Madagascar



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Background: The worldwide spread of expanded-spectrum beta-lactamase-producing *Enterobacteriaceae* (ESBL-PE) is a major public health issue in developing countries where the burden of bacterial diseases is high. Severe neonatal bacterial infections are of particular concern. Given the potential for mother-to-child transmission of these bacteria in community, the aim of the study was to investigate the ESBL-PE colonization among pregnant women in Madagascar and to determine factors associated with this colonization.

Methods & Materials: Women included in the pilot phase of Children's Antibiotic Resistance infections in Low Income countries project (<http://www.charliproject.org>) living in rural or urban areas in Madagascar and having given birth between June and September 2013 where enrolled in the study. Stool samples were collected during delivery and screened for ESBL production. Women's socio-demographic characteristics and living conditions, past medical and pregnancy history and detailed antibiotic consumption during the previous year were recorded to assess possible factors associated with ESBL-PE colonization in multivariate analysis.

Results: Among the 139 women interviewed, 11.5% (95% CI 6.1–16.9) were colonized with ESBL-PE, with no significant difference between urban and rural areas. Most ESBL-PE were identified as *Escherichia coli*. Previous antibiotic use within the last year was reported for 32% of the women. In univariate analysis, factors associated with colonization included graduate or post-graduate education (Odds Ratio (OR) 3.1; 95% CI 1–9.5), private access to tap drinking water (OR 8.9, 95% CI 2.2–33.8), toilet use restricted to family (OR 3.2; 95% CI 1.2–9.4), delivery with a doctor (OR 5.8; 95% CI 1.6–20.2) and antibiotics use in the last 3 months (OR 2.7; 95% CI 0.8–8.7). In multivariate analysis, only private access to tap drinking water was found significant (OR 7.3; 95% CI 1.7–30.7).

Conclusion: The prevalence of colonization with ESBL-PE among pregnant women in the Madagascar community is high. In