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Viewing human health through the lens of livestock health: Linked human and animal syndromic surveillance

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Background: For most rural households in sub-Saharan Africa, livestock health and human health are closely related. Within a household, the health of livestock is crucial in meeting household nutritional needs, socio-economic needs, and in averting the burden associated with zoonotic diseases. Although the relationship between animal and human health and welfare is recognized, there is a dearth of data on the contribution and effect size of socio-economic, nutritional or zoonotic pathways to human health.

Methods & Materials: To remedy this, a study conducting simultaneous multi-year syndromic surveillance in humans and their animals in 1500 rural households in Western Kenya is being conducted. Each study household is visited bi-weekly and data on four human syndromes; fever, jaundice, diarrhoea and respiratory illness (cough, pneumonia), and 9 animal syndromes; respiratory, death, reproductive, musculoskeletal, nervous, digestive, skin disorders, udder disorders, and urogenital syndromes collected in cattle, sheep, goats and chicken. Additionally, a comprehensive socio-economic survey is conducted in each of the 1500 households quarterly.

Results: Preliminary results show over 90% of the households own at least one form of livestock: 55% own cattle, 88% own chicken, 41% own goats and 19% own sheep. Digestive syndromes, mainly diarrheas are the most common syndromes observed in cattle, goats and sheep, and account for over 50% of all livestock syndromes. Data collected show correlations between households with high human illness cases with those with high animal illnesses. While controlling for household size, the odds of human illness cases increases 1.71 times (95% CI 1.01 – 2.99) for every 10 cases of animal illnesses and deaths observed. Additionally, probability of health seeking is positively associated with level of income and wealth, which are themselves positively associated with livestock herd sizes.

Conclusion: This study provides a unique dataset that will allow for the determination and quantification of the link pathways between human and animal health, including determination of human disease averted, increment in household educational attainment and income levels associated with livestock health. Such data will increase our understanding of the health implications of livestock keeping, and provide information vital to policy makers in setting priority and strategy on integrated human-animal disease control.

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The first study of plasma voriconazole concentration in Thai patient with invasive aspergillosis

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Background: Voriconazole is the treatment of choice for invasive aspergillosis (IA). The association between plasma voriconazole level and its efficacy and toxicities has been demonstrated, suggesting the potential role of therapeutic drug monitoring. Genetic polymorphisms affect voriconazole level, which may vary between patients with different ethnic groups. We report here the first study of voriconazole level in Thai patients who had IA.

Methods & Materials: Patients with IA treated with voriconazole were enrolled. All subjects received oral voriconzole 200 mg twice daily following 2 loading doses of 400 mg. Clinical characteristics were recorded. Plasma samples were collected for voriconazole level assays at day 0, 3, 7, 14 and 28. Whole blood samples were collected for analysis of CYP2C19 polymorphisms.

Results: There were 54 subjects enrolled. Mean age was 47 ± 14 years and 62% were male. Proven IA was diagnosed in 19%, probable IA 52% and possible IA 29%. Pulmonary IA was diagnosed in 82%. Hematological diseases were the most common underlying diseases (82%), in which 70% were acute leukemia. CYP2C19 polymorphisms were determined as extensive metabolizer (EM) in 49%, intermediate metabolizer (IM) 42% and poor metabolizer (PM) 9%. Overall mean voriconazole concentration in all patients at days 0, 3, 7, 14 and 28 were 0, 6.3, 6.2, 3.9 and 2.7 μg/mL, respectively. Mean voriconazole levels between patients with EM vs. PM at day 3, 7, 14 and 28 were 7.1 vs. 7.7 μg/mL (NS), 7.2 vs. 7.6 μg/mL (NS), 3.8 vs. 7.0 μg/mL (NS) and 2.3 vs. 6.2 μg/mL ($p < 0.05$), respectively. Mean voriconazole levels in patients who were improved vs. worsened after treatment at day 3, 7, 14 and 28 were 5.7 vs. 8.3 μg/mL (NS), 4.7 vs. 9.5 μg/mL ($p < 0.05$), 2.4 vs. 1.2 μg/mL (NS) and 2.7 vs. 3.6 μg/mL (NS), respectively.

Conclusion: The levels of plasma voriconazole in Thai patients tend to be high and a higher voriconazole concentration during the first week of treatment is associated with poor outcomes. In Thai patients, CYP2C19 polymorphism seems to affect the plasma voriconazole concentration after 1 month of treatment with the association between PM and higher voriconazole concentration.

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