2014 Annual Research Symposium

Public Health aspects of infectious disease

SPEAKER ABSTRACTS

Thursday 4 September 2014
The John Niland Scientia Building
University of New South Wales
Estimating infectious disease parameters from routinely collected data

DR JAMES WOOD

In this presentation we briefly cover two case studies of statistical techniques applied to routinely collected data for estimation of key transmission parameters. Planned observational studies are often not of sufficient scale to be useful in this context, so it’s useful to try to maximise the utility of routinely collected data. In the first example, we cover an approach (based on branching processes) to estimating the reproduction number for measles in Australia based on the distribution of observed outbreak sizes over the period 2009-11. These results are somewhat reassuring (R<1) but at odds with an alternative method. In the second case study, we describe an approach to estimating vaccine uptake for MMR vaccine using population serosurveys. This is applied to Australian data and used to estimate vaccine coverage and other parameters for individuals too old to be represented on Australian vaccination register. I conclude by briefly discussing some planned innovations and the use of routine data more generally.

A systematic review of the avian and human epidemiology of influenza A H5N1 and H7N9

DR CHAU BUI

This paper compares the viral and epidemiological characteristics of avian influenza viruses H5N1 and H7N9, in both avian and human populations. H5N1 is pathogenic in birds, whereas H7N9 is not, yet both have caused sporadic human cases, without evidence of sustained, human-to-human spread. H7N9 viruses are diversifying at a much greater rate than H5N1 viruses. H7N9 strains demonstrate similarities with engineered transmissible H5N1 viruses which make it more adaptable to the human respiratory tract. The number of H7N9 human cases in the first year is far higher than the total cases of H5N1 over a similar time frame. Despite the higher incidence of H7N9, the spatial distribution of H5N1 within a comparable timeframe is considerably greater than that of H7N9, both within China and globally. The pattern of spread of H5N1 in humans and birds around the world is consistent with spread through wild bird migration and poultry trade activities. In contrast, human cases of H7N9 and isolations of H7N9 in birds and the environment have largely occurred in a number of contiguous provinces in South-Eastern China. Although rates of contact with birds appears similar in H5N1 and H7N9 cases, there is a predominance of incidental contact in H7N9 as opposed to close, high-risk contact in H5N1. Additionally, level of H7N9 virus in birds in avian surveillance studies has been low, particularly in poultry farms. These differences between the human and avian epidemiology of H5N1 and H7N9 raise questions as to how H7N9 has spread, which should be investigated further.
Characterising hepatitis C virus transmission dynamics in a high-risk incarcerated population

MR NEIL BRETT ANA

Hepatitis C virus (HCV) is predominantly transmitted between people who inject drugs (PWID) with high prevalence rates in this population globally. Incarceration rates are very high among PWID due to the illegal nature of drug use. Accordingly, imprisonment is an independent risk factor for HCV acquisition. HCV transmission dynamics in the custodial setting have not previously been explored.

We integrated viral sequences with epidemiological data to analyse transmission clusters and better understand HCV transmissions in an Australian prison setting. Longitudinal HCV laboratory data, risk behaviour, and spatio-temporal information were collected from 498 subjects enrolled in the Hepatitis C Incidence and Transmission Study in prisons (HITS-p) cohort. Phylogenetic analysis was performed on viral sequences (E1-E3) of 79 incident case subjects. Clustering analysis was performed using a conservative clustering distance threshold to detect recent clusters of HCV transmission. Clusters were validated using estimated dates of infection, risk behaviour, and spatio-temporal data.

Subjects moved between prisons, and between prisons and the outside community, with a median number of 7 movements per year. Three clusters were detected - a cluster of three subjects infected with genotype-1a, and two clusters of two subjects among genotype-3a infected subjects. Four likely transmission events were identified involving a source-recipient pair co-located in the same prison at the same time. Furthermore, three likely transmission events were associated with reported drug injecting and equipment sharing behaviors.

Transmission events were identified using a conservative approach for detecting HCV transmission clusters in a prison setting. Mapping transmission dynamics will inform prevention strategies.

Characteristics associated with increased risk and burden of pertussis in older adults

DR SURENDRA KARKI

Introduction: Recent Australian notification data show a significant burden of pertussis in adults, but there is limited information about risk factors, especially among older adults.

Methods: We analysed data from a population based cohort of 267,098 adults aged 45 years or older, recruited in New South Wales, Australia between 2006-2008 (the 45 and Up Study). Participants were followed up until 2012 for incident pertussis notifications, hospitalisations, and deaths through linkage of the cohort to various health related administrative data collected in NSW, Australia. The incidence of pertussis notifications, hospitalisations, and hazard ratios (HR) were estimated according to important participant characteristics using cox proportional hazard models.

Results: During 1,252,950 person-years at risk, 968 participants had a pertussis notification. The incidence rates of notifications and hospitalisations were 77.3 (95%CI, 72.5, 82.3) and 4.3 (95%CI, 3.2, 5.6) per 100,000 person-years respectively. After adjusting for potential confounders the following characteristics were associated with a higher rate of pertussis notification: age 45-64 years compared to 75+ years (HR 1.25, 95%CI 1.04, 1.50), being female (HR 1.34, 95%CI 1.16, 1.56), BMI category (25-29 versus <25: HR 1.30, 95% CI 1.11, 1.53; 30+ versus <25: HR 1.53, 95%CI 1.29, 1.82), history of asthma (HR 1.41, 95%CI 1.19, 1.67), only English spoken at home (HR 1.35, 95%CI 1.02, 1.77), having children (HR 1.28, 95%CI 1.02, 1.61) and residing in outer regional areas compared to major cities (HR 1.28, 95% CI 1.08, 1.51; remote/very remote HR 1.76, 95% CI 1.36, 2.28).

Discussion: We identified factors associated with adult pertussis which could be useful for targeted vaccination strategies.
Does an automated hand hygiene training system improve hand hygiene compliance?

DR ANGELA KWOK

Background: Performing effective hand hygiene at the right times and using the correct technique which consists of seven poses can save lives. An automated training system has been reported to have improved hand hygiene compliance. We investigated the effect of this new automated training system on compliance rates of medical and nursing staff before and after introducing.

Methods: Over an 8-month period the automated training system rotated around 18 departments in a 380-bed teaching hospital. Volunteer staffs used the automated system video to mimic the seven poses for correct hand hygiene technique. A unique staff code was used to track individual staff pass rates for first attempt for each of the seven poses. Trained auditors collected hand hygiene compliance data quarterly before and after the intervention period. Hand hygiene compliance rates, collected in accordance with the National Hand Hygiene Initiative, were used to establish the effect of the training.

Results: Eight hundred staff volunteered completed training until each achieved 100% correct technique for each of the seven poses. The hand hygiene compliance rate during the quarter prior to the introduction of the training system was 76% (95%CI 75%-78%). During the training period compliance did not increase significantly and ranged from 72%-74%. The hospital wide compliance rate for the post-training audit quarter initially failed to pass accreditation but when repeated reached 82%. All staff reports about the automated training system were positive and 92% believed this system was a time-saving experience.

Conclusion: Using technology for training hand hygiene techniques played an important role for correcting technique but could not be identified as a causal factor for improving hand hygiene compliance.

Are further hepatitis A outbreaks possible among men who have sex with men in Sydney, Australia?

DR HAMMAD ALI

Introduction: Two outbreaks of hepatitis A occurred in Sydney in the 1990s in men who have sex with men (MSM); however, there have been no outbreaks since 1996. We aimed to determine trends in the proportion of MSM who are susceptible to hepatitis A virus (HAV) infection in Sydney and thus the potential for further outbreaks.

Methods: Anonymous data on HAV status (past infection, HAV antibody test result, and vaccination status) of MSM seen at the Sydney Sexual Health Centre between 1996 and 2012 were extracted from medical and laboratory records. $\chi^2$ test for trend was conducted.

Results: A total of 14,799 MSM were seen for the first time from 1996-2012. The proportion of MSM, who reported past hepatitis A or a prior positive test for HAV antibodies declined from 11.3% in 1996 to 2.4% in 2012. Of those tested at the clinic, the proportion positive for HAV antibodies without a history of hepatitis A increased from 10.8% to 16.3%. The proportion of MSM who had previously received the vaccine increased from 9.8% to 45.2%. Overall, the proportion of MSM susceptible to hepatitis A decreased from 68.1% in 1996 to 36.2% in 2012 (p trend<0.001).

Conclusion: The proportion of MSM, who are susceptible to HAV infection decreased substantially over 18 years; most of this reduction was attributable to vaccination. A recent modelling study found population immunity of 60%-70% is needed to avert person-to-person outbreaks among MSM. Therefore, vaccination rates in MSM need to be maintained to avoid future outbreaks.
Human papillomavirus infection in teenage men who have sex with men and implications for HPV vaccination policy

DR HUACHUN ZOU

Background: To determine the incidence of anal, penile and oral HPV infection and estimate the site specific probability of transmission per partnership, for teenage men who have sex with men (MSM).
Methods: Observational study of a cohort of 200 MSM aged 16 to 20 years were recruited via community and other sources in Melbourne, Australia. Men were seen at baseline, month 3, 6 and 12. At each visit swabs from the anal canal, penis, and mouth were collected for HPV DNA detection. We defined definite incident HPV infection as detection of the same HPV type on more than one occasion over 12 months from the same anatomical site in a participant negative for this HPV type at baseline. Possible incident HPV infection required only a single sample to be positive during follow up. We also calculated the probability of transmission of HPV per partnership.

Results: Definite and possible incidence rates were 57.1 (95% CI: 45.9-67.9) and 64.5 (95% CI: 56.7-71.7) per 100 person years for any anal HPV infection and 32.5 (95% CI: 22.6-43.7) and 31.3 (95% CI: 21.6-42.4) per 100 person years for any quadrivalent vaccine HPV type (qHPV). The definite and possible incidence rates were 12.2 (95% CI: 6.0-21.3) and 20.9 (95% CI: 14.9-27.9) per 100 person years for any penile HPV infection and 4.9 (95% CI: 1.3-12.0) and 6.7 (95% CI: 3.4-11.8) per 100 person years for any qHPV. No definite and 6 possible oral HPV infections were detected. Estimated probabilities of HPV transmission from the penis to the anus were significantly greater (mostly at least 100%) compared to those from the anus to the penis which ranged from 4 to 12%.

Conclusions: The vaccination coverage in MSM will need to be higher than in heterosexual if the same reductions in HPV are to be realized.

Hepatitis C (HCV) testing and treatment among people who inject drugs (PWID)

MS KERRYN BUTLER

Introduction: Despite efforts to improve access to antiviral therapy for HCV infection, and hence treatment outcomes; uptake for chronic HCV infection remains low among people who inject drugs. This presentation explores the knowledge and perceptions regarding diagnosis and available treatment of a group of PWID who have been previously tested for HCV antibodies.

Method: The Illicit Drug Reporting System (IDRS) is an annual sentinel surveillance system involving survey interviews with ~900 PWID in all capital cities of Australia. The survey consists of demographics, drug use, price, purity and availability of illicit drugs, mental health, blood borne viruses and crime. In 2013, a module was included to determine the extent of knowledge and the perceived barriers to treatment uptake.

Results: The majority of participants were actively involved in their health care and possessed good knowledge about their HCV diagnosis and treatment options. One quarter of those who reported an active virus had already undergone treatment with the majority of those achieving a sustained virological response (SVR) or 'cure'. Two-thirds of those who reported an active infection were aware of the recently available triple therapy and three-quarters of those would consider this treatment if it were suitable.

Of concern is the proportion of PWID (41%) who had tested positive for antibodies but have not progressed to any further testing.

Discussion: Increases in diagnosis and further testing and widespread access to care may help improve treatment rates for chronic HCV.
Antenatal care and infectious disease risk at Aboriginal Medical Service Western Sydney

MS DEA DELANEY-THIELE

Background: Specialist antenatal services are an integral and effective component of service delivery in many Aboriginal Community-Controlled Health Services (ACCHSs). The Aboriginal Medical Service Western Sydney (then known as Daruk AMS) established a comprehensive, multi-disciplinary antenatal service in 1990. This service often works with women with complex social and emotional issues that are the legacy of the long history of racism and colonisation. The aim of this project was to examine antenatal care at AMSWS via collection of routine clinical data in order to strengthen care of antenatal women and their families.

Methods: This project was undertaken as a component of the REACCH collaboration. An audit of recent antenatal clients (n=50) was undertaken in addition to an analysis of patient attendance and testing for sexually transmitted (STI) and blood borne viral (BBV) infections extracted via GRHANITE software. Testing and positivity for STI and BBV were examined along with patterns of antenatal care.

Results: A total of 288 pregnant women attended the service in the time covered in this study. The mean age of antenatal attendees was 23.9 (Range 15 - 46). Across all clients, 208 (72.2%) were tested for chlamydia with 21 positive (10.1%); 142 were tested for hepatitis C with 4 positive (2.8%). Hepatitis B testing included tests for active infection in 175 clients (60.8%) with 6 positives (3.4%) and immunity in 119 clients (41.3%) with 49 positive (41.2%). Audits of records revealed that on average, women attended the clinic on average 20 times in their pregnancy (range 1 – 84 visits)

Conclusion: The results of this study indicate that antenatal clients of AMSWS, in general, receive extensive follow up and support. Clients with chaotic lives tended to take part in fewer visits. Given the high levels of risk as indicated by STI and BBV positives, additional support needs to be directed to clients most at risk.

The use of routinely collected clinical data to illuminate gaps in current research into STI and BBV in the urban Aboriginal and Torres Strait Islander population

DR MARY ELLEN HARROD

Objectives: Sound policy development and clinical quality improvement are reliant on accurate, timely and complete data in order to assure optimal outcomes for people at risk from sexually transmitted and blood borne viral infections (STI and BBV). To date, key sources of information have been the National Notifiable Disease Surveillance System (NNDSS) and research, primarily from clinical audits. These information sources have some notable gaps in reporting on STI and BBV in Aboriginal and Torres Strait Islander peoples including under-reporting of Indigenous identification information in urban population, few studies that include testing rates and little detailed information on viral hepatitis – notably in hepatitis B vaccination and detailed information about hepatitis C infection. One method that has been increasingly employed to overcome these gaps is extraction of clinical data from the patient information management systems in Aboriginal Community Controlled Health Services (ACCHS). This paper describes the use of routine clinical data from a primary care setting in the Research Excellence in Aboriginal Community Controlled Health (REACCH) collaboration.

Method: Design: A cross-sectional study of de-identified records from electronic patient systems over 5 years (8 January 2009 - 11 July 2013).

Setting: The study was undertaken at four Aboriginal Community Controlled Health services.

Participants: All patients attending for a clinical visit were included in the study. Pathology records were accessed for all patients with testing for STI (chlamydia, gonorrhoea, syphilis, trichomoniasis) or BBV (hepatitis B and C, HIV).

Main Outcome Measures: Testing and positivity for STI and BBV

Results: A total of 13,849 (7,738 women) patients attended the four clinics participating in REACCH between 1 Jan 2009 – to 30 June 2014. A total of 3,056 unique Aboriginal and Torres Strait Islander patients were tested for chlamydia during the study period with data available for 2,845 tested for gonorrhoea, 2,563 tested for hepatitis B surface antigen, 2,466 tested for hepatitis B surface antibody and 2,602 tested for hepatitis C antibody.
Conclusion: The clinics participating in the REACCH study represent a substantial cohort of urban Aboriginal and Torres Strait Islander patients. Participating ACCHS have utilised STI and BBV indicator reporting to improve clinical service delivery and increase testing in accordance with current guidelines and data from the REACCH have been used to inform immunisation policy and build the evidence base for STI and BBV testing and positivity.

Testing for blood borne viruses among Indigenous prison entrants in Australia

MS DINA SAULO

Background: Risk behaviours, lack of harm minimisation strategies and high prevalence of blood borne viral infection within prisons place offenders at risk for BBV acquisition. In 2011, Aboriginal & Torres Strait Islander people made up 3.0% of the Australian population yet accounted for 27% of those in prison. We undertook an analysis of BBV prevalence and risk factors in Indigenous and non-Indigenous prison entrants.

Methods: We used data from the National Prison Entrant’s Blood Borne Virus Survey (NPBBVS), a triennial cross-sectional survey that has been undertaken three times over the past 10 years. During a two week period, prison entrants are invited to complete a survey and provide blood and urine samples. These analyses include 2004, 2007 and 2010 survey data from four Australian states who participated in each of the three surveys. Demographic data, risk factors and serological markers for hepatitis B core antibody (anti-HBc), hepatitis C antibody (HCVAb) and HIV were analysed.

Results: A total of 1752 prison entrants participated across the three surveys, of whom 22% were Indigenous. HCVAb prevalence was high among both Indigenous (32%) and non-Indigenous prison entrants (29%). Risk factors associated with HCVAb were: female sex, injecting drug use and age over 30 years. Prior incarceration and living in an urban area before prison were associated with HCVAb in Indigenous prisoners. Overall 34% of prison entrants self-reported never having had a HCV test. Anti-HBc prevalence was higher in Indigenous (29%) compared to non-Indigenous (16%) prison entrants. Anti-HBc positivity was associated with being from a rural and remote area and aged above 25 in Indigenous inmates. Of all prison entrants, 36% had no evidence of HBV immunity according to serological testing.

HIV prevalence was low in both Indigenous (0.62%) and non-Indigenous (0.46%) prison entrants. Overall 32% of prison entrants self-reported never having had a HIV test. Conclusion: Incarceration places prisoners at risk of BBVs. Given the high prevalence of HCVAb and anti-HBc among Indigenous prison entrants, as well as associated risk factors, there is a continuing potential for HIV transmission despite low rates so far. As prisoners are identified as a priority population in the national HIV and other BBV strategies, HIV testing coverage should be improved. With a national HIV agenda of “test and treat” it is important not to exclude those in the justice system who represent some of the most vulnerable populations in society.

Immunisation coverage among a birth cohort of Aboriginal preschool children in an urban community

A/PROFESSOR ELIZABETH COMINO

Vaccine preventable infections remain an important cause morbidity and mortality in Australian Aboriginal and Torres Strait Islander children and contribute to the disparities in the burden of disease between Aboriginal and non-Aboriginal children. In particular, invasive Haemophilus Influenza (Hib), and Meningococcal and Pneumococcal bacterial infections persist as important causes of pneumonia and meningitis in Aboriginal children under five years of age. Collectively these contribute to higher rates of hospitalisation for pneumonia among Aboriginal children compared to non-Aboriginal children.

Aim: The aim of this presentation is to describe age appropriate immunisation coverage and the factors associated with this among Aboriginal and non-Aboriginal preschool children resident in an outer urban Sydney community.

Methods
Study 1: The study population was 178 Aboriginal and 356 non-Aboriginal children identified at birth at Campbelltown Hospital between October 2005 and May 2007. Non-Aboriginal children were matched on birthdates and gender. Data on immunisation coverage to age 2 years was extracted from the Australian Childhood Immunisation Register (ACIR). Data on maternal socioeconomic and other characteristics were collected by questionnaire.

Study 2: Information on immunisation status was collected at 6-monthly intervals from birth to 5 years from children participating in the Gudaga cohort.
Results: Study 1: ACIR records were identified for 92% of children. Immunisation rates of Aboriginal infants were comparable to those of non-Aboriginal children except for delay at 4 and 6 months. Rates of delay in immunisation at 12 and 18 months for both Aboriginal and non-Aboriginal infants were similar. Young maternal age and higher parity were both associated with a greater likelihood of delay.

Study 2: at five years of age 94% of parents reported that their child’s immunisation was up to date.

Conclusions: Immunisation rates in this population of Aboriginal infants are comparable to those of non-Aboriginal infants except for delay in immunisation at 4 and 6 months. Identified risk factors for both Aboriginal and non-Aboriginal infants may be amenable to intervention. Strategies to ensure timely compliance with immunisation schedules in this outer urban community have achieved reasonable immunisation coverage for both Aboriginal and non-Aboriginal infants.

“As for my infection, this was a national sadness, it was”: elderly gay Chinese men’s experiences of living with HIV

PROFESSOR HEATHER WORTH

There has been a large increase in the prevalence of HIV amongst homosexual men in China, and amongst those men aged between 50-64 years. This paper comes out of an oral history study of 31 elderly Chinese gay men undertaken in four cities in China in 2011. It was a collaboration between UNSW researchers and Chinese researchers from Tsinghua and Renmin Universities.

In particular, it examines the experiences of four HIV-positive Chinese men who were diagnosed when they were over 60 years old.

Elderly gay Chinese men have mostly kept their sexuality secret for their entire adult life. Most have married and have children and their relationships with other men have been entirely clandestine.

Their HIV-positive diagnosis brings an overwhelming sense of sadness. Many have to admit their homosexuality to their wives and children. The men broke off relationships, or even moved house because of the humiliation they felt. Some men contemplated suicide because it was “too hard to live”.

ANNUAL RESEARCH SYMPOSIUM 2014
Infection control survey in three Asian countries to examine policies and practices around the use of facemasks in healthcare setting

**MR ABRAR AHMAD CHUGHTAI**

Background: Currently there is an ongoing debate around the selection and use of facemask for respiratory protection. The aim of this study was to examine the policies and practices around the use of facemasks to protect hospital healthcare workers (HCWs) from respiratory infections.

Methods: A cross sectional survey was conducted in Health Departments and tertiary/secondary hospitals in China, Pakistan and Vietnam to analyze the policies and practices around the use of facemasks. Samples of each type of masks and respirators used in the hospital were also collected. Three infectious diseases were selected for this study; influenza, SARS and TB.

Results: Policies - Across the three countries, there is some inconsistency in regards to the types of products (i.e. masks vs. respirators) recommended for three diseases. Training and fit testing is recommended in most policy documents. Reuse of facemask is not recommended.

Practices - Amongst the 89 hospitals surveyed, clinical practices around the use of masks/respirators are divergent from recommended practices. Certified respirators are used in few hospitals. Training and fit testing is also not performed in most hospitals. We collected 369 samples of facemask from three countries, and these masks are of various size, shape, layers and design. The penetration of particles through the cloth (median 85.5%, range 66-90%) and surgical masks (median 53%, range 0.4-93%) was very high compared to the N95 respirators (median 0.6%, range 0.1-30%).

Conclusion: There is a great deal of inconsistency in regards to the selection and use of facemasks recommended for various respiratory infection in the three countries studied. Given the variation in quality between the products being currently used, there is a need to develop a comprehensive and uniform policy on facemask use and healthcare facilities should comply with those policies.

The contribution of travellers visiting friends and relatives to notified infectious diseases

**DR ANITA HEYWOOD**

Introduction: Migrants and their children who return to their country of origin to visit friends and relatives (VFR) are at increased risk of infectious diseases. With a quarter of Australia’s population foreign-born and a quarter of departing Australians VFR travellers, VFR travel is an important national disease control issue. Data is lacking on the magnitude of VFR travel-associated disease, globally and in Australia. We aimed to determine the contribution of VFR travel to notifiable diseases in Australia.

Methods: A prospective study of notified cases of typhoid, measles and hepatitis A was conducted. During routine follow-up of notified cases between February 2013 and January 2014, permission for enhanced surveillance was obtained. Investigators collected additional data on international travel, pre-travel health preparation and at-risk behaviours.

Results: Recent travel was reported by 22/24 (91.7%) typhoid, 29/40 (72.5%) hepatitis A and 13/23 (56.5%) measles Australian residents cases. VFR travel was reported by 21/22 (95.5%) typhoid, 19/29 (65.5%) hepatitis A and 4/13 (30.8%) measles travel-associated cases. The majority of travel-associated cases were in migrant Australians (35, 54.7%) or their children (18, 28.1%). Only 8/64 (12.5%) had sought pre-travel advice and 2/64 (3.1%) pre-travel vaccination. Low risk perception was the most frequently cited reason for not seeking advice.

Discussion: VFR travel is an important contributor to imported typhoid, hepatitis A and to a lesser extent measles. Communicable disease control strategies targeting VFR travellers are likely to make an impact on importation of these travel-related infections.
Antibiotic Prescribing Practices and Antibiotic Resistance in Cambodia

MR CHHORVOIN OM

The ability to treat common infectious diseases in Cambodia will soon be affected by the global crisis of antimicrobial resistance. To understand the risk of antibiotic resistance we conducted a national survey of physician prescribers from public hospitals to examine factors associated with antibiotic resistance.

Methods: Hospitals were selected using random sampling weighted by prescribing frequency. All prescribing physicians in each selected hospital were invited to participate in the survey. The self-administered questionnaire consisting of 46 items including six clinical case scenarios specific to Cambodia to measure prescribing practices. Hospitals were classified into two levels, national and provincial/district (non-national), for data analysis.

Results: 689 (78%) of physicians responded, 74% (505/684) of whom had >10 years clinical experience. 81% of all physicians believed that antibiotics were used inappropriately in patient catchment area and half (54%) believed that antibiotics were inappropriately prescribed by their hospital. Yet inappropriate prescribing was common uncomplicated sore throat (86%) commonly prescribed amoxicillin, erythromycin and azithromycin for sore throat. A third (36%) of physicians inappropriate prescribed antibiotics for non-bloody afebrile diarrhoea, commonly with cotrimoxazole and metronidazole. Just over half (58%) of all physicians were experienced in treating multiple resistant Staphylococcus aureus infections yet 76% of these experienced prescribers could not identify the appropriate antibiotic treatment.

Physicians agreed that antibiotic resistance was a problem for their ability to care for their patient (99%), that antibiotic resistance was a problem in Cambodia (98%), in hospitals (89%) and in their private practices (82%). Almost all physicians (99%) would welcome education programs and 97% believed that national antibiotic guidelines would be helpful for prescription.

Conclusion: Awareness of antibiotic resistance was high. Yet prescribing practices reflected poor knowledge and dangerous prescribing practices. Diagnostic laboratories are uncommon across Cambodia and physicians were receptive to the idea of a national antibiotic prescription guideline based on antibiotic resistant patterns provided from a reference hospital and further training in best practice for antibiotic prescribing.