

Clinical Review

Clinical Review identifies issues in the medical literature of interest to clinicians in Africa. Essential references are given at the end of each section

Pharmacy Review

Antibiotics

Antibiotics are among the most important medicines that we will ever use, and to enable us to make the best use of them, there is a term 'Antibiotic Stewardship' or 'Antimicrobial Stewardship'. The term started to be used in about 1996, and has expanded and made part of official government policy.

UK guidelines

In the UK in 2015 NICE (National Institute for Health and Care Excellence) published a guideline Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use.¹

The guidelines include 15 points for prescribers of antibiotics including: prescribing the shortest effective course; taking into account the risk of antimicrobial resistance for individual patients and the population as a whole; discussing options with patients as to why prescribing an antimicrobial may not be the best option; alternative options to prescribing an antimicrobial; and not issuing an immediate prescription for an antimicrobial to a patient who is likely to have a self-limiting condition.

The purpose of the guideline is to discourage inappropriate use of antibiotics, to encourage their proper selection, and to reduce antibiotic resistance.

USA pneumonia study

A recent presentation at the 2017 American Thoracic Society International Conference looks at the effectiveness and choice of antibiotics for pneumonia.² The authors looked at the effectiveness of four classes of antibiotics from prescribing data. The classes are: beta-lactams (penicillins and cephalosporins), macrolide (erythromycin and clarithromycin), and tetracycline, or fluoroquinolone (ciprofloxacin). In each case the choice of antibiotic successfully treated in 75% to 80% of patients. Between 20–25% of patients had to return to the doctor for a longer course, a change of antibiotic, or admission to hospital. The authors' conclusion is that antibiotics should be prescribed according to the official antibiotic policies, but the official policies needs updating to include how to manage cases of antibiotic failure.

Antibiotic shortages

We are all faced with problems that occur when certain antibiotics are unavailable. These problems are

not restricted to low- and middle-income countries as there have been difficulties also in the UK. Recently the following antibiotics have been in short supply: vancomycin, piperacillin/tazobactam (Tazocin) injection, co-amoxiclav, amoxicillin/clavulanate (Augmentin) injection, and aztreonam injection. In each case, urgent changes had to be made to the prescribing guidelines.

I was at a conference in Brighton³ about pharmacy response in humanitarian emergencies. One of the speakers said that as supplies were erratic the prescribers were used to prescribing by diagnosis, and leaving the pharmacist to choose the most appropriate drug that was available.

Another of the speakers, Eneyi Kpokiri from Nigeria, looked at antibiotic prescribing in relation to official policies. She reported that almost a third (31.1%) of antibiotics prescribed were given for respiratory tract infections, which are usually viral in nature. One of her recommendations is that there should be regular audits for antibiotic prescribing patterns; more training of prescribers is needed; and restrictive antibiotic dispensing practise, including checks by a pharmacist. Most prescribing was not in accordance with official guidelines, but the guidelines had not been revised for many years.

Antibiotics in pregnancy

A recent Canadian article⁴ looked at the risks of different antibiotics in early pregnancy, and the incidence of miscarriage. The overall rate of miscarriage was 4.7%. With some antibiotics, the risk of miscarriage was increased (however, some of this may be due to the infection being treated). Erythromycin, penicillins, cephalosporins, and nitrofurantoin were shown to not increase the risk. Clarithromycin, tetracyclines, quinolones, and metronidazole were associated with an increased risk of miscarriage. The authors concluded that guidelines for treating infections in early pregnancy should be revised as a result of the study. The good news is that the older, more established antibiotics have a better safety profile than newer ones, and they are also likely to be cheaper.

Antibiotics after bomb blast injuries

In May this year, there was a terrorist attack at a pop concert in Manchester, UK. Twenty-two (22) people were killed and 59 injured. As a result of this attack the UK Government has issued information on the choice of antibiotics to prevent infections due to impact and injury from organic matter (often fragments of bone from other victims).⁵ The advice includes: ensure that all victims have an up-to-date tetanus vaccination; all victims with injuries that penetrate the skin should have hepatitis B vaccination; all victims should be monitored for hepatitis C and HIV (post-exposure prophylaxis for HIV is not necessary). The choice of antibiotic depends on the site, severity and nature of the injury. One of the guidelines is that patients should be sent home with the complete course of antibiotics (up to six weeks for open fractures) as patients are likely to be followed-up in different parts of the country.

Antibiotic resistance

Over-use of antibiotics leads to resistance, therefore it is important to use antibiotics only when clearly necessary, and to select an appropriate antibiotic. There is evidence that when an antibiotic is not used for a number of years, bacteria once again becomes sensitive. This is similar to malaria being sensitive to chloroquine after a period of not using it (see *Africa Health*, May 2017)⁶ when malaria parasites in Malawi and Cameroon were becoming sensitive to chloroquine. In the UK nitrofurantoin had not been used for many years until a few years ago. Urinary tract infections (UTIs) were becoming resistant to trimethoprim, so policies were changed to use nitrofurantoin, and most UTIs cleared up.

A recent news report talks of a modified version of vancomycin designed so that bacteria 'cannot become resistant'.⁷ The modified vancomycin has three separate modes of action. So far it has been tested only in the laboratory, but it is a start to developing new methods of combating resistance. It is not clear if it will ever go into commercial production, or be of use in humans, or if anybody would be able to afford it.

Handwashing

We have all traditionally been taught that handwashing in hot water for three minutes is the gold standard for removing bacteria and cleaning the hands. A recent study⁸ shows that cold water is just as effective as hot, and that antibacterial soap is no better than ordinary liquid soap. A wash time of 20 seconds was considerably better than five seconds; 10 seconds is sufficient to remove most bacteria. The authors comment that using cold water instead of hot gives considerable energy saving without reducing effectiveness.

Access to essential medicines

*The Pharmaceutical Journal*⁹ has published a series of questions and answers with the co-chairs of *The Lancet* Commission on Essential Medicines. The questions deal with the cost—the estimate is US\$1–\$2 per person per month to provide a basic set of medicines. The comments include that new medicines would be too expensive unless special prices were negotiated, and specifically highlights the cost of medicines to treat hepatitis C. In the Netherlands the specially negotiated price is €55 000 per patient, and treatment has to be rationed because of the cost. Getting affordable medicines to those who need it requires action from governments as well as access to medicines.

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Public Health Review

The growing role of mobile phones in Africa's healthcare

The ownership and use of mobile phones in Africa has grown continuously over recent years. For example, 'As much as 88% of Kenya's population access the internet through their phones, thanks to cheaper data plans and the ubiquitous use of mobile money platforms like Mpesa'.¹ Ironically, Kenya's mobile internet speeds are faster than Austria, Sweden, Ireland and USA. Because of dropping prices, smartphone ownership in Africa nearly doubled between 2014 and 2016.²

The founders of the data company mSurvey observe that mobile phones are one of the few connections Africans have with the formal economy and public services.³ AfroBarometer reports that across Africa 93% of people have access to cell phone service (with or without internet), but less than two-thirds have access to clean water and electricity.⁴ Only 30% have a sanitary sewage system.

With mobile phones becoming nearly ubiquitous it is not surprising that their use in various aspects of health service delivery has also increased. Using the search term 'mHealth' many recent articles were found. These identify health interventions in several key categories:

- Communication of targeted health education to clients and patients;
- Continuing education for health workers;
- Collecting and sharing health information/data.

Communicating with clients

Both qualitative and quantitative studies have been used in the design and evaluation of mHealth interventions. Qualitative inquiry is valuable on a formative basis in designing mHealth interventions. van Heerden and colleagues used focus group discussions and key informant interviews with community health workers (CHWs) and potential clients to learn about the perceived benefits and barriers to a mHealth educational effort for persons living with HIV in South Africa.⁵ Respondents felt that mHealth would aid in removing distrust, enhancing appointment and medication reminders, and gathering better health information.

A study in Mozambique recognised that while success in small scale or pilot mHealth efforts may occur, a better understanding of how clients and health workers (HWs) respond to mHealth is needed to scale-up

such efforts. Views on a mHealth intervention aimed at supporting client retention in antiretroviral therapy (ART) and tuberculosis (TB) treatment. Most respondents gave a high rating to the system and cited positive effects as reducing the number of failures to collect medication and avoiding missing appointments.⁶ Therefore, scale-up to transmit reminders for appointments, medications, motivational texts, and health education to increase retention in care was recommended.

From the quantitative perspective, an example of targeted twice weekly short message service (SMS) communication with HIV-positive women throughout their pregnancy comes from South Africa. The strength of this study was having both an intervention and a control group of women. The supportive information was timed to stage of pregnancy and resulted in greater antenatal care attendance, improved birth outcomes, and better attendance at testing for the new child post-delivery.⁷

A new study in Kenya is planned around mHealth strategies to optimise adherence and efficacy of Option B+ prevention of mother-to-child HIV transmission. It will have three arms where one will receive educational SMS, the second will receive messages and a request to respond, and the third is a control. The primary outcomes to be measured include virological failure, maternal retention in care, and infant HIV infection or death.⁸ It will be interesting to compare the relative influence of the intervention on the epidemiological versus the behavioural outcomes.

Continuing education

Zurovac et al see text messaging in malaria endemic areas as a means to bridge the communication gap between managers of health services and HWs at the periphery. They outlined areas where HW performance could be improved, including texts that ensure

HW adherence to treatment, service guidance and communication as a way to remotely conduct post-treatment-review.⁹

In Kenya, Zurovac et al also conducted a cluster-randomised controlled trial wherein health facilities were randomly allocated to either the intervention group, in which all HWs received text messages on their personal mobile phones on malaria case-management for six months, or the control group, in which HWs did not receive any text messages. Ten malaria messages were developed based on recommendations from national malaria guidelines, and two messages were delivered per work week during the intervention. Within the intervention group, intention-to-treat analysis showed that correct artemether-lumefantrine management improved by 23.7% immediately after intervention and by 24.5% six months later. Likewise there was improvement in giving advice on medication adherence immediately after training, which continued to increase by six months. The control groups did not show such increases.¹⁰

HWs in an intervention group in Ethiopia were given android phones that had preloaded reminders and educational messages on antenatal care, delivery and postnatal care (PNC) that could be sent to their clients. Follow-up surveys of women showed significantly greater delivery at health facilities and attendance at PNC among those receiving the reminders and educational messages during pregnancy.¹¹

Often the information available on efforts to improve HW performance is qualitative. In a review of studies using SMS in seven African countries to improve clinical decision-making, HWs were generally supportive of SMS to improve clinical decision-making and perceive them as useful. They did express concerns about increased workload and altered workflow hinder sustainability.¹²

Qualitative evaluation with the Kenyan HWs mentioned above who received the intervention appreciated the SMS reminders according.¹³ The perceived value of SMS interventions to improve performance in this study was summed up succinctly in its title, 'Even if you know everything, you can forget'. The intervention consisted of motivating quotes to HWs' mobile phones. HWs agreed that the messages were quite acceptable and seen as a way to keep oneself 'up-to-date'. Overall when logistical issues are accounted for such as phone reception and network management, mHealth can be used to change and reinforce HW behaviour and are acceptable to staff members.

Health information processes

Cell phones are used to report health statistics, conduct surveillance and manage logistics and commodities. Zurovac et al also observed that frontline HW reporting via mHealth platforms helps with disease and treatment effectiveness surveillance, monitoring of the availability of health commodities, and pharmacovigilance concerning the safety and quality of drugs.¹⁰

Asimwe and co-researchers in Uganda, in what could be termed a feasibility study, demonstrated the several potential benefits from enabling HWs to



report on rapid diagnostic tests (RDTs) and artemisinin-based combination therapy use in a timely manner. The project increased timeliness of reporting such that 88% of health facilities reported within a one-week time frame compared to the norm of one month for submitting paper reports.¹⁴

The SMS for Life project, which helps track life-saving commodities was used in Kenya to reduce stock-outs of malaria commodities.¹⁵ The intervention was carried out in all 87 public health facilities in five Kenyan districts over 26 weeks. 'Weekly facility stock counts of four AL packs and RDTs were sent via structured incentivised SMS communication process from HWs' personal mobile phones to a web-based system accessed by district managers'. Response from the health facilities was 97% with a mean formatting error rate of 3%. The accuracy of stock count reports was 79% while accuracy of stock-out reports was 93%. This intervention reduced the stock-out problem in the study areas.

Reporting can also be linked with surveillance. The same SMS for Life project in Kenya looked at reporting of RDT results as a form of surveillance. While there was a high response rate (96%) with 87% of facilities reporting on time, only 58% of surveillance data parameters were accurately reported.¹⁶

Mass Drug Administration for lymphatic filariasis is a global effort aimed at remote rural communities in Africa and Asia. A mobile application was developed and used in several countries that not only guided HWs to estimate and maintain drug stock, but also to report back coverage information. The authors believe that the multi-country experiences showed the 'value of this simple and practical suite of tools that empowers local HCWs to contribute to local, national, and global elimination of disease'.¹⁷

In conclusion, mHealth shows potential to improve communication between communities and health services, and between central and frontline HWs. While the evidence to 'prove' effectiveness of mHealth interventions is mounting, many reports are still qualitative or anecdotal. As access to mobile technology increases and costing becomes more reasonable, it is expected that mHealth will play a larger role in sharing health expertise and information.

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