Irrational Prescribing
Sudan Journal for Rational Use of Medicine (SJRUM) is a quarterly publication produced by the National Medicine Information Center and Reference Library (NMICRL); Directorate General of Pharmacy; Federal Ministry of Health; Sudan. SJRUM is funded by Global Fund and technically supported by the World Health Organization. The first issue was published in September 2012. SJRUM aims to promote Rational Use of Medicines (RUM) through disseminating principles, views, news, and educating health providers about rational use of medicines. SJRUM targets health professionals; prescribers, pharmacists, and nurses. Each issue is centered on a theme; which usually is an important subject in RUM. SJRUM highlights in each issue the current situation in Sudan relevant to the theme, presented either by evidence from local research or with reliable anecdotal evidence. SJRUM includes research studies which aim to encourage young researchers to publish their work at national and international levels. SJRUM also includes a section for educational materials relevant to RUM relying mostly on the WHO educational materials and other reliable sources. The section of news reflects some important published news that may affect RUM practice. SJRUM includes some selected case studies, reflecting current practice at different health facilities in Sudan, so as to highlight the irrational aspects in order to overcome them. As part of NMICRL activities, medical students and the public are endowed with leaflets and fliers on selected topics of SJRUM.

Readers have the freedom to use and reproduce any part of this journal.

For participation please contact: sjrum@khmic.org
For more information … You can access SJRUM online on www.sjrum.sd

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Dear fellows and readers

Welcome to the 7th issue of SJRUM.

We are pleased to present to you our 7th issue of SJRUM, which comes under the theme of irrational medicines' prescribing. The issue includes articles, research, and case studies revolving around the theme. Financial implications on irrational prescribing are given, beside educational material that is informative and may help professionals use medicines rationally.

To reach many stakeholders, and disseminate knowledge about RUM, the NMICRL, beside the SJRUM, made a TV show on the theme of the previous issue “self-medication” with emphasis on antibiotics and pain killers. Preparation for the forthcoming workshop on irrational use of medicines is underway. It is anticipated that the workshop will contribute to raising the awareness about the problem.

We would like to encourage our readers to contribute to the coming issues. For information see the guide to authors or go to www.sjrum.sd. Your comments and views are welcomed.

Dr. Nuha M. Agabna

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Call for Contributions

SJRUM team invites all health professionals to publish about issues on medicine use.

The themes for the year 2014 include:

- Inappropriate use of antibiotics.
- Patient non-adherence to medicines.
- Herbal medicines

The journal welcomes contributions in the following:
Thematic topic, research, case studies, success stories, and any other sections of SJRUM.

To Contribute:
Please submit your contribution to: sjrum@khmic.org

Or by hand to Directorate General of Pharmacy, NIMCRL Algama Street.
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### Factors

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### Problems

| Polypharmacy: use of too many medicines without justified diagnosis¹. | Overuse of antibiotics and injections (73%)². | Non compliance with guidelines (60%)². | Self-medication³. |

### Consequences

| Prevalence of antimicrobial resistance (73%)⁴. | Medicines stock outs⁵. | Eroded patient confidence in health system⁵. | ADR⁵ | Loss of public and personal resources⁵. |

### References

2. Assessment of national pharmaceutical sector North Sudan 2007, MOH, DGoP.
4. Amal M., Salma, M., Antibiotic resistance of common uropathogens among community and hospitalized adult patients at Omdurman Teaching Hospital. BSc dissertation, Ahfad University for Women.
Rational use of medicines has been defined by the World Health Organization (WHO) in 1985 as:
"Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and their community."

This implies that, irrational use of medicines includes all of the practices that make the mentioned processes of appropriate medicine prescribing not fulfilled. In other words, irrational prescribing can be described as the medically inappropriate and economically ineffective use of pharmaceuticals. It is a commonly observed practice that occurs in both developed and developing countries, with enormous costs from the perspectives of the scarce resources and adverse clinical consequences. It may occur in different forms; misuse, overuse, polypharmacy, adverse drug events or drug-drug interactions. Medication abuse describes a situation, when someone uses medicines very frequently that it becomes harmful, while medication misuse is simply, when someone doesn't use the medication correctly. Using many medicines concomitantly is known as polypharmacy, which is defined as using 2-5 medicines simultaneously. However, patients with co-morbidities have a compelling need to use many medications to treat their multiple illnesses. Nevertheless, polypharmacy is associated with increased risk of medication related problems and increased risks of medications interactions, which can be caused by a seemingly innocuous combination of medicines and may result in heart attacks, stroke or even death. Irrational prescribing may be manifested by the following examples:

- Prescribing of medicines when no medicine therapy is indicated, e.g. antibiotics for viral upper respiratory infections.
- The use of the wrong medicine for a specific condition requiring medication therapy, e.g. antibacterial in childhood diarrhea instead of ORS.
- The use of medicines with doubtful/unproven efficacy, e.g. use of antimotility agents in acute diarrhea.
- Failure to provide available, safe, and effective agents, e.g. failure to vaccinate against measles or tetanus.
- The use of correct medicines with incorrect administration, dosages, and duration, e.g. use of IV metronidazole when suppositories or oral formulations would be appropriate.
- The use of unnecessarily expensive medicines, e.g. use of a third generation, broad spectrum antimicrobial when a first-line, narrow spectrum, agent is indicated.

Several factors can lead to irrational prescribing of medicines, the two mostly recognized are: availability of a large number of commercial preparations in the pharmaceutical market; which makes medication selection difficult for the prescriber. The second factor is the physician's decision making process, which can be greatly influenced by demanding patients and/or the aggressive promotional activities by the pharmaceutical companies.

Inappropriate prescribing, dispensing practices and prevalence of self-medication with antimicrobials and herbal products were found to be alarmingly high in Sudan. The indicators of rational use of medicines have worsened over the past decade despite the implementation of managerial, regulatory and training interventions. It has been concluded...
that educational interventions are needed to address self-medication and adherence⁴.

Effective interventions to improve rational use of medicines should be the main concern for all members of the healthcare team. The political will from the decision makers would streamline the implementation of the interventions across the whole country. The WHO has advised different countries to implement national programs to promote rational use of medicines through policies, structures, information and education. These include¹:

- a national body to coordinate policies on medicine use and monitoring their impact;
- evidence-based clinical guidelines for training, supervision and supporting decision-making about medicines;
- to have lists of essential medicines used for medicine procurement;
- Pharmacy (drugs) and Therapeutics Committees in hospitals to monitor and implement interventions to improve the use of medicines;
- problem-based training in pharmacotherapy and prescribing in undergraduate curricula;
- continuing medical education as a requirement of licensure;
- publicly available independent and unbiased information about medicines for health personnel and consumers;
- public education about medicines;
- elimination of financial incentives that lead to improper prescribing, such as prescribers selling medicines for profit to supplement their income;
- regulations to ensure that promotional activities meet ethical criteria; and adequate funding to ensure availability of medicines and health personnel.

References

A large teaching hospital received a large shipment of two injectable third generation cephalosporins - ceftriaxone and cefotaxime - as a donation from an international organization. The medical staff who were made aware about the donation were very pleased because they realized that their patients have access to free of charge third generation cephalosporins. However, the situation started to spiral out of control when indiscriminate prescribing took over and both medicines were prescribed on an outpatient prescription form.

**Problem**

- Indiscriminate prescribing of intravenous third generation antibiotics which should be left as reserve drugs for critically ill patients.

- Irrational use of third generation cephalosporins leads to selection of resistant bacterial strains. With little choices of other reserve antibiotics, serious infections would be very difficult to manage.

- Overuse of third generation cephalosporins leads to emergence of resistant bacteria such as Methicillin Resistant Staphylococcus Aureus.¹

- The use of intravenous medicines in an outpatient setting without appropriate community nursing support leads to risks such as indwelling line infections.

- The reliance on intravenous medicines instead of oral medicines is defined by the WHO as irrational prescribing.

**Solutions**

- Hospitals should have a functioning microbiology laboratory that produces sensitivity data on prevalent organisms. This would provide clinicians with good data on antibiotics to be used as empirical therapy and eliminate the need to resort to third generation cephalosporins.

- The prescribing of third generation cephalosporins should be subject to strict guidelines and only allowed after confirming sensitivity data from microbiology.

- An antibiotic policy should be developed by the Pharmacy and therapeutics Committee in liaison with microbiology laboratory.

- The policy should restrict the prescribing of third generation cephalosporins to senior prescribers and for a limited period of time until definitive sensitivities have been confirmed.

**References:**

Patients' Education is the Solution

Habab K. El kheir

A 43 year old lady visited a community pharmacy complaining from pain in her leg requesting NSAIDs by name. She informed the pharmacist during counseling that she is using oral contraceptive which her friend advised her to use 10 years ago!!

The pharmacist tried to explain to her that it is not preferable to use these medications for a very long time without any medical advice. She was not convinced with the pharmacist argument and purchased her contraceptives and pain killer from another pharmacy. The lady returned to the pharmacy few days later asking the pharmacist which doctor she should visit because her pain has worsened and she has some numbness as well. The pharmacists advised her to stop the oral contraceptive immediately and referred her to the nearest hospital where she was diagnosed with Deep Vein Thrombosis (DVT).

Problems

• Irrational use of NSAIDs and contraceptives by the lady
• Use of contraceptive without medical advice and without any medical screening
• Use of oral contraceptive for a long duration without any medical follow up
• Irrational dispensing of contraceptives without proper counseling and reviewing the patient condition or medication history.

Solutions

• First use of contraceptives has to be based on a medical consultation
• Scheduled medical follow up should be performed at a regular bases
• Proper health education for all females about family planning methods using the media
• Use of family planning centers as educating centers
• Proper counseling by doctors and pharmacists about continuous use of oral contraceptive
• Appropriate dispensing and counseling procedures
A 6 month old child has developed fever, cough and runny nose prior to encounter, the mother took him to the nearby health center, the child was given oral amoxicillin suspension and a herbal cough syrup for 5 days with no response. Then patient was taken to another doctor’s clinic who changed the antibiotic to an oral third generation cephalosporin, with no response. Then she took her child to a third doctor who gave her another herbal cough syrup. The mother told the doctor that her child now has vomiting, so he gave her an antiemetic, and an antitussive cough syrup containing dextromethorphan. The child’s case has progressively deteriorated afterwards, became agitated, had insomnia and tremors, tachycardia and hyperreflexia. Accordingly, the child was admitted to rule out meningitis or encephalitis. His lumbar puncture and brain CT were all normal, therefore was given supportive treatment in the form of IV fluids. Stopped all the previously prescribed medications, he was diagnosed as serotonin syndrome. After receiving benzodiazepines to reduce agitation and control spasms, IV fluids and correction of imbalanced electrolytes, the child has been discharged in good condition.

Serotonin syndrome is a life threatening condition that is precipitated secondary to some drug-drug interactions or overdoses.

Involved medications are those which increase serotonin production including those that directly increase serotonin levels, those that prevent the removal of serotonin from nerve endings; and those that bind to serotonin receptors to produce effects similar to those of serotonin. Commonly involved medicines include antidepressants, migraine medications and some herbal remedies. Symptoms of serotonin syndrome include: confusion, disorientation, irritability, anxiety, muscle spasm, tremors, diarrhea and/or vomiting, high blood pressure, tachycardia over/active reflexes and dilated pupils.

Problems

- Prescribing cough syrups for children while their clinical value is not proven
- Cough syrups are usually found in combination which might increase the risk of overdose and drug-drug interactions
- Repeated use of cough syrups without considering concurrent/ previous cough medications used which might subject the child to over dose or drug interactions

Serotonin syndrome is a life threatening condition that is precipitated secondary to some drug-drug interactions or overdoses.

Solutions

- Taking full medication history is essential for proper diagnosis.
- Prescribing to children should be done carefully by taking many factors into consideration (individual dosing, formulation, taste, etc.).
- Use of certain medicines e.g. cough syrups in high doses, may precipitate serotonin syndrome, which is best avoided by preventing it.
A severely ill 6 years old boy was brought to the ER department of a pediatrics hospital. The boy was febrile and dehydrated. He was semi-comatose. The doctor has cannulated him for an IV line access, administered an antipyretic suppository to control his fever. IV fluids were given for rehydration, then a combination of injectable antibacterial, antimalarial and antiviral drugs were administered after taking blood specimens for culture and sensitivity testing. This combination is called the 'umbrella' used as routine therapy for all severely ill children who are admitted to that hospital, until a proper diagnosis is done. The “umbrella” regimen contains: acyclovir sodium injection, quinine sulphate injection, metronidazole infusion and ceftriaxone, to be administered simultaneously. These combined antibacterial, antimalarial and antiviral drugs were used empirically assuming presence of an infectious disease!!

Two days following the use of this antimicrobial regimen, the patient became pale, had urine retention, edema and puffy face due to renal shut down, diagnosed as acute renal failure.

Problems

- Use of combined antibacterial, antimalarial and antiviral is not justified and considered an overuse of antibiotics.

- Improper assessment of severely ill children may worsen their clinical situation and increase the likelihood of iatrogenic diseases.

- Acute kidney injury is a well-described side effect of acyclovir, the most common mechanism being crystal nephropathy; it usually develops within 12–48 hours of drug administration as indicated by a rapid rise in the serum creatinine (S-Cr).

- Blind antibiotic combinations with potential nephrotoxicity profiles, in a dehydrated patient with unknown renal function exposes the patient to increased risks of nephrotoxicity.

Solutions

- This is a tertiary referral hospital which should have clear approved standard treatment guidelines that must be adhered to by all doctors working there, to avoid irrational use of medications.

- A clear antimicrobial policy must determine the criteria of empirical antibiotics, considering their indications, selection of agents and their doses.

- Proper assessment and diagnosis of children who arrive to the ER department is crucial to successful management.

- Renal and hepatic function tests are important parameters to consider when prescribing proper doses of medicines.

Lesson learnt

- Use of the combined antimicrobial and antimalarial agents was unjustified; it predisposes patients to risks and adverse effects of medications with the possible development of resistance and the unnecessarily added cost of treatment.
**Typhoid Fever (Enteric Fever)**

**Introduction**

Typhoid fever is a febrile illness caused by *S. Typhi*. The disease is spread through faeco-oral route by ingestion of contaminated food or water. Humans are the only known reservoirs. Enteric fever is a public health problem of global magnitude. Each year 12.5 million cases are reported in the developing countries. It remains a serious endemic health problem in Sudan and other developing countries. The mortality rate is as high as 30% if not treated.

**Signs, Symptoms and History**

The symptoms and signs are not specific in the majority of cases. The incubation period is usually 6-14 days. Fever is the main presenting symptom. The fever is usually remittent and gradually increases in stepladder fashion (use of antibiotic affects the fever pattern), headache, malaise, anorexia, abdominal pain, and cough. Constipation presents initially and is followed by diarrhoea. Other less frequent symptoms include: vomiting, sore throat, neuropsychiatric symptoms and behavioural changes that occur during late presentation (Figure 1).

The commonest signs on physical examinations are abdominal tenderness usually over the right lower abdomen, splenomegaly in about 50% of cases, and hepatomegally in 30%. Rose spots occur in about the second week in 20-30% of cases are discrete/irregular pink macula-papular rash that blanches on pressure; usually found on the anterior chest and abdomen and last for 3-5 days occurring during week 1–2. Relative bradycardia cannot be accurately determined.

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**Figure 1 Typhoid fever Symptoms**
Criteria for referral
All cases with complications should be referred. Complications occur late (third/fourth week) such as intestinal haemorrhage and perforation in about 2-8% of cases. Other complications include: lobar pneumonia, cholecystitis, meningitis, osteomyelitis, severe neuro-psychiatric manifestation, leucopenia, neutropenia and encephalopathy.

Investigations
Blood, stool, urine or bone marrow culture showing presence of S. typhi.

Widal test is the recommended serological testing. Two readings of Widal test using the Tube method are recommended. An average of one week between the samples is the golden standard. The peripheral white blood count is usually normal in most of the cases in spite of the presence of fever unless late complications occurred.

Treatment of typhoid fever
Non pharmacological treatment
• Adequate rest;
• Rehydration and correction of electrolyte disturbances;
• Antipyretic therapy as required – preferably tepid bath and sponging.

Pharmacological treatment
First Line
• Adults: Ciprofloxacin 500 mg by mouth 12 hourly for 7-10 days depending on clinical response.
• Children: Ciprofloxacin (use with caution): 10 mg/kg by mouth 12 hourly for 7-10 days depending on clinical response.
• Pregnant women and children (when ciprofloxacin is contra-indicated): third generation cephalosporin (oral cefixime) 15-20 mg/kg by mouth per day in two divided doses for 10-14 days. Or ceftriaxone intravenously 50-75 mg/kg per day in one or two divided doses for 10-14 days.

Second Line
• Adults: Azithromycin 1g by mouth once, followed by 500mg once daily on the following 14 days.
• Children: Azithromycin by mouth 10-20 mg/kg /once daily for 5 days.

Follow up
Follow up cultures need to be carried out to ensure that the patient is no longer a carrier.

Prevention
• Availability of safe drinking water, proper sanitary disposal, excluding disease carriers from food handing.
• The use of oral or parental vaccine is recommended but the vaccine does not provide full protection from infection.

Note: this vaccine is not available in Sudan
• Patient education
• Hygiene – hand washing and appropriate disposal of faeces and urine;
• Eating a healthy diet - non bulky, high-calorie meals;
• Early and rapid commencement of treatment.

Reference
Sudan National Standard Treatment Guidelines 2014
new or more expensive products used when no clear advantage over cheaper alternatives is proved. The potential health consequences for the consumers are not benign; for instance, treatment failures will result in patients suffering unnecessary adverse effects, increase in antibiotic-resistant microorganisms; and the waste of patients’ money and national health resources, as well losing confidence in the health care system.

Violations of existing drug promotion codes is frequent, the most alarming breaches are misleading drug information (more than 35%). This further supports the argument that drug promotion does not operate with patients' interests in mind, but rather on generating profits by maximizing sales revenue.

This study aims to evaluate the content of brochures provided by medical representatives to medical officers in private clinics in Omdurman city according to the WHO criteria for ethical promotion. It also investigates the medical officers' evaluation of the brochures.

Material and methods

This study was conducted in Omdurman City during the period from August 2010-October 2010. Private clinics run by medical officers, who received one or more medical representatives a day were selected (40). The medical officers were asked for the nearest brochure and filled a questionnaire.

The content of the brochure was assessed based on the WHO criteria for ethical promotion. The claims in the brochure were measured against cited publication to see if the claims were consistent with the cited references. The references cited in the brochure were accessed to evaluate their availability.
Results
Assessment of brochures concluded that 95% were not complying with the WHO criteria for ethical promotion (Figure 1), only two of the 40 collected brochures met all nine criteria. Side effects, precautions, contraindications and interactions were frequently omitted in the majority of brochures. Regarding the consistency of claims presented in the brochure and the cited references; 47% were quoted from references that were not retrievable. Only 22% (from total) contained information that was consistent with the claims' statements.

The interviewed medical officers acknowledged the role of medical representatives in providing information about medicines (63% strongly agree, 38% to some extent). However, when the medical officers were asked about their evaluation of brochures provide by medical representatives; (95%) regarded them as a source of drug information, 55% admitted they accept the information without doubt. 98% think that the brochures should be near and easily accessed in their office as a quick reference for doses and indication. 52% of the interviewed medical officers admitted that detailing by medical representatives and the claims in the provided brochures influence their prescribing, and 47% perceived themselves to be influences on some occasions.

Conclusions and Recommendations
The majority of the brochures were not complying with the criteria of ethical promotion. The claims were not consistent with the cited reference in many brochures. Medical officers in the study regard brochures as a reliable source of medicines information, and admit to being influenced by pharmaceutical promotion. This would result in irrational prescribing and negatively affect patient's health and finance. Scientifically sound, reliable and independent sources of information should be available at clinics, like the Sudan National Formulary SNF and the British National Formulary BNF. Medical officers should be trained to appraise the literature and criticize the promotional materials. The content of promotional brochures should be assessed by authorities and only complying ones to be allowed for use.

Figure 1 Percentage of brochures that met the WHO criteria for ethical promotional literature 1988

References:
5. The European Consumers Organisation., Consumers say NO to unethical drug promotion. Briefing paper for European consumer organizations 24 November 2006
Introduction

For the last several decades, ensuring the availability of an adequate quantity and quality of pharmaceuticals has been one of the objectives of improving health care in developing countries. Now with the proliferation of greater quantities and varieties of pharmaceuticals in developing countries, promoting their appropriate use has become a priority. To address this issue, the World Health Organization (WHO) established indicators to systematically describe drug use in health facilities. Studies using these indicators have explored educational, supervisory and regulatory measures to encourage appropriate drug use.

An initial survey in 1991 for improving rational use of medicines found an average of 1.4 drugs per encounter (prescription), with 63% of medicines prescribed in generic name, 63% of encounters with an antibiotic and 36% with an injection. Subsequent study held in White Nile State found that 33.3% of drugs were prescribed in generic, and 68.7% of prescriptions contained antibiotics, and 19.3% contained injectables.

Objectives

The study aims to assess prescribing patterns in Sudan National Health Insurance Fund Health Care Centers in south Kordofan state.

Methods

A descriptive, center based, cross-sectional study was conducted from June to November 2011. The study was conducted at four Primary Health Centers in South Kordofan State that belong to NHIF.

398 prescriptions were randomly collected from the archive. Core and modified WHO drug use indicators, in addition to new indicators, to identify current prescribing were used. Patient encounters were analyzed according the ideal prescription content.

Results

NHIF Health Centers prescribers prescribed an average of 2.3 drugs per prescription; antibiotic prescription rate was 54.8%. Where injection average prescription rate was 12.1%, and percentage of medicines prescribed by generics was 32%, the prescribing practitioner's name and address were missing from 55.3% of the prescriptions. 42% of the prescriptions did not include the address of the patient.

Figure 1: Facility specific average number of drugs per prescription rate 2011

Figure 2: Facility specific antibiotic prescription rate 2010
Discussion

Drug indicators such as the average number of drugs per prescription, antibiotic prescription rates, and injection rates are significant indicators of appropriateness of prescribing. While the indicators are important, what is more important are those factors that significantly effect a change in the indicators. NHIF Health Centers prescribers prescribed an average of 2.3 drugs per prescription, which is comparable to what was found in Tanzania (2.2) but lower than in Nigeria (3.8). However, studies in Malawi and Uganda revealed lower percentages, 1.8 and 1.9, respectively. The average number of drugs per prescription varied among the four centres, as shown in Figure 1. The Diling Health Center had the highest number of drugs per prescription which might have been due to lack of training and supervision.

The average rate of antibiotic prescription at the selected NHIF health centers’ was found to be 54.8%, as shown in Figure 2. This was much higher than findings in Nigeria (48%) and Tanzania (39%). Antibiotic prescribing was found to be high in all health facilities, with marked variations. The highest prescribing rate of antibiotics was found in Abbasyia Health Center (69.3%) followed by Diling Health Center 61.1%, Kadogli Model Health Center 54.6%, and Abogbeiba Health Center 34%.

The average prescription rate of injectables was found to be 12.1%, which is much lower than in Khartoum State (36%) and in White Nile state (19.3%). Diling showed the highest rate 19.4% while Abbasyia Health Center had the lowest rate 5.3%. In Kadogli and Abogbeiba the rates were 11.5% & 11% respectively (Figure 3).

The percentage of medicines prescribed by generics was 32%, which is very low when compared to the standard (100%) and studies in other countries. Studies revealed that prescribing in generic was 63% in Sudan, 94% in Zimbabwe, 82% in Tanzania, and 58% in Nigeria. (Figure 3)

The differences between the four health centers was significant (p. 0.012, The mean difference is significant at the 0.05 level) (Diling was 22%, Abbasyia 25%, Abogbeiba 35%, and Kadogli model center was 43%) these results shows the bad prescribing habits in all health centers especially Diling health center which may be due to the lack of training and supervision to prescribers in pharmacology and therapeutics as well as courses and training in prescribing and prescription writing.

Conclusion

The results of this study complement and clarify research already done in the area of improving prescribing practices in Sudan, while it represents the first one conducted in South Kordofan State.

Recommendations

- Development and implementation of standard treatment guidelines.
- Establishment and activation of DTCs so as to describe current treatment practices, show trends over time, motivate health care providers, Improve and follow standard, and evaluate the impact of interventions.

References

1. How to investigate drug use in health facilities- selected drug use indicators- ‘WHO.
A study published in the UK reveals that polypharmacy is not always indicative of poor prescribing

British Journal of Clinical Pharmacology 2014

An analysis of the records of more than 180,000 adults in primary care in Scotland has revealed that polypharmacy may not always be the cause of unplanned hospital admissions. Patients with multiple medications had higher admissions than others but the admission risk varied according to the number of co-morbidities. For patients with one co-morbidity, the odds ratio for unplanned admission for 4-6 medications was 1.25 (95% CI 1.11-1.42) vs. 1-3 medications, and 3.42 (95% CI, 2.72-4.28) for ≥10 medications vs. 1-3 medications. However, this effect was greatly reduced for patients with multiple co-morbidities; amongst patients with ≥6 co-morbidities, those on 4-6 medications were no more likely to have unplanned admissions than those taking 1-3 medications (OR 1.00 (95% CI 0.88-1.14)), and those taking ≥10 medications had a modestly increased risk of admission (OR 1.50 (95% CI 1.31-1.71)).

The authors concluded that polypharmacy should be considered in view of the clinical status of the patient and the number of co-morbidities, rather than the number of medications purely.

Generic prescribing not always the standard of care in epilepsy

United Kingdom Medicines Information (UKMI) January 2014

One of the important aspects of rational use of medicine RUM is prescribing drugs using generic names only. This not only promotes the rational use of medicines but contributes to patient safety because standardisation leads to reducing the confusion related to brand names. However, the matter of bioequivalence remains a contentious issue, particularly in epileptic patients who are well controlled and may be receiving drugs that have a narrow therapeutic index.

There are limited studies comparing the switching of patients from branded anti-epileptic drugs to generics. Most of these studies show that the switching may have little clinical impact on patients. However, in patients who are well controlled on branded anti-epileptics, the risk and impacts of losing seizure control due to switching between brands far outweighs the benefits.

A report published by the UKMI recommends against the switching of well controlled epileptic patients between a branded product and a generic product.

Antibiotic Prescribing can affect warfarin metabolism in a subset of patients

JAMA February 2014

A retrospective longitudinal cohort study was conducted in Colorado on patients receiving warfarin. The analysis was used to identify factors independently associated with a follow-up INR of 5.0 or more. A total of 5857 (48.8%), 5579 (46.5%), and 570 (4.7%) patients were included in the antibiotic, stable control, and sick control groups, respectively.

The proportion of patients experiencing an INR of 5.0 or more was 3.2%, 2.6%, and 1.2% for the antibiotic, sick, and stable groups, respectively (P < .001, antibiotic vs. stable control group; P < .017, sick vs. stable control group; P = .44, antibiotic vs. sick control group). Cancer diagnosis, elevated baseline INR, and female sex predicted a follow-up INR of 5.0 or more. Among antibiotics, those interfering with warfarin metabolism posed the greatest risk for an INR of 5.0 or more.

The authors concluded that respiratory tract infections increase the risk of excessive anticoagulation independent of antibiotic use. Antibiotic use also increases the risk but not in previously stable patients.
A Turbuhaler is a dry-powder inhaler (DPI) available in an easy-to-use format. It is breath-activated; this means when inhaled, the Turbuhaler automatically releases the medication. If used properly, the Turbuhaler can deliver medication deep into the lungs.

Some Turbuhalers feature a dose counter that shows the exact amount of medication left. Other Turbuhaler have a red indicator in the windows on the side of the device. A red window indicates that there are approximately 20 doses left and it's time to order a refill.

Patients to use such type of medication should be selected carefully and informed about the differences between DPI and Metered Dose Inhalers (MDI).

The following steps should be clearly explained to the patient. Make sure that patients are able to demonstrate the following steps properly before leaving the pharmacy or clinic. Check performance on the next visit.

**Advice on How to use a Turbuhaler:**
1. Unscrew and remove cover
2. Check dose counter
3. Keep inhaler upright while twisting grip around and then back until a click is heard
4. Breathe out gently away from mouthpiece
5. Place mouthpiece between teeth without biting and close lips to form a good seal
6. Take a quick deep breath in. hold breath 10 second
7. Remove inhaler from mouth
8. Breath out gently away from mouthpiece
9. Rinse and spit
10. Replace cover

**Advice on how to clean Turbuhalers:**
1. Mouthpiece should be cleaned by a dry tissue or cloth, two or three times a week or as needed, and **NEVER** be washed. If it gets wet, it will not work properly.
Focus

Medical Education: Where are we going to?

Elkhaim Elyas

Human resources for health are important because it is one of the six building blocks of the health care system. Physician education lies at the center of this block as they are involved in many aspects of this system starting from services delivery, training, and research. Therefore this article addresses the link between physicians’ education to service delivery because it would be more meaningful.

After the re-conquest of Sudan in 1898 the British administration established Sudan Medical Corps, (which later became Sudan Medical Service) services to meet the health needs of the country which was then thinly populated.

The service was then managed and run by non-Sudanese doctors; mainly British, Egyptians, Syrians and Armenians. Then there were no hospitals and the practice was based mainly at dispensaries within the Armed Medical Force. In 1909, ten hospitals were built throughout the country and there was an expansion in health care system which was known since then as Sudan Medical Service. By the year 1924 and because of the expansion of the health system and growing population and its needs the British administration established the Kitchener's School of Medicine and the first batch of 10 students were enrolled to be graduated as the first batch of Sudanese doctors in 1928. It is worth mentioning that the top of this first batch was Dr. Ali Badri; who became the first Sudanese Minister of Health in 1948 and the first president of the Sudan Medical Council in 1968. Through the 1930’s and 1940’s, the intake and graduation of doctors remained unchanged and started to gradually increase in the 1950’s.

At the time of independence in 1956 there was total of 227 doctors in the country managing the health care system and running a total of 49 hospitals at that time with a capacity of 9373 beds and a bed/population ratio of 88/100,000 beds in the provincial and big cities.

The primary health care was then run by medical assistants and village midwives, graduates of the first School of Midwifery which was established in 1918.

In 1965-1966 there were 438 doctors running 73 hospitals with a capacity of 13,498 beds and a bed/population ratio of 96/100,000 beds.

Faculty of Medicine University of Khartoum

After independence the Kitchener School of Medicine, which was the only medical school in Sudan, was renamed as the Faculty of Medicines University of Khartoum. Since then, the intake gradually increased to reach 60 students per year. The year 1968 witnessed the first substantial increase when 120 students were enrolled. By 1975 there was a significant increase in the number of doctors graduating from the Faculty of Medicine-University of Khartoum, in addition to those coming from abroad (Egypt and Eastern Europe), by then the number of hospitals and beds increase to 139 and 15,670 respectively with a bed/population ratio of 100/100,000 beds.

Two major developments took place in 1975, the first was the establishment of Algezera University Faculty of Medicine whereby 60 extra graduates were added to the workforce, and the second one was the start of local specialization in the University of Khartoum.

Current situation

In 1990 it was decided to increase the number of universities and consequently the number of medical schools, both public and private, which at present are 31 medical schools; 24 public and 7 private, producing 3632 graduates of which 38% are males and 62% are females.

The total number of doctors registered in the Sudan Medical Council is about 22,000, of whom...
12140 are currently working in the health care system distributed among 416 hospitals public and private with a capacity of 27122 beds, with a bed/population ratio of 82/100,000 beds.

**Conclusion**

The rate of production of doctors now far exceeds the capacity of health care system to absorb and perhaps far exceeds the needs of the country. While the rate of increase in the number of doctors since the independence is astronomical, the rate of increase in hospitals and beds is only modest; in fact the bed/population ratio remained almost the same for the last 50 years though with large variations from one state to another.

The doctor population ration is currently 34.6/100,000 population.

The doctor/nurse, doctor/midwife ratio is reversed, while the lowest accepted ration is 1/4, the current ratio is 1/1.5 for nurses and 1/1.2 for midwives, and consequently the critical shortage of health care workers affects mainly nurses and midwives and this is one of the major short comings of service delivery and needs more attention than what’s been given now.

It is really sad to know the little attention is given to in-service training and continuous professional development for this work force. Very few organized sustained programs are now being conducted particularly for the young doctors; this issue needs to be addressed with the seriousness and objectivity it deserves.

**References**

2. A Bayomi, History of Health Services in Sudan
3. Committee on Human resource on health 2010
Q. What is rational prescribing?
A. Rational prescribing is to select the best medicine in the right dose and suitable duration of time for the right patient.

Q. What are the different steps involved in rational prescribing?
A. Step 1: Define the patient’s diagnosis.
   Step 2: Assess the patient properly.
   Step 3: Specify the therapeutic objectives.

Q. What do you want to achieve with the treatment?
A. Step 1: Select the best therapeutic choice, considering patient’s health parameters and verify the suitability of your treatment based on benefits/risk measures.
   Step 2: Start the selected treatment
   Step 3: Provide the patient with full needed information, instructions and warnings about the prescribed medicine(s) and its use.
   Step 4: Monitor (and stop?) treatment to check the therapeutic response.

Q. How can I select best medicine?
A. First you need to define carefully the patient’s problem (the diagnosis). After that, you have to specify the therapeutic goals and objectives, then select the best treatment of proven efficacy and safety, from different alternatives.

Q. How can I select from different alternatives?
A. You should select from available standard treatment guidelines (STGs), national protocols and essential medicines list (EML), bearing in mind the patient’s specific health parameters; contraindications, liver and kidney functions...etc.

Q. Do these lists contain all the medicines that I may need for my patients?
A. The list of medicines that are registered in the country are much more than one doctor uses for prescribing. Most doctors use only 40-60 medicines routinely. It is therefore useful to make your own rational selection from the list of medicines, so that you will have your own essential medicines list (personal medicines).

Q. Where can I obtain reliable information about medicines?
A. You may ask the pharmacist at the Medicine Information Centre MIC at your institution, or the MIC at the state level e.g. Khartoum State MIC (telephone no. 4141) or may search in different formularies like Sudan National Formulary (SNF), hospital formulary if available or British National Formulary BNF.

For more information about rational prescribing, you can access all detailed information at www.who.org, Guide to Good Prescribing, A practical manual, World Health Organization.
The Central Medical Supplies Public Corporation (CMS): A New Era

The Central Medical Supplies Public Corporation (CMS) has relaunched its main website to try to tell its customers and Sudanese health professionals about the changes coming with implementation of the CMS reform. The main purpose of the website; www.cms.gov.sd, is to help patients who seek a medicines whether it is available in CMS’s pharmacies or not. The revamped website also provides weekly updated information about the availability of medicines and other medical consumables. In addition, the website is designed to provide an online marketplace where public health institutions and community pharmacies can purchase their medicines. Customers are able to register their firms by online applications from January 2012 to get a user name and password to use them later for online purchase. Through the customer’s web interface, the customer is assured of certain stocks and can place an order accordingly. Once the order has been released, the quantity ordered could be virtually reserved in the system (i.e. the quantity will not be available for sale to other customers) and once the order is confirmed by the payment, the quantity is taken out of the stock register in the system (the system means ERP).

More than 500 customers are now using this service. They made 2,356 orders (SDG 63.0 million) through the on-line interface (see the table below). However, despite efforts to promote the online purchase service, many clients still know little about it. For the first time in Sudan, CMS introduces electronic payment in collaboration with Faisal Islamic Bank. This service enables electronic purchasers to pay their invoices online. Finally, the website gives opportunities to consumers and customers to ask questions and to send online complaints about the quality of the medicines distributed by CMS.

<table>
<thead>
<tr>
<th>Description</th>
<th>2012</th>
<th>2013</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of users of online supply (customers)</td>
<td>266</td>
<td>542</td>
<td>276</td>
</tr>
<tr>
<td>% Of users to overall CMS’s customers</td>
<td>9%</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Number of electronic orders</td>
<td>535</td>
<td>3398</td>
<td>2863</td>
</tr>
<tr>
<td>% Electronic orders to the public sectors</td>
<td>93%</td>
<td>84%</td>
<td>-9%</td>
</tr>
<tr>
<td>% Electronic orders to the private sectors</td>
<td>7%</td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>Amount of electronic orders in SDG million</td>
<td>30</td>
<td>167</td>
<td>137</td>
</tr>
<tr>
<td>% of the electronic sales to the total CMS’s sales</td>
<td>9%</td>
<td>30%</td>
<td>21%</td>
</tr>
</tbody>
</table>

The hot telephone line ‘5959’ helps consumers to ask queries about the availability of certain medicines. During the first 10 months of the service, the department of pharmacies has received and answered 15,110 calls. Only 86 calls were missed. The average waiting time for reply was only 10 seconds.

The CMS offers its customers the option of importing the requested item(s), if it is not available in Sudan, from neighbouring countries within 72 hours at costs without charging any additional fees. In 2013, 77% of the requested medicines (17 out of 22 medicines) have been secured from Saudi Arabia. The pharmacies department will sign a contract with an Egyptian pharmacy to avail medicines that do not exist on Sudanese market upon request and on prescription-base. This service is not for profit.

The CMS has developed a Short Message System (SMS). The system automatically sends message to mobile phones of the CMS’s customers, immediately after new items have been added to the inventory. This service updates the CMS’s customers on the availability of medicines and other medical supplies.
A prescription is a request from a doctor or a prescriber to a pharmacist or a dispenser to issue a medicine to a patient. It is usually the end point of a long process which aims to manage or treat a specific condition. Writing a prescription is a challenging step that requires good knowledge and skill.

There is no global standard for prescriptions and every country has its own regulations. However, the most important requirement is clarity; a prescription should be clear, legible and precise. A standard prescription should include three components: prescriber’s data, patient’s data and medication’s data (Figure 1).

Rational prescribing has been described as the process whereby prescribing decisions are made. It encompasses four goals: maximising effectiveness, minimising harm, avoiding waste of healthcare resources, and respecting the patient’s choice. It is crucial that these decisions go in line with local protocols and guidelines.

<table>
<thead>
<tr>
<th>Date</th>
<th>Date of the prescription</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriber data</td>
<td>Name, address and signature</td>
</tr>
<tr>
<td>Patient data</td>
<td>Name, age and weight (for children)</td>
</tr>
<tr>
<td>Medication data</td>
<td>Medicine: generic name, strength, dosage form and total amount to be dispensed. Instructions on use: dose, frequency and duration of use.</td>
</tr>
</tbody>
</table>

Figure 1: Components of a standard prescription

Ensuring appropriate or rational prescribing is a process that involves several steps (Figure 2). The sequence of events leading to a rational prescription initially starts with defining the patient’s problem and reaching a diagnosis. The goal of treatment must then be determined and a clear plan with therapeutic objectives must be set. The goal of treatment may be curative, symptom relief, prevention or occasionally an aid to the diagnostic process. At this point, it is important to involve the patient as an informed partner in decision making; this ensures compliance and commitment to the therapy plan. The prescriber should then decide whether any treatment is necessary and, if so, select an appropriate medicine taking in consideration its suitability to the patient (Figure 3).

Choosing the appropriate medicine is a step that needs to be done very carefully. The prescriber needs to be sure that the medicine chosen is appropriate to the patient with regard to its efficacy, safety and convenience; taking in consideration the cost. It is very
important to exclude any possible interactions (drug-drug, drug-food, drug-disease) and ensure that the medicine does not interact with any medicine the patient is currently taking or will be taking.

The next step of the process is writing the prescription. This needs to be clear and precise containing all the data necessary as mentioned earlier. The medicine name should be written in generic, however, exceptions are allowed in certain conditions. Brand prescribing may be a choice when dealing with chronic diseases that are well controlled by specific medicines, as in the case of epilepsy.

It is the prescriber’s responsibility to state the strength, dosage form, frequency, duration of use and any other information about the prescribed medicine, as it is HIS/HER decision. This decision is made according to the given data about the patient and his medical condition and the diagnosis reached.

Once the prescription is written, the patient should be aware of its contents. Counseling is an important step of rational prescribing. The prescriber should give the patient all the information necessary on the use of the medicine prescribed and any precautions, if necessary.

The process is then completed by monitoring the outcome, and reaching a decision to stop, modify or continue the treatment.

Writing a prescription is not easy and doctors are fully responsible for the prescriptions they sign. Their responsibility extends from the decisions made to the actions taken when they supply and administer medicines and devices or authorize or instruct others to do so. To ensure rational, appropriate and safe prescribing it is mandatory to have adequate knowledge of the patient’s health, and adequate knowledge of the medicine to be prescribed. Therefore, comply with standard treatment guidelines and prescribe from Essential Medicine List (EML).

**BEFORE WRITING A PRESCRIPTION, ALWAYS CONSIDER THE FOLLOWING:**

- Is this medicine licensed for use in this condition?
- How does the drug compare with available alternatives in relation to evidence, efficacy, safety, convenience and cost?
- Are there any absolute contraindications for the use of the medicine in this particular patient?
- Are there relative contraindications for the use of the medicine, including other medical conditions or common unwanted effects?
- Is the patient taking any other medicines that might adversely interact with the medicine to be prescribed?
- Has the patient suffered previous adverse drug events that should make you cautious about using this particular medicine?

**Figure 3: Verify the suitability of the medicine to be prescribed**

**Educational Materials**

References:

Educational Materials

Common Cold Treatment in Children

Ali M. Arabi, Nuha M. Agabna

Over-the-counter (OTC) cough and cold medications are readily available for children and adults and are sold in various combinations to address different symptoms. This article lists the commonly used medicines for children in Sudan and some evidence on their assumed efficacy.

Antibiotics
The common cold is a viral infection, and there is no role for antibiotics. Antibiotics are indicated only when secondary bacterial complications are diagnosed.

Antiviral Agents
Except in the case of influenza, no antiviral drugs are available to treat the common cold.

Antihistamines
First-generation antihistamines, such as chlorpheniramine, are common ingredients in OTC cough and cold medications. They decrease mucus secretion and also have anticholinergic effects. Second-generation antihistamines (e.g. loratadine) lack anticholinergic activity and have fewer CNS effects.

In adults, several studies show that first-generation antihistamines provide some symptomatic relief of cold symptoms, specifically, decreased sneezing and increased mucociliary clearance. However, their use in children showed no effect. In one study, children treated with an antihistamine-decongestant combination showed no improvement in cough over placebo. In another study, diphenhydramine at bedtime was no better than placebo or dextromethorphan in reducing cough or improving sleep.

Decongestants
Oral decongestants are common ingredients in OTC cough and cold medications e.g. pseudoephedrine.

In adults, evidence show that both pseudoephedrine and phenylpropanolamine effectively reduce nasal symptoms, including nasal congestion and sneezing. Yet they have proven to be ineffective in children. Studies showed that the use of these drugs in children aged 6 months to 5 years had no improvement in nasal congestion, rhinorhea, or cough over placebo.

Antitussives
One of the most common antitussive ingredients is dextromethorphan, a narcotic analogue that does not have CNS effects, unless excessive doses are used. In one study, on children 18 months to 12 years of age, there was no difference in cough between the placebo-, dextromethorphan-, or codeine-treated groups.

Dextromethorphan can have serious CNS effects like serotonin syndrome, especially when ingested in large doses. Therefore they should be avoided in young children because risk outweighs the benefit.

Codeine, a narcotic, is often used as an antitussive. It is also a mild analgesic and sedative. In one study, of children aged 18 months to 12 years, codeine was no more effective than placebo in suppressing night-time cough due to a cold. The American Academy of Pediatrics recommends against the use of codeine in children with cough. Narcotics such as codeine may cause dose-dependent respiratory depression, and infants seem to be particularly susceptible to these effects and the subsequent development of apnea.

Honey
A recent study suggests that bee honey may provide some relief from night-time cough in children who have colds.
**Expectorants**

Guaifenesin is the most commonly available expectorant; however there is no strong evidence in treatment of common cold. A study, of young adults with cold, showed that the use of guaifenesin failed to decrease cough frequency, however, subjective improvement was reported⁵.

**Analgesics/Antipyretics**

Analgesics/antipyretics such as paracetamol, aspirin, and ibuprofen may be useful for reducing high body temperature and general discomfort of the common cold. However, both aspirin and paracetamol suppress the neutralizing antibody response, which results in increased nasal symptoms and prolonged viral shedding. Nevertheless the antipyretic and analgesic effects help control symptoms and bring some sort of relief. However, the use of aspirin is not recommended in children under 12 years because of its association with Reye syndrome.

**Menthol**

Menthol is a common ingredient in vapor therapies. In a recent study in school-age children inhalation of menthol did not decrease cough or increase nasal patency, but patient perception of improved nasal patency was reported⁶.

**Saline Nasal Drops/Bulb Suction**

Saline drops with bulb suction are often used to moisten the nasal mucosa and loosen secretions for removal from infants and children. Nasal saline is also used for adults. A recent study in school-age children suggests that nasal symptoms and sore throat improve more quickly with daily saline washes⁷.

Common cold is probably the most common illness causing distress and reduces physical activity, especially in children. Colds usually get better within a few days to weeks, whether medicines are used or not.

**Effective treatments for the common cold remain elusive.** Medicines proved not to cure the common cold, but can relieve symptoms such as muscle aches, headache, and fever. Like most viral infections, colds just have to take their time. Getting plenty of rest, avoiding vigorous activity, and drinking lots of fluids (juice, water, and non caffeinated beverages) may help the child feel better while recovering.

The best treatment of a cold remains to be prevention, although they are difficult to prevent entirely. Effective hand washing and limiting contact with one’s own nasal and conjunctival mucosa and contact with people who have a cold may prevent spread.

This article is an excerpt from the American Academy of Pediatrics http://www.aap.org/advocacy/releases/jan08coughandcold.htm

**References**


Staphylococcus Aureus (SA) is a common bacterium found in the nose and the skin of about 25% of healthy people and animals, but not found in the natural environment (soil or water) and is a common cause of food poisoning\(^1\). SA had early developed resistance to methicillin, which is semisynthetic penicillin-related antibiotic that was also known as staphcillin, shortly after its arrival to the market in 1960. Since then, methicillin resistant staph aureus (MRSA) has been widely recognized to cause morbidity and mortality around the whole world. Resistance of Staph aureus to methicillin is an intrinsic resistance to \(\beta\)-lactam antibiotics, mediated by methicillin resistance determinant\(^2\). Infection with MRSA is contagious and can cause life-threatening infection. The immune-compromised, hospitalized, and dialysis patients are at increased risk for contracting this infection\(^3\).

Prevalence of MRSA infection has remarkably and steadily increased from 5% in the year 1970 and thereafter\(^3\). Infections caused by MRSA are either hospital acquired or community acquired. The Hospital-acquired MRSA (HA-MRSA) is one of many hospital-acquired infections exhibiting increased antimicrobial resistance. HA-MRSA has increased during the past decade due to a number of factors including an increased number of immune-compromised and elderly patients; high number of invasive procedures, e.g., advanced surgical operations and life support treatments; and failures in infection control measures such as hand washing prior to patient contact and removal of non-essential catheters.

The other type, community-associated MRSA (CA-MRSA), which cause infections that typically occur as skin or soft tissue infections, but can develop into more invasive, life-threatening infections\(^3\).

MRSA was found to account for 20-40% of all SA isolates. Prevalence of infections with MRSA is high, with great disparities in different countries around the world; 71% in USA, 84% in Malaysia, 68% in Peru and 53.6% in Iran\(^4\). In Africa, where MRSA did not appear to pose a threat, current reports are showing that MRSA resistant types are spreading, since the first case of MRSA which was reported in 1978\(^3\). All surveyed African countries have shown MRSA infection prevalence at lower than 50%\(^5\). Prevalence in the African countries appears to have risen since the year 2000, except for South Africa. By 2004, MRSA had exhibited genetic diversity leading to the emergence of 6 major clones of MRSA worldwide; relating to the Staphylococcal Cassette Chromosome SCC mec types.

In Sudan the first case of MRSA has appeared in 1999\(^3\). A recent survey, has shown MRSA to be resistant to many antibiotics, susceptible only to vancomycin. Cases were associated with high rate of fatalities and very challenging to treatment\(^6\).

The above results were confirmed by another study done in Khartoum to find the prevalence and pattern of sensitivity of MRSA, the results of which have found SA to be the third of total wound specimen isolates, and MRSA to be as high as 64.1% among them. The CA MRSA were likely to be sensitive to many antibiotic classes, while the majority of HA - MRSA, isolates were multidrug resistant. This was attributed to the continuous antibiotic pressure on the bacteria in the hospital setting\(^7\).

Vancomycin also seems to be losing its privilege;
many reports are coming up with development of resistance. Resistance to vancomycin and other glycopeptides is currently described to be rapidly increasing. The above mentioned study in Khartoum has found the rate of resistance to vancomycin to be 9%, while 28.2% of the cases were the intermediate strains.

This fact may urgently require increasing the awareness of the healthcare providers; inform the healthcare system at different levels, bringing the issue to the attention of microbiologists – government health authorities – physicians and the public, to take an action. It is always recommended to reserve the currently effective antibiotics and support the discovery of new agents, but certainly, the most important strategy is to develop, approve and enforce a good antibiotic policy in all healthcare facilities, beside the regulation of pharmaceutical advertising and promotional activities.

It worth's mentioning that, emergence of CA-MRSA has the potential to be a major threat with serious implications for the epidemiology of and therapy for S. aureus infections.

Particular vigilance and surveillance are required to detect newly emerging resistant strains.

References
1. ABCs report: Methicillin resistant staph aureus CDC 2006. From http://www.cdc.gov/abcs/reports-findings/survreports/mrsa06.html
4. US department of health and human services from www.cdc.com
Obituary

Professor Awatif Ahmed Osman., died aged 79. In a hospital in the Emirates, surrounded by her family on Sunday, 7th of September 2014. She was born in 1935. She obtained her Bachelor degree in Nursing from University of Alexandria in 1959 followed by a Master degree in Nursing from University of California in 1972. Finally she obtained her Doctorate in Nursing sciences from University of Alexandria in 1982. In the periods between her postgraduate degrees she worked in different institutions to develop her academic profession with jobs in Sudan, Yemen and Libya. She is considered by the nursing community as the pioneer of nursing sciences development and contributed effectively to the profession. She worked as a lecturer at the University of Khartoum Nursing College in 1962 and promoted later to the first professor of Nursing sciences in Sudan. She became the first Dean of the Nursing College in Khartoum University. She established a Nursing school in Libya. During her illustrious career she worked as a WHO consultant in Yemen (1967-1973). Her last appointment was as the Dean of the Faculty of Nursing Sciences at the University of Medical Sciences and Technology in 1996.

Prof. Awatif was a member of a large number of various committees in Universities, the Ministries of Health, The Higher Council of Paramedical Professionals, The Ministry of Higher Education and Scientific Research. She was a member of the Arab Association of Nurses. She worked as a consultant with national and international organizations in Sudan and abroad. She published numerous scientific papers, articles, books and reviews in her specialization. In her late years she was very proud to graduate the first batch of Ph. D graduates from University of Medical Sciences and Technology in 2014. Prof. Awatif was a member of the editorial board of this journal. She will be terribly missed by her students, colleagues and followers.

Prof. Awatif loved her job and profession and she dedicated all her life and time for betterment of the profession. She enjoyed and loved socializing, her academic life and student gatherings. She had a wonderful smile and a heartfelt empathy for everyone around her. Her presence could light a room. She had a lifelong commitment to her nursing career and to her students. Prof. Awatif was a kind and a gentle soul. She had a loving and generous heart and was always giving to others.

She was survived by her daughter Dr. Shahad and her son Shahir. She leaves her loving memories to be cherished by her family and thankful students. We all miss her and pray for her and ask Allah to rest her soul in heaven. We can only say to her family and students she is one of the greatest scholars of her generation and an excellent teacher and kind and loving mother.

May Allah bless her.
Guide for authors

Scope of the journal:
Rational use of medicines (RUM) issues directed to health care providers and medical students.

Suitability of publication:
All topics related to the different aspects of RUM will be evaluated by the editorial board. Prospective authors with a subject(s) or questions about the suitability of their papers or materials are invited to request an opinion from the Editorial Board. (sjrum@khmic.org).

Avoid plagiarism

How to submit materials:
Manuscripts can be handed over directly to the Directorate General of Pharmacy as soft copy or by e-mail (sjrum@khmic.org).

Types of manuscripts:
1. Research papers.
2. Case reports.
3. Thematic topics.
4. Success stories.

Preparation of manuscripts
All manuscripts must be typed in Arial font size 12, with 1.5 line spacing. Manuscripts must be in Word. Page margins on all sides must be at least 2.5 cm wide. You can use either English or American spelling but not both on the same manuscript.

1. Research papers
Original research will have the priority of publications. Author(s) name and affiliations should be clearly written. Contact person, telephone number and e-mail address should be included.
Total words count should not exceed 800 words including references, tables, table captions, figure legends, and footnotes. Maximum of three tables and figures are accepted.
The manuscript should be divided into sections. Each section should have a separate heading. Subheadings take the form of paragraph lead-ins (should be bold case), indented and run in with the text, separated by a period.

Introduction: This section should provide the reader with sufficient background information to evaluate the results of the research. An extensive review of the literature is not needed in this section. It should also give the rationale for and objectives of the study that is being reported.

Methods: Sufficient information must be provided so that the reader will understand the methodology and be able to repeat the experiment.

Results: The results section should be written in such a manner to provide information by means of text, tables and figures. Results and discussion may be combined or there may be a separate discussion section. If a discussion section is included, place extensive interpretations of results in this section. Do not repeat the results. Give numbers to figures and tables in the order in which they are mentioned in the text. All figures and tables must be cited in the text.

Conclusions and recommendations: Acknowledge personal, financial and institutional assistance at the end of this section.

References: Use the Vancouver reference system. Cite 6 references maximum.

Ethical clearance is a requirement for all researches from 2012 onward.

2. Case reports
Any case that is related to RUM will be considered. The manuscript should include the following setting: complete description of the case, consequences and outcome and finally follow up if applicable. Suggestions for solutions should be included. Words count should not exceed 400 words.

3. Thematic topics
Any topic related to rational medicine use is considered. The manuscript should not exceed 400 words.

4. Success stories
Any story that reflects rational use of medicine and positive changes towards rational medicines use is welcomed. The manuscript should not exceed 400 words.

NOTE: Accepted manuscripts may be subjected to minor/appropriate changes prior to publishing.
Sudan National Pharmacovigilance Center

Sudan National Pharmacovigilance Center was established in June 2007 as part of the National Medicines and Poisons Board (NMPB). It is concerned with the detection, assessment and monitoring of Adverse Drug Reactions (ADRs) in order to identify the hazards associated with pharmaceutical products and minimizes the risk of any harm that may come to patients. The Sudan National Pharmacovigilance Center joined the Uppsala Monitoring Center (UMC) in 2008. The theme of the Sudan National Pharmacovigilance Center is the demonstration of safety rather than the identification of risks.

Although many medicines have been extensively used in Sudan, their safety and quality profile are not completely studied. We encourage our readers to be involved in reporting ADRs and pharmaceuticals’ quality defects to the center.

How to report?

Healthcare professionals (physicians, pharmacists, dentists, nurses...etc) and the public can report ADRs and quality defects. For the form please visit the link below:
http://www.nmpb.gov.sd/pharmacovigilance

How to report:
• Fill out the reporting form.
• Attach additional information, if needed.
• Use a separate form for each product.
• Please submit completed forms to:

National Medicines and Poisons Board at the address provided.

Phones +249183482250
P.O box 218
Email complaints@nmpb.gov.sd
Website http://www.nmpb.gov.sd