IMPROVING ACCESS AND RATIONAL USE OF PAEDIATRIC MEDICINES

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INTRODUCTION

- Globally early nine million children under five years of age die every year, with pneumonia, diarrhea, and neonatal causes being the major killers [1]
- Many of these conditions could be treated with safe, effective medicines.
- On he other hand, irrational use of the available drugs has led to adverse drug reactions and drug resistance to the usual pathogens and infections by unusual organisms
- Promotion of appropriate and safe drugs in children is the need of the hour globally.
- WHO states that he ideal children medicine is one that suits the age, physiological condition, and body weight of the child taking them and is available in a flexible solid oral dosage form that can be taken whole, dissolved in a variety of liquids, or sprinkled on foods, making it easie for children to take [2]
- Pediatric population by itself is a spectrum of different physiologies with significant variation in harmacodynamics
- 50 0% of drugs used in children today have never been actually studied in this population, and the results of drug studies done in adults are often extrapolated for use in children.
- Many medicines in pediatric population are off label or unlicensed [3]

ACCESS TO MEDICINES

- Baby hanthi a two-year-old child from Sri Lanka is diagnosed with epilepsy
- Her aediatricianknows that the child requires an anti-epileptic medicine in the right formulation to ensure compliance, as consistent steady-state drug concentration in the blood is essential for effective control of epilepsy.
- So he prescribes carbamazepine, the right drug for hanthiepilepsy, in a liquid dosage form, an appropriate formulation for a two year old child.
- Shanthiother visits the hospital pharmacy to obtain the medicine. The pharmacist informs her that carbamazepine syrups is not available, and there is no dispersible dosage form either
- The harmacist dispenses carbamazepine 200mg tablets and instructs her to give a quarter of a tablet to hanthievery day.
- At home, hanthirefuses to take the broken, crushed and dissolved arbamazepinetablet.
- Her mother tries honey, milk, water and many other solvents to make her baby take the drug.
- But hanthicontinues to refuse and, moreover her mother realizes that it is very difficult to break the tablet into four equal pieces.
- Worried, hanthimother goes to the nearest private pharmacy and asks for arbamazepinesyrup.
- The pharmacy has arbamazepinesyrup, but the cost is much too high so she returns home without the medicine for her baby.
- Shanthihas just been denied access to an essential medicine for an important childhood disease [4].
- Access to medicines is defined as having medicines continuously available and affordable at public or private
- health facilities or medicine outlets that are within one hour walk from the homes of the population.
- Access encompasses availability (physical access), affordability (economic access) and acceptability (socio-
- cultural access).
- In this case, the right case, the right medicine in the right formulation was not available in the public hospitalat the private pharmacy it was not affordable for hanthiparentsand manipulation of the adult dosage form dispensed

was of unproven bioavailability and not acceptable for hanthi[5].

- Medicine for children is often unavailable and unaffordable, when a correct medicine is available, it is frequently in the wrong formulation and dosage for a child. What can we do?

RATIONAL USE OF DRUGS

- Rational se of drugs can be defined as prescribing the right drug, in adequate dosage for the sufficient duration and appropriate to the clinical needs of the patients at lowest cost [6].

FEATURES OF IRRATIONAL USE OF DRUGS

- Some of the practical features of irrational use of drug in our society that require urgent government attention include the following[7].
- The use of drug when no drug therapy is indicated. The use of wrong drug for specific condition requiring drug therapy.
- The use of drug with doubtful or unproven efficacy. The use of drug with uncertain safety status.
- Failure to prescribe available, safe and effective drugs.
- Incorrect administration, dosages, or duration.
- Example of common inappropriate prescribing practice in our health institutions. The overuse of antibiotics and antidiarrheals for non specific childhood diarrhea.
- Indiscriminate se of injections for malaria.
- Multiple or over prescription.
- Use of antibiotic for mild, non-bacterial infection, e.g. URI.
- Tonics multivitamins for malnutrition.
- Unnecessary use of expensive rugs

Measures to promote appropriate and rational used of drugs in children

- Prescribing the appropriate medicines
- Daily practice medicines
- Antimicrobials
- Designing better pediatric formulations
- Minimizing drug administration errors
- Minimizing adverse effects.
- Improving drug compliance
- Making drugs available
- Educating parents and caretakers
- Supervising public health programs involving children
- Educating the doctors, paramedical staff, and health workers

PEADIATRIC DOSING

- Peadiatricpatients constitute a vulnerable group with regard to rational drug prescribing since many new drugs are released onto the marker without the benefit of even limited experience in this age group[8].
- This eficiency causes aediatriciansto often prescribe children drugs in an ff-label anner, thereby increasing the risk of drug toxicity[9].
- Adequate controlled clinical trials in children are lacking, mainly because of issues of cost and responsibility, and to regulations that frequently act as major obstacles[10].
- Moreover, until recently, the few clinical trials that had been performed involving children focused on the efficiency of drugs and rarely monitored their safety[11].
- Children, and particularly neonates, differ from adults in their response to drugs.
- Special care is needed in ensuring the drug prescribed is appropriate and that the correct dosage is given, especially in the neonatal period[12].
- Factors to be considered in dosing pediatric population include:

DRUG DISPOSITION IN CHILDREN

Oral absorption

- Mariable gastric and intestinal transit time: in young infants, gastric emptying time is prolonged and only approaches adult values at about 6 months of age. In older infants, intestinal hurry may occur.
- Increased gastric pH: gastric acid output not reach adult values may occur.
- Other factors: gastrointestinal contents, posture, disease states and therapeutic interventions, such as drug therapy, can also affect the absorption process.
- Increase total body water: as a percentage of total water and extracellular fluid volume decrease with increasing age. Neonates require higher doses of water-soluble drugs, on a mg/kg basis, than adults.
- Decreased plasma protein binding: plasma protein binding in neonates is reduced as a result of low levels of albumin and globulins and an altered binding capacity. High circulating ilirubinlevels in neonates may displace drugs from albumin.
- Enzyme systems mature at different times and may be absent at birth, or present in considerably reduced amounts.
- Altered metabolic pathways may exist for some drugs.
- Metabolic rate increases dramatically in children and is often greater than in adults. Compared with adults, children may require more frequent dosing or higher doses on a mg/kg basis.
- Complete maturation of renal function is not reached until 6-8 months of age.

ROUTE OF ADMINISTRATION AND DRUG REGIMENS

- Compliance in children is influenced by the formulation, taste, appearance and ease of administration of a preparation.
- Prescribed regimens should be tailored to the child daily routine.
- Whenever possible, the use of products which avoid the need for administration during school hours should be considered (e.g. modified-related preparations or drugs with long half-lives).
- When administration at school is unavoidable, consideration should be given to prescribing and supplying the school time dose in a separate labeled container.
- Whenever possible, painful intramuscular (IM) injections should be avoided in children.

DOSAGES

- Children are not mini-adults. Paediatric doses should be obtained from a eadiatricdosage reference text and not extrapolated from the adult dose.
- When considering drug use in children, the following age groups should be used: neonate (birth to 1 month), infant (1 month to 2 years), child (2 to 12 years) and adolescent (12 to 18 years).
- Dose calculation hildren doses may be calculated from adult doses by using age, body-weight, or body-surface area, or by a combination of these factors. The most reliable methods are those based on body-surface area.
- Body-weight may be used to calculate doses expressed in mg/kg.
- Young children may require a higher dose per kg than adults because of their higher metabolic rates.
- Other problems need to be considered.
- For example, calculation by body-weight in the overweight child may result in much higher doses being administered than necessary in such cases, dose should be calculated from an ideal weight, related to height and age.
- Body-surface area estimates are more accurate for calculation of aediatricdoses than body-weight since many physiological phenomena correlate better to body-surface area.
- Body-surface area may be calculated from height and weight by means of a omogramor using the Body Surface Area Calculation.

ADVERSE DRUG REACTIONS

- Adverse drug reaction profiles in children may differ from those seen in adults for different reasons:-
- Drugs are not extensively tested in children prior to regulation
- Many drugs are not specifically licensed for use in children and are used ff-label
- Suitable formulations may not be available to allow precise dosing in children
- The nature and course of illnesses and adverse drug reactions may differ between adults and children
- The action of the drug and its pharmacokinetics in children (especially in the very young) may be different from that in adults
- It is important to report all adverse drug reactions to the appropriate authority.

SAFETY IN THE HOME

- Parents and care givers must be warned to keep all medicines out of the reach of children
- All solid dosage and all oral and external liquid preparations must be dispensed in a child-resistant container whenever possible
- Parents must not share a child prescription with his siblings, even when they are having similar symptoms.
- It is advisable to get the sibling properly assessed as different illnesses have similar symptoms.
- All unused drugs, especially reconstituted suspensions should be discarded when the treatment course is completed.

Proposed solutions to improve children's access to medicines in developing countries.

- Promoting appropriate and safe drugs for children is a global concern.
- In December 2007, WHO published its first ever model list of essential medicines for children, with more than 200 medicines, including HIV/AIDS treatment, vaccines, anesthetics, hormones, vitamins, and minerals.
- This serves as a reference for countries to develop national essential medicines lists, according to their specific public health needs.
- The list is updated every two years and has been recognized as a powerful tool to promote health equity.
- The second edition was published in April 2010.

PROPOSED SOLUTIONS

- We need to have a separate list of essential medicines for children, the list should include child friendly dosage forms
- We need to advocate for essential medicines for children to be available at the different types of hospitals including district and tertiary hospitals as well as primary care
- Procurement and distribution of medicines to public hospitals should be based on the essential medicines list for children
- Authorities should ensure continuous availability of the medicines for children in public hospitals
- Research needs to be done on availability, accessibility, affordability, palatability, bioequivalence of manipulated adult dosage forms, acceptability, quality and safety of children medicines
- Development of financial viable children formulations (e.g. dispersible tablets) needs to be encouraged
- Manufacturers and suppliers should be encouraged to market medicines for children as well as adults, irrespective of profit
- Policy makers and regulators should be sensitized about the issue of children medicines
- There should be guidelines on storage and transport of aediatricmedicines (bottles, large volumes, climate, refrigerator, space in stores)
- There may be need for price controls for children medicines sold in private pharmacies
- Doctors, pharmacists and nurses should choose not only the right medicine for children, but the right formulation

- Parents need to be empowered to demand better medicines for their children
- Pharmacist and other Health
- Workers should document outcomes of medicine used in the aediatricpopulation
- There is a need for appropriate pharmaceutical care providers to monitor and evaluate medicines used in aediatricpopulation since a growing body of evidence suggests that Pharmacists interventions have major impact on reducing medication errors in eadiatricpatients, thus improving the quality and efficiency of care roividers

CONCLUSION

- There are enough clinical and scientific grounds to understand the significant differences in the pharmacological science between adults and children and not merely extrapolate the results from adult studies.
- It is of paramount importance to strengthen the health system so that the individual child medical need is both scientifically and ethically addressed right from the drug manufacture to its administration.
- Availability of properly labeled pediatric formulations, regular audit by pharmacists, judicious prescriptions, proper counseling about drug administration, and surveillance of adverse effects can save millions of children.
- Access to essential medicines for children needs to be increased. Government needs to subsidize the prices of medicines through taxes, duties and fees reduction.
- Importance of essential medicines for children should not be monopolized by a few companies, so as to reduce the market prices.
- Manufacturing of essential medicines for children should be encouraged through appropriate legislation.
- Regional and local monitoring system on prices of selected essential medicines for children should be established.

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