

Comparative analysis of national essential medicine list for children by Indian academy of pediatrics and pediatric drugs available at a tertiary care teaching hospital in Rajkot, Gujarat, India

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Received: 10 July 2016

Revised: 12 July 2016

Accepted: 09 August 2016

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ABSTRACT

Background: The better medicines for children initiative of the WHO began in December 2007 as a consequence of the World Health Assembly resolution 60.20, when there was evidence that nearly 50% of children under five were dying for preventable diseases for which medicines existed. There is a need to develop “child friendly” formulations and make them available.

Methods: This cross sectional study was conducted during September 2015. The availability of essential medicine for children (drugs, strength, and dosage form) was noted down. Drugs which are not listed in the National list of Essential medicines (NLEM) for children but available in the hospital pharmacy were also noted down.

Results: Out of the drugs listed in NLEM, 86.56% drugs were available in the pharmacy of tertiary care teaching hospital, Rajkot. 57.76% percent of these drug formulations were available as specified in NLEM and 44.36% of the available drugs had the same strength as specified in NLEM. For those drugs which are mentioned in NLEM but not available in the hospital pharmacy, alternative drugs are available for the same indication.

Conclusions: Majority of the drugs available in hospital pharmacy of tertiary care teaching hospital, Rajkot are in accordance to NLEM. However hospital pharmacy is deficient in paediatric formulations and strength in accordance to NLEM.

Keywords: Children, NLEM, IAP

INTRODUCTION

WHO “levels and trends in child mortality 2014” show that 6.3 million children under the age of five years died in 2013. Among these most of these early child deaths could be prevented. India (21%) and Nigeria (13%) together account for more than one third of under five children death.¹

Pediatric population is heterogeneous group with different age groups with different physiologic and development stages. The availability of pediatric

formulations and strengths are limited due to higher cost, limited demand and require specific storage conditions.² To increase the global awareness of essential medicines for children WHO initiated “better medicines for children initiative” and “make medicine child size” campaign.³ Four editions of essential medicine list for the children (up to 12 years of age) were published by WHO. Latest edition was on April 2013.⁴

The concept of child friendly formulations is at infant stage. Indian academy of paediatrics (IAP) published national essential medicine list for children (NEMLC) on

October 2011 based upon WHO criteria of selection list and national health programs.⁵ Chhattisgarh and Odisha are the only two states included paediatric specific formulations in their essential medicines in their EML. Even 7-17% paediatric formulations only procured.

METHODS

Observational cross sectional study was done at pharmacy of tertiary care teaching hospital Rajkot. Existing hospital Pediatric medicine list was obtained from central medical store along their dosage forms and strengths. IAP - NEMc October 2011 was downloaded from the official website and was used as reference for comparison. The percentage availability of the medicines along with dosage forms, strengths present in hospital were noted at the time of visit and the reason of non-availability.

RESULTS

NEMc contain 134 drugs including fixed dose combinations. They are 22 groups including cardiovascular, CNS, oncologic, analgesic, anti-allergic, and ophthalmic, ENT, dermatological drugs. Hospital pharmacy contains 116 drugs (at least single dose) (86.56%). As per utility analysis hospital pharmacy maintains most of the drugs. The drugs not available in the hospital pharmacy listed in Table 1.

Table 1: List of drugs not available in hospital pharmacy from NEMc.

| Drugs not available at hospital | Group of drug |
|--|-------------------|
| Morphine | Opioid analgesic |
| Charcoal activated | Antidote |
| Naloxone | Antidote |
| Pentamidine isothionate | Antileishmaniasis |
| Sod. Stibogluconate | Antileishmaniasis |
| Hydroxyurea | Antianaemia |
| Levothyroxine | Thyroid hormone |
| Pyrantel | Anti-helminthic |
| Abacavir | Anti-HIV |
| Didanosine | Anti-HIV |
| Lamivudine | Anti-HIV |
| Zidovudine | Anti-HIV |
| Daunorubicin | Anticancer |
| Mercaptopurine | Anticancer |
| Methotrexate | Anticancer |
| Methylprednisolone | Anticancer |
| Chloroxylonol | Disinfectants |
| Insulin (insulin zinc or isophane insulin) | Hormones |
| Procaine benzyl penicillin | Antibiotics |

NEMc contains 284 dosage strengths for children less than 12 years of old. Hospital pharmacy contains 126 dosage strengths.

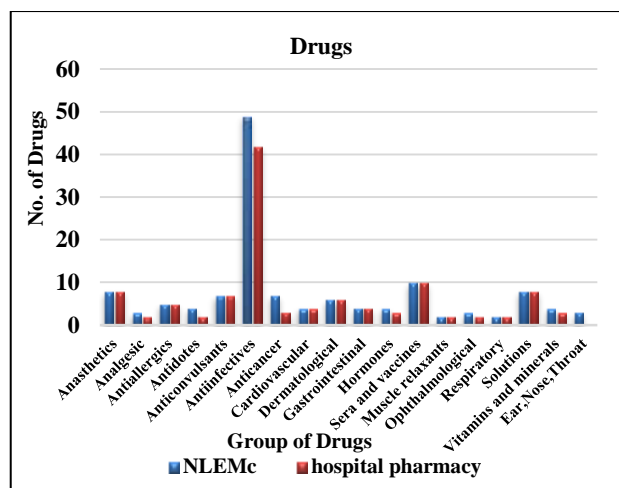


Figure 1: Comparison of drugs available at hospital pharmacy from NEMc.

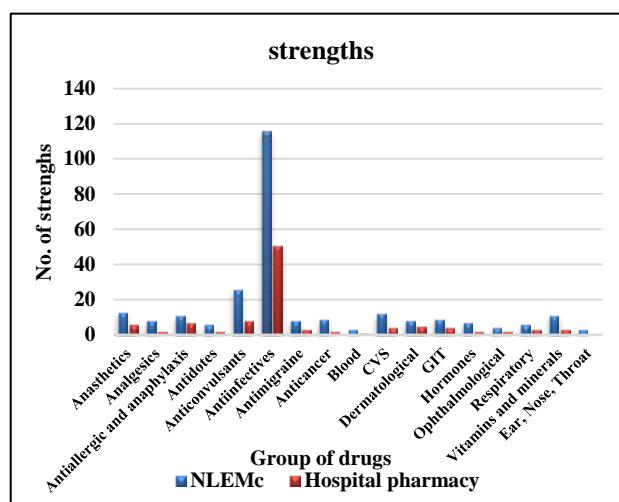


Figure 2: Comparison of strengths available at hospital pharmacy from NEMc.

The dosage forms commonly missing from hospital pharmacy given in Table 2. Mainly chewable, dispersible tablet, dental cartridge, oral liquids are missing.

Table 2: List of the dosage formulations missing from hospital pharmacy.

| Group of the drug | Formulations not available |
|--|---|
| Local anaesthetics | Lidocaine + epinephrine (dental cartridge) |
| Sedation for short term procedure | Midazolam (oral liquid) |
| Antiallergics and medicine used in anaphylaxis | Chlorphenamine (oral liquid), prednisolone (oral liquid) |
| Antiepileptics | Carbamazepine (oral liquid, chewable tablet), phenobarbital (oral liquid), phenytoin (oral liquid, chewable tablet), sodium valproate (oral liquid, crushable tablet) |
| Antifilariasis | Diethylcarbamazine (oral liquid) |

| | |
|----------------------------------|--|
| Betalactum antibiotics | Amoxicillin+ clavulanic acid (oral liquid, dispersible tablet), Cefadroxil (powder for oral liquid), procaine benzyl penicillin (powder for injection) |
| Other antibacterials | Ciprofloxacin (oral liquid, dispersible tablet), sulfamethoxazole + trimethoprim (injection) |
| Antileprosy drugs | Rifampicin (oral liquid) |
| Antituberculosis drugs | Isoniazid (oral liquid), pyrazinamide (oral liquid), rifampicin (oral liquid) |
| Antifungal drugs | Fluconazole (oral liquid, injection) |
| Antiretroviral drugs | Efavirenz (oral liquid, capsule), nevirapine (oral liquid) |
| Antimalarial drugs | Quinine (suspension) |
| Antianaemia drugs | Ferrous sulphate + folic acid (oral liquid) |
| Cardiovascular medicines | Digoxin (oral liquid), furosemide (oral liquid), spironolactone (oral liquid) |
| Dermatological medicines | Hydrocortisone (cream or ointment) |
| Gastrointestinal medicines | Metoclopramide (oral liquid), omeprazole (granules for oral liquids) |
| Ophthalmic preparation | Atropine (ointment) |
| Ear, nose and throat preparation | Budesonide (nasal sprays), xylometazoline (nasal drops) |

Table 3 shows alternative drugs available in hospital pharmacy for those drugs that are missing according to NLEM.

Table 3: List of alternative drugs available in hospital pharmacy that are not mentioned in NLEM.

| Group of the drug | Alternative drugs available |
|-------------------|---|
| Antileishmaniasis | Amphotericin B |
| Antianaemic | Iron + folic acid |
| Anthelmintics | Albendazole |
| Anti HIV | Combinations are available |
| Anticancer | Etoposide, fosaprepitant, fluorouracil, granisetron, gemcitabine, interferon, leucovorin, paclitaxel, zolidronic acid, bleomycin, cisplatin, doxorubicin. |

DISCUSSION

Pharmacologically children make a heterogeneous group with different pharmacokinetics from that of adults. Particularly Infants and new born must need specific medicines in correct and appropriate dosage formulations and strength as they suffer from different disease than adults. Our study demonstrated that 86.56% availability

of paediatric medicines and modest scarcity of formulations and strength in tertiary care teaching hospital, Rajkot.

The drugs not available in the pharmacy are pyrantel, diloxanide, sodium stibogluconate, pentamidine isothionate, daunorubicin, mercaptopurine, naloxone, hydroxyurea, morphine, activated charcoal. Alternative drugs like albendazole, Metronidazole, fluconazole, and amphotericin B are available. Etoposide, fosaprepitant, fluorouracil, granisetron, gemcitabine, interferon, leucovorin, paclitaxel, zolidronic acid, bleomycin, cisplatin, and doxorubicin are the alternative anti-cancer drugs available in hospital. Anti-HIV drugs combinations are available.^{4,5}

Regarding formulations paediatric specific like dispersible, chewable formulations are completely absent. Formulations mentioned in the IAP- Essential medicine list for children October 2011 only 57.76% are available. Only 44.36% paediatric specific strength is available in the hospital. For paediatric use adult dosage forms are grinded or divided by health care workers or parents. Paediatric specific formulations are worldwide concern for which WHO initiated campaign like “make medicines child size” and “child friendly formulations” to increase the awareness of paediatric specific strength and formulations.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Prajapati M, Kubavat A, Bhansali N. Comparative analysis of national essential medicine list for children by Indian academy of pediatrics and pediatric drugs available at a tertiary care teaching hospital in Rajkot, Gujarat, India. Int J Basic Clin Pharmacol 2016;5:2077-9.