Drug utilization statistics to improve drug use:rational drug use country perspective

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- WHO CC ATC DDD Meeting SanTiago Chile April 2025

Outline of presentation

- **Use of ATC DDD tool,to improve drug ,rational use of drugs**
- WHO SEARO countries Drug utilization studies/research DUR systematic review
- Way forward /Recommendation
- Case study –ICMR prescription research -manual
- Case study –ICMR prescription research –prescription research software **PrescReSof©**
- Precription research ,Use of ATC DDD –challenges

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Use of ATC DDD tool

Present drug utilization statistics

To improve drug use

Examine trends in drug use over time and settings ,interventions

to improve prescribing and dispensing of medicine

Ref WHO Collaborating centre https://atcddd.fhi.no/use_of_atc_ddd.

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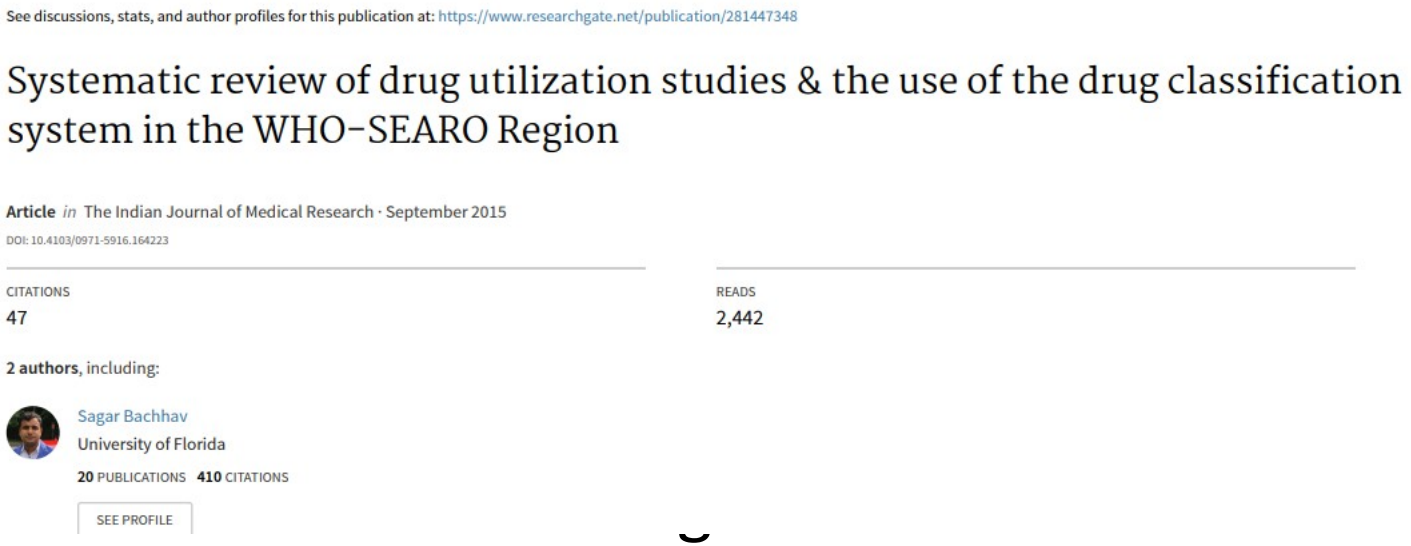

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Systematic review of drug utilization studies & the use of the drug classification system in the WHO-SEARO Region

Article *in* The Indian Journal of Medical Research · September 2015

DOI: 10.4103/0971-5916.164223

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47

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University of Florida
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Data sources

- Sales data –national aggregate usually not available
- Dispensing data-national aggregate usually not available
- Patient encounter data
- Patient survey data

Systematic review:drug utilization studies and use of ATC DDD classification in WHO SEARO region

- 318,published studies analyzed
- All studies were in healthcare setting
- Objectives of studies-comparison ,develop methods and study impact of intervention on prescription,correlate antibiotic use &susceptibility
- Data sources-prescriptions,pharmacy,patient records,survey of healthworkers,patients
- Settings -hospital,community,primary centre
- Study design,type of patient,setting,use of ATC DDD ,analyzed
-

Bacchav ,Kshirsagar IJMR

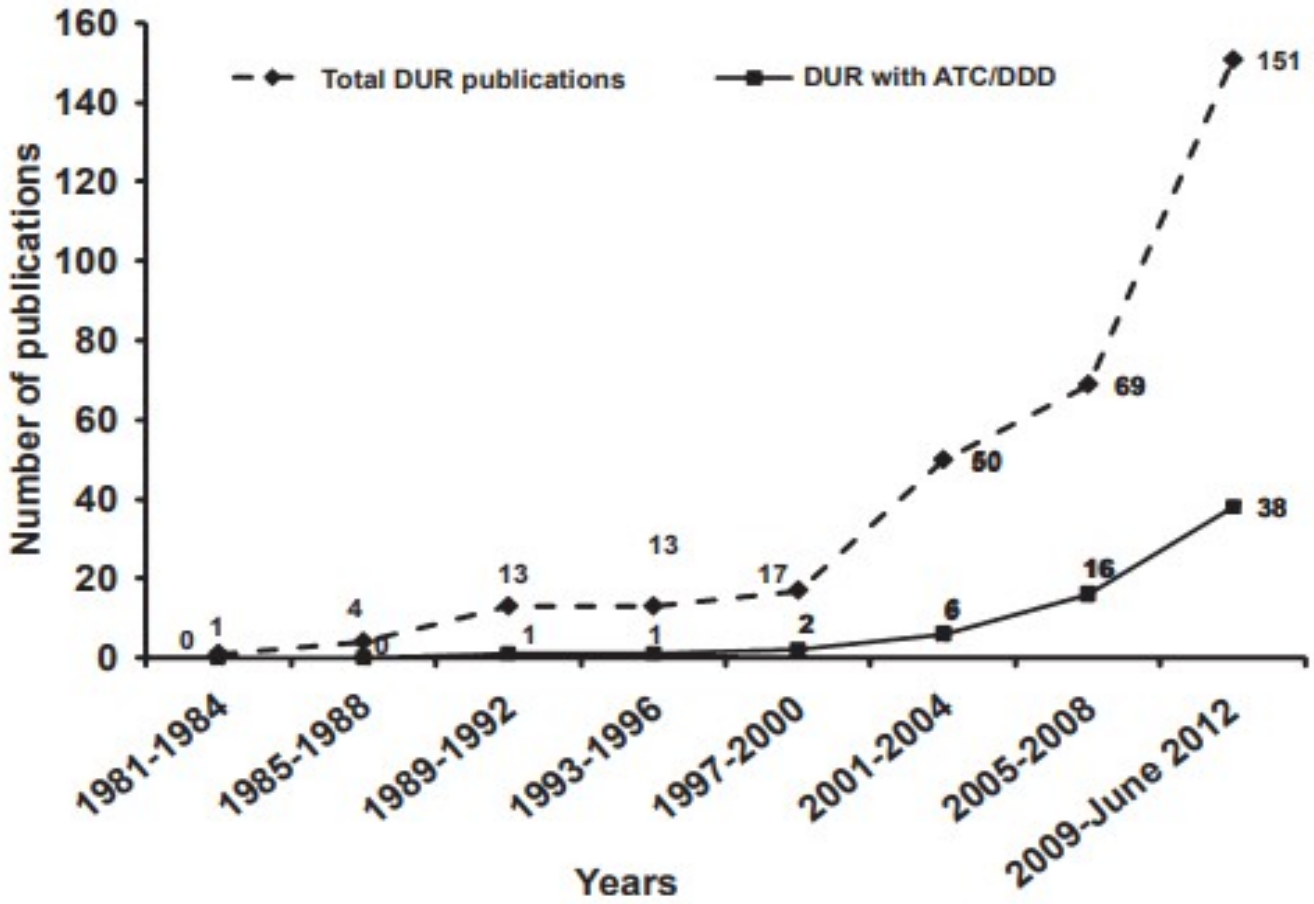
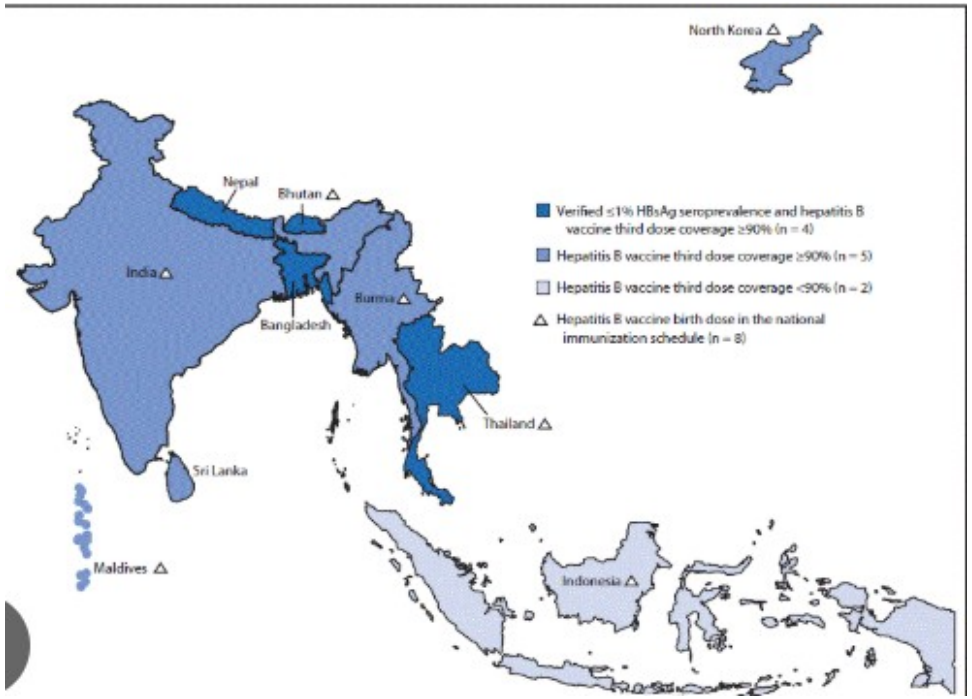


Fig. 2. Trend in drug utilization research (DUR) and use of ATC/DDD methodology over the years in WHO-SEARO countries.



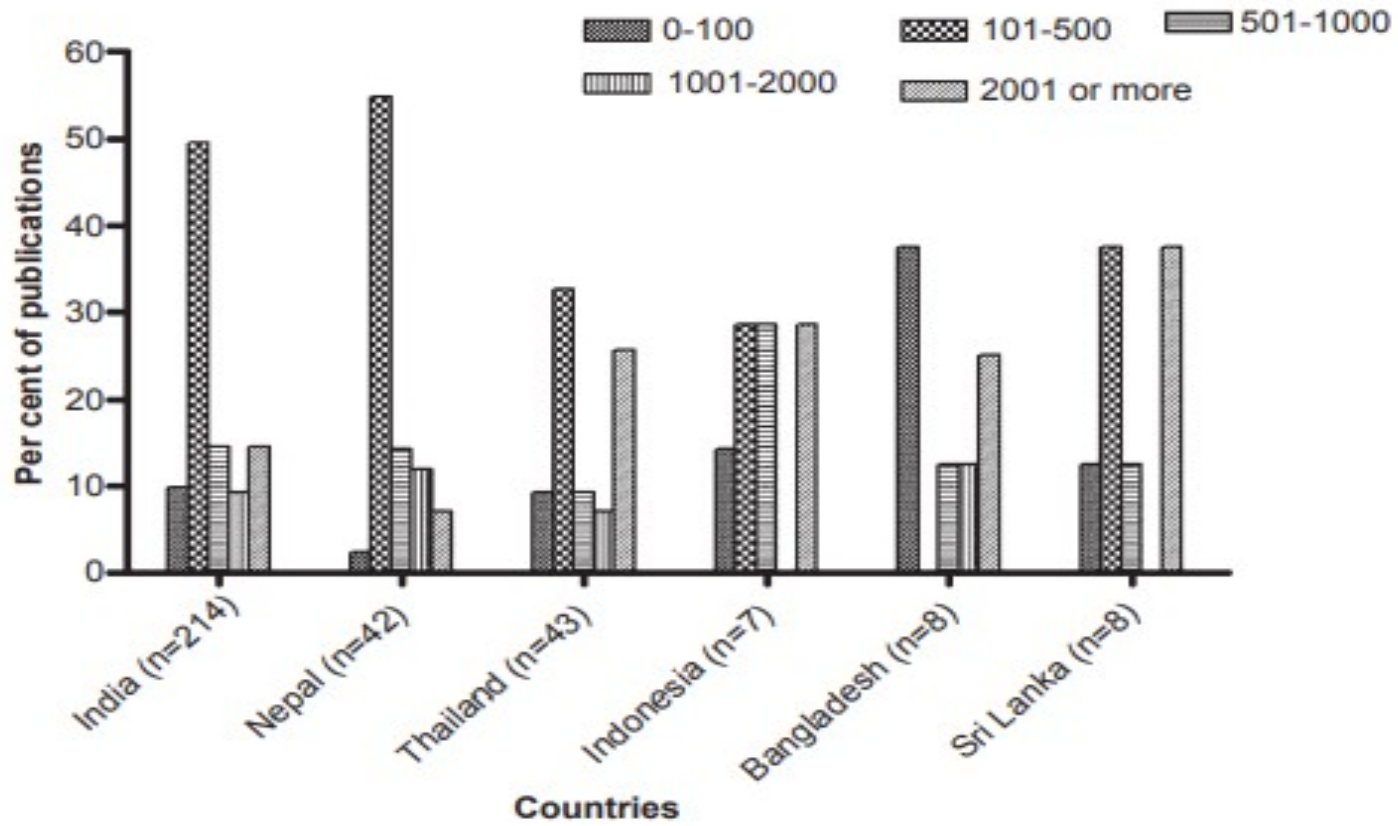


Fig. 3. Sample size used in drug utilization research (DUR) study publications from WHO-SEARO. (Other SEARO countries *viz.* Bhutan, Maldives, Myanmar and Timor-Leste did not have any publication on DUR studies).

Publications using ATC DDD

- No -80%
- Only ATC-4%
- Only DDD-8%
- ATC+DDD-8%
- DDD/100bed days 8%
- DDD/1000 patient days-6%

Way forward/recommendation

- DUR ATC DDD needs to be promoted
- Ongoing studies needed
- DUR important for rational use of medicines
- Relevant for policy , resource allocation

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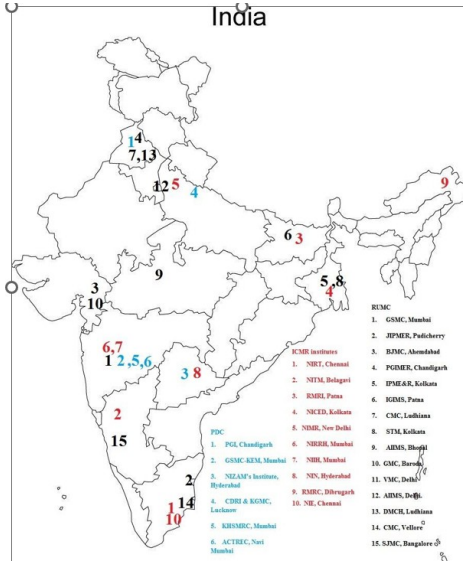
Indian Council of Medical Research – Prescription research (drug utilization research)



- Carried out by Rational use of medicines centres (RUMC-NvCCP)
- To capture ,analyse , interpret prescriptions
- Identify gaps , suggest corrective steps
- Provide input for intervention –prescribing skills training program

Multicentric ,multispecialty study Patient population

- Outpatient dept of tertiary care hospitals
- Justification-Numbers large, multiple specialties, medication complex ,prescription by junior graduate doctors , most other studies single centre ,specific population
- Number-600 per centres proportion per specialty as per OPD attendance ,100 community med,med.surgery,gyn obs

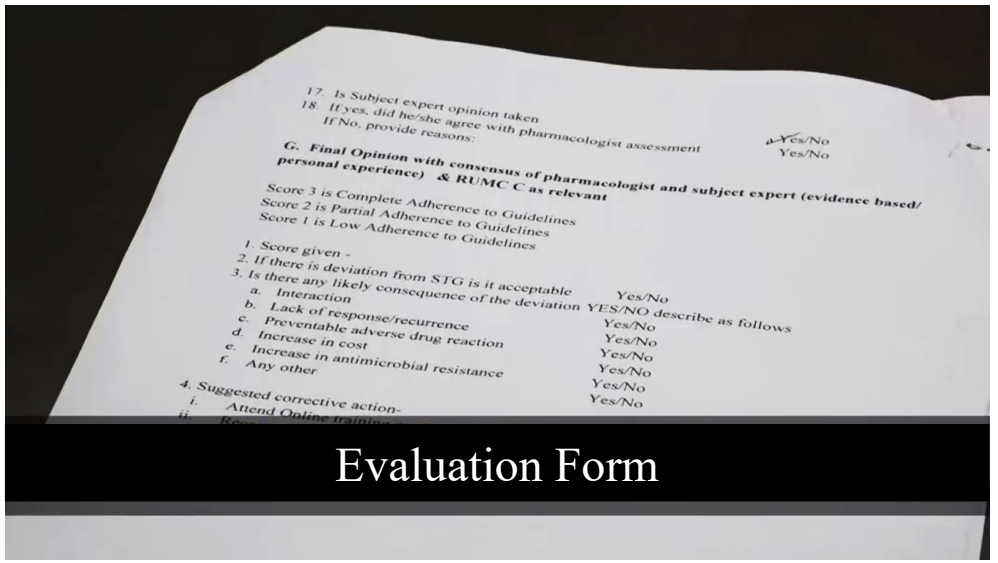
  80 ped,30dermat,ophthalm,ENT,psy
- Common protocol,CRF,EC approval,Consent

Prescription capture evaluation


Collecting Prescription.


Pharmacologist's evaluation


Community Medicine -evaluation



Evaluation Form

Assessment

- Assessed for WHO indicators –use of
  - ❖ Poly pharmacy, (more than 6 drugs)
  - ❖ Fixed Dose Combinations,(FDC)
  - ❖ National List Essential Medicines,(NLEM)
  - ❖ Antibiotics, injectables, vitamins, ASM

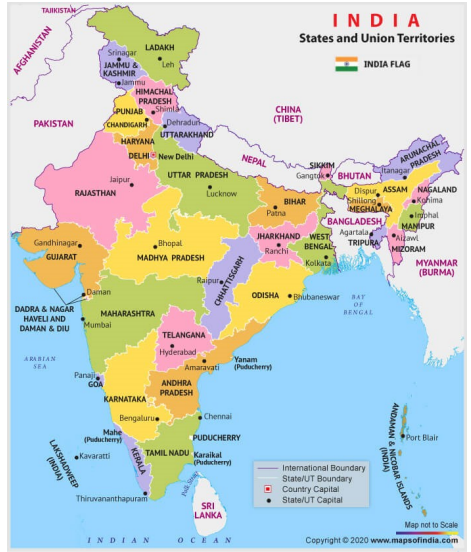


Table 1: Summary of parameters assessed as per World Health Organization drug use indicators from all the centres

Parameters	*n* (%)
Total number of prescriptions collected	4838
Number of prescriptions with monotherapy	820 (16.94)
Number of prescriptions with polytherapy	4018 (83.05)
Number of prescriptions with brand names	2778 (57.42)
Number of prescriptions with FDCs	2093 (43.26)
Number of prescriptions with drugs not from the hospital formulary	1086 (22.44)
Number of prescriptions with drugs not from NLEM	2677 (55.33)
Number of prescriptions with antimicrobials	853 (17.63)
Number of prescriptions with injectables	241 (4.98)
Number of prescriptions with Vitamins/iron preparations	2610 (53.95)

Data presented as *n* (%). FDCs=Fixed dose combinations, NLEM=National list of Essential medicines

		Yr 1 (manually aggregated) 2019-2020
3.	**Drugs per prescription**	**3.34**
4.	**Prescription with FDC**	**2093 (43%)**
5.	**Prescription with non NLEM**	**2677 (55%)**

Method to evaluate inappropriateness of prescriptions

- Prescription complete or incomplete,errors of omissions,commission
- Is it as per standard treatment guidelines STG) Local, National International ,to assess appropriateness/deviation from STG (explicit)

- Assessment was done by medical pharmacologist ,community medicine , clinical experts and Committee for consensus (implicit)

- Is there Deviation from STG,is deviation it acceptable or unacceptable
- unacceptable deviations Potential impact assessed

Table 3: Detail of completeness of prescription as per World Health Organization indicators

Parameters	Total (*n*=4838), (%)
Complete prescriptions	2968 (61.34)
Incomplete prescriptions	1870 (38.65)
Dose not mentioned	1106 (22.86)
Frequency not mentioned	305 (6.30)
Duration not mentioned	759 (15.69)
Formulation not mentioned	178 (3.68)
Follow-up visit not mentioned	1319 (27.26)
Instructions not mentioned	2358 (48.74)

n=number of prescriptions and %-percentage of prescriptions out of 4838

	Title	Yr 1 (manually aggregated) 2019-2020
1.	No. of eligible prescriptions(captured7800)	4838
2.	Prescriptions not as per STG 1870 incomplete	2171 (44%)
3.	Prescriptions with unacceptable deviations	475 (9.8%)

	Potential impact	Yr 1 (manually aggregated) 2019-2020
1.	Drug interaction	81 (17%)
2.	Lack/ delayed /reduced response	77 (16%)

	Potential impact	Yr 1 (manually aggregated) 2019-2020
1.	Preventable ADR	254 (53%)
2.	Increase in cost	301 (63%)
3.	Increase antimicrobial resistance	72 (15%)

Table IV. List of drugs prescribed inappropriately in the prescriptions with unacceptable deviations

Drugs	Number of prescriptions (475)	% of total prescriptions with unacceptable deviations
Pantoprazole	54	11.36
Rabeprazole + domperidone	35	7.36
Trypsin or chymotrypsin	24	5.05
Serratiopeptidase	25	5.26
Azithromycin	20	4.21
Ranitidine	11	2.31
Cefixime	11	2.31
Amoxicillin+clavulanate	10	2.1
Aceclofenac	6	1.26
Others (antidiabetics, antiemetics, antihypertensives, antiepileptics, antimicrobials, antipsychotics, antispasmodics and FDCs - gabapentin + nortriptyline, montelukast + levocetirizine, diclofenac + serratiopeptidase, phenylephrine + chlorpheniramine+ dextromethorphan and multivitamins)	279	58.73
Total	475	

FDC, fixed-dose combination

Examples of inappropriate prescriptions

- URTI-FDC Montelucast+levicetirizine,ATC-R03DC53
- FDC rabeprazole+domperidone ATC –A02BC54
- Use of oral serratiopeptidase NO ATC CODE,trypsin,chymotrypsin ATC M09AB52 for inflammation
- Pantoprazole when not indicated
- Anal fissure-metronidazole ,ciprofloxacin
- Aphthous ulcers-amoxicillin,clavulanic acid

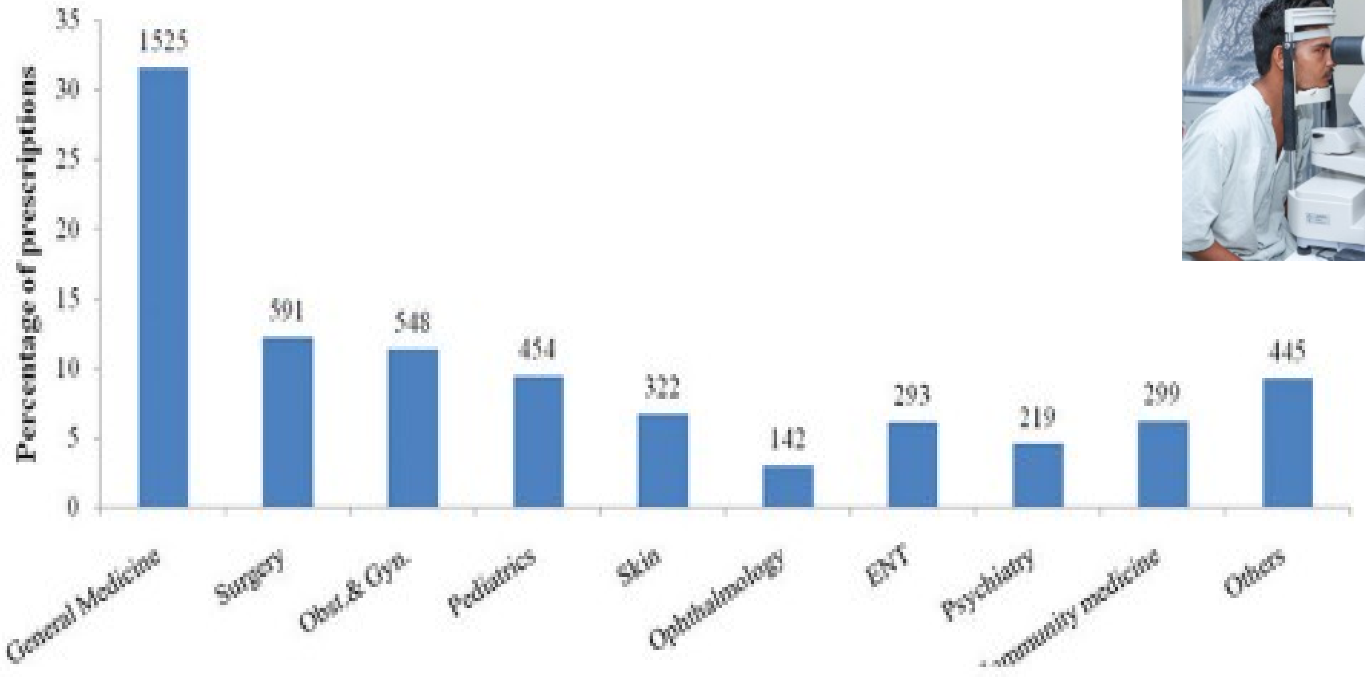


Figure 1: Number of prescriptions collected from various departments of tertiary care institutes of India. Data presented as n (%)

Prescriptions for URTI,Diarrhoea

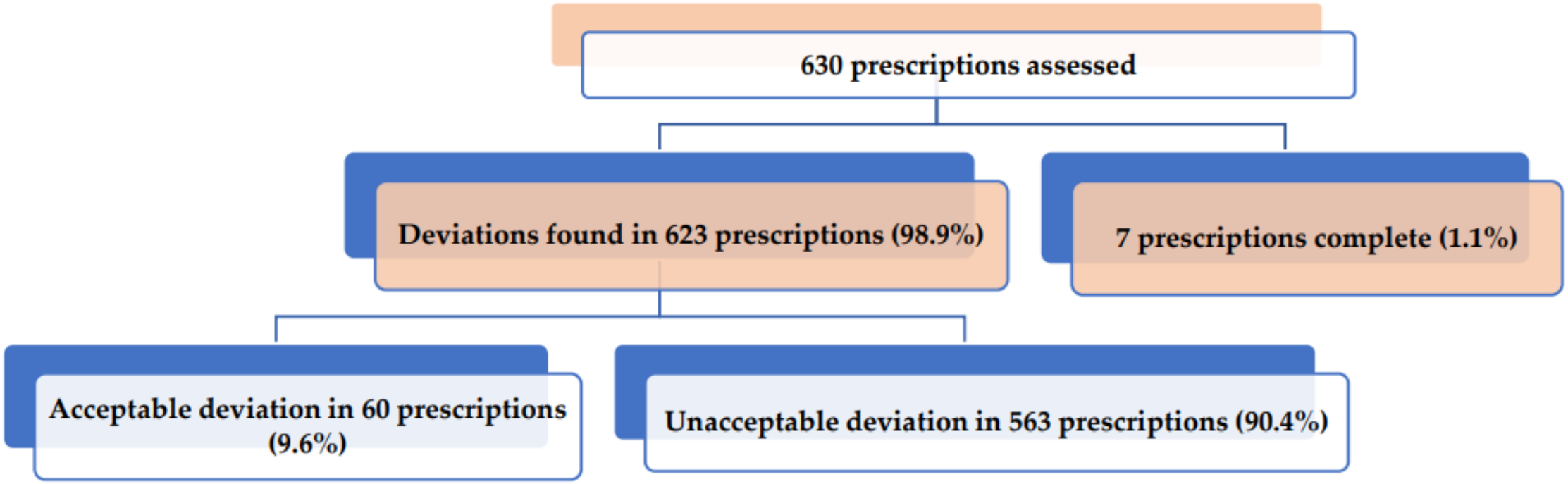


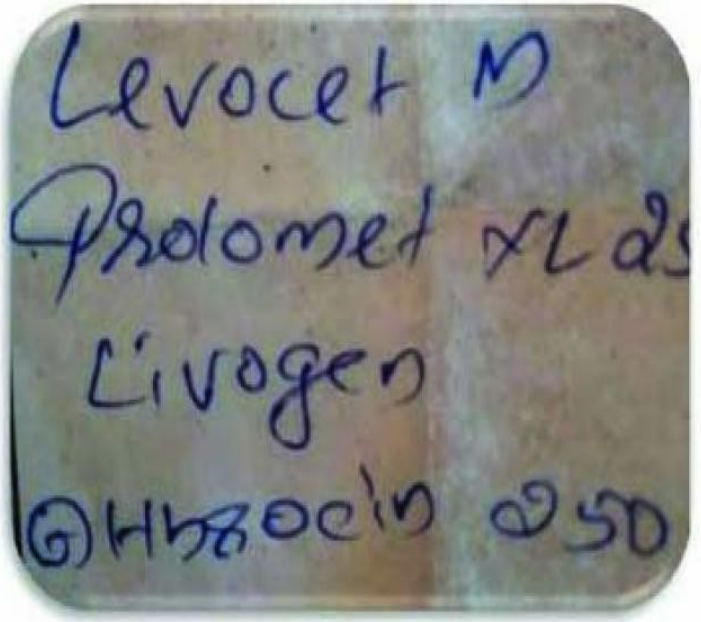
Figure 1. Acceptability of the deviations in assessed prescriptions through a consensus committee approach.

Table 3. Distribution of Drug responsible for unacceptable prescription. (n = 563 prescriptions, proportions are not mutually exclusive).

Drug Group	Specific Agents Prescribed	No	%
Antibiotics	Amoxycillin, Cefuroxime, Azithromycin, Ofloxacin, Co-trimoxazole.	246	43.7
Bronchodilators	Salbutamol, Terbutaline, Theophylline	240	42.6
H1-Antihistaminics	Chlorpheniramine, Cetrizine, Fexofenadine	128	22.7
Probiotics	Lactobacillus, Bifidobacterium	87	15.4
Proton pump inhibitors	Omeprazone, Pantoprazole, Esomeprazole	70	12.4
Vitamins and mineral supplements	Water soluble vitamins, Iron, Calcium, Zinc.	56	9.9
Leukotrine receptor antagonists	Montelukast	49	8.7
Rehydrating agent	Oral rehydrating salt	44	7.8
H2 receptor blockers	Ranitidine, Famotidine	31	5.5
Non- steroidal anti-inflammatory drugs	Paracetamol, Nimesulide, Diclofenac	28	4.9
Antacids	Magaldrate, Aluminium hydroxide	15	2.6
Anti spasmodic agents	Dicylomine, Drotavarine	15	2.6
Anti-emetic agents	Ondansetron, Domperidone	12	2.1
Corticosteroids	Prednisolone, Deflazacort	7	1.2
Digestive enzymes	Amylase, Lipase	6	1
Nasal decongestants	Oxymetazoline, Xylometazoline	4	0.7
Mucolytic agents	Ambroxol, Guiaphenesin	2	0.3
Non-specific anti-diarrhoeal agent	Racecodotril	1	0.2

Drawback of manual work

- Manual – variations in recording medicine name
- Aggregation difficult
- ATC Code manually entered
- Statistical analysis limited



ICMR NvCCP RUMC – NIMS
PrescReSof©
Prescription Research Software

Developed by

Rational Use of Medicines Centres (RUMC) &

Technical Advisory Group (TAG)

Of National virtual Centre of Clinical Pharmacology,(NvCCP)

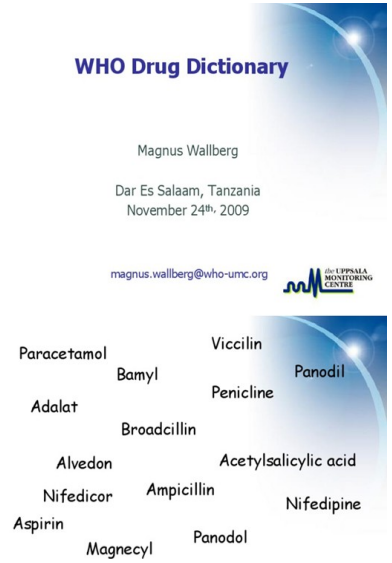
With ICMR National Institute of Medical Statistics (NIMS)

NvCCP
National virtual Centre
Clinical Pharmacology
Network of RUMC

PrescReSof©-ICMR RUMC NIMS Software

Unique features

- Developed in-house by NIMS, RUMC,TAG
- Built on previous expertise & experience
- Incorporates
  - ❖ WHO Drug Dictionary, ATC Code
  - ❖ ICD Disease Code,
  - ❖ NLEM
- Besides prescription, analysis by disease & drug use possible



Features of PrescReSof©

1. Patient demography, Prescriber details(anonymized)

2. Details of prescription (drug, dose, route, duration, instructions, etc).
3. Assessment – as per STG. If not then deviations of omission and of commission, acceptable and unacceptable, potential impact

Features of PrescReSof©

4.Feedback from clinician for corrective steps

5.Statistics,indicators auto calculated ,permits user wise analysis for user

6.Superuser –PanIndia ,sector wise aggregation ,analysis ,interpretation

PrescReSof (copyright)

- Internal validation
- External Validation
- Analysed using excel to cross check
- 1000 prescriptions entered
- Launched on 4rth March 2022 by DG ICMR

Scope of Prescription Research

- Prescription problem areas identified
- ATC DDD use helps comparison across centres
- Corrective steps identified
- Provide input into training programs

Specific drugs –Anti microbials as per ATC code

- Prescriptions with AMA – 2034(22.8%)out of total 8917
- With score 1 ,inappropriate -204(10%)
- Maximum number- b lactam J01C,J01D,macrolides J01F
- Maximum proportion -Macrolides and combinations

PrescReSof© –Future-Version 2

- Incorporate STG, Use AI for analysis
- Various applications, Detect early warning signals in real time
- Available to states for audit, Available to other countries
- Specialized areas

Limitations of prescription research study

- Funding ,expert time required
- Excludes prescriptions without indication
- Pharmacologist ,clinician consensus could be an issue
- Interventions proposed ,only PSC implemented
- Limitations of STGs
- For some drugs no ATC DDD ,WHO UPPSALA CENTRE unofficial code used

- Thank you

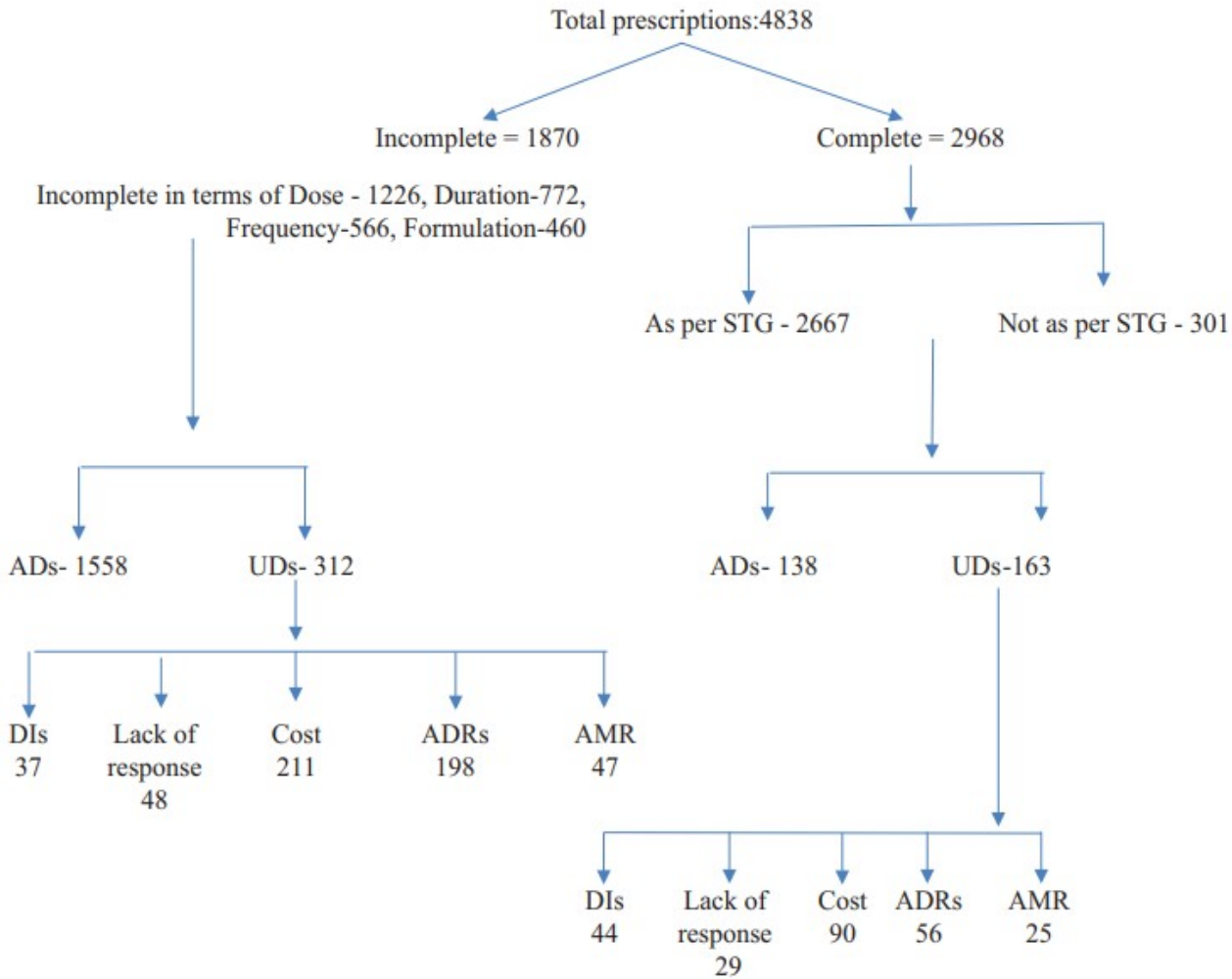


Figure. Flow chart of prescription analysis. AD, acceptable deviation; UD, unacceptable deviation; DI, drug interaction; ADR, adverse drug reaction; AMR, antimicrobial resistance; STG, standard treatment guidelines.

methods of assessment

- Potential prescribing omissions (POP)-error of omission
- errors of commission, medicines not effective or risk more than benefit, safer one available, dose, frequency,duration ,indication not right
- Potentially inappropriate prescription(PIM)-
- Criteria based –explicit(eg Beer's, STOPP,elder, PROMPT,middle aged)
- Implicit –judgement based (eg Medication appropriateness index MAI)
- Limitation :Patient population eg geriatric ,pediatric,Health care setting OPD IPD.None for all age groups,all specialties

Corrective steps suggested

- Issuance of administrative order to write complete prescription as per STG
- Continue prescription research
- Provide feedback on errors/deviations
- Implement on line Prescribing skills course with real life case studies