Journal of Antimicrobial Stewardship Practices and Infectious diseases

JASPI

June 2025 / Volume 3 / Issue 2

Narrative Review

Medical Antimicrobial Prophylaxis in Indian Settings – What to Practice

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ABSTRACT

Background: Medical antimicrobial prophylaxis (AP) is a key preventive measure aimed at reducing disease morbidity, mortality, and transmission, particularly in diverse healthcare environments such as India. While surgical prophylaxis is well-documented, guidance on medical AP remains less explored.

Objectives: This narrative review aims to provide evidence-based guidance for healthcare workers and the public on medical AP, covering indications, recommended antimicrobial agents, doses, frequencies, and durations for common conditions in India.

Methods: A narrative review of national and international guidelines (including ICMR, MOHFW, NACO, NTEP, WHO, CDC), supplemented by evidence from published literature, was conducted. Data were compiled for common indications of medical AP, focusing on infections relevant to Indian healthcare settings.

Results: Medical AP encompasses post-exposure prophylaxis (e.g., for HIV, pertussis, leptospirosis, and meningococcal disease), pre-exposure or travel prophylaxis (e.g., for malaria, HIV PrEP), and secondary prophylaxis in recurrent or latent conditions (e.g., tuberculosis, urinary tract infections, febrile neutropenia, chronic liver disease, cardiac conditions). Despite national recommendations, uptake remains suboptimal in India. Appropriate AP has demonstrated significant benefits in preventing disease transmission, reducing complications, and mitigating antimicrobial resistance.

Conclusions: Medical AP represents an essential component of antimicrobial stewardship in India. Enhancing adherence to national guidelines and improving public and healthcare worker awareness can substantially contribute to disease prevention and control.

KEYWORDS: Antibiotic Prophylaxis; Developing country; Health-care workers; Prevention and control; Surgical Prophylaxis

INTRODUCTION

Antimicrobial prophylaxis (AP), a strategy commonly employed to prevent infections, including surgical site infections, can be categorised as primary (preventing initial infection) or secondary (preventing recurrence or reactivation of latent infection). The indications for AP can be broadly grouped into medical prophylaxis,

Citation: Panda PK, Tulsian V. Medical Antimicrobial Prophylaxis in Indian Settings – What to Practice. *JASPI.* 2025;3(2):14-25. DOI: 10.62541/jaspi084

prophylaxis for non-surgical interventions (e.g., for endoscopic procedures) and surgical prophylaxis. A recent Indian survey revealed that 42.8% of antimicrobial prescriptions were for prophylactic purposes[1]. While extensive literature focuses surgical or perioperative AP, information regarding medical AP is comparatively scarce and often overlooked. However, medical AP can be grouped into three main categories.

a. Post-exposure prophylaxis (PEP)
b. Pre-exposure prophylaxis (PrEP)
c. Secondary prophylaxis in recurrent/latent conditions

Medical prophylaxis is crucial in India's diverse healthcare setting to reduce disease morbidity and mortality, particularly given varied population, health literacy levels, and access issues. Appropriate prophylactic therapy can prevent disease transmission, minimize disease complications, and mitigate the spread of antimicrobial resistance (AMR). This intervention can even be considered as a 'low-hanging fruit' of antimicrobial stewardship practices. Despite clear national guidelines, the uptake of prophylactic regimens remains inconsistent in India. For example, adherence to national guidelines in India, such as those promoting isoniazid preventive therapies under Revised National Tuberculosis Control Programme, is often poor[2, 3]. Despite existing individual recommendations of AP in medical settings, compliance is often low.

This narrative review offers concise guidance to healthcare workers (HCWs) and the public on medical AP for common conditions, detailing specific indications, recommended antimicrobial agents, doses, frequency and duration. All dosing recommendations assume normal renal and hepatic function, and the absence of contraindications. Prior to initiating AP, it is essential to discuss the potential risks and benefits of the proposed regimen with the healthy individual or patient.

SEARCH METHODOLOGY

A narrative review approach was adopted. Relevant literature was identified through searches of PubMed, Google Scholar, and official guidelines from national (**ICMR, MOHFW,** NACO, NTEP) and international (WHO, CDC) bodies. Priority was given to Indian guidelines and high-quality systematic reviews/meta-analyses. The review emphasizes commonly recommended AP regimens applicable to Indian settings.

A. POST-EXPOSURE PROPHYLAXIS

Post-exposure prophylaxis (PEP) plays a crucial role in preventing infections following a recognized or potential exposure to infectious agents. PEP is particularly important for infections associated with high infectivity, severe morbidity, or mortality, and in settings where immediate containment is critical to public health.

1. Antimicrobial Prophylaxis for Bite wounds

Prophylactic antibiotic use following bite wounds aims to prevent infections (relative risk =0.56, NNT =14), particularly in high-risk individuals, although evidence for universal use is limited[4]. Prophylaxis is recommended for immunocompromised patients, asplenic individuals, those with advanced liver disease, edema at the wound site, moderate to severe injuries (particularly to the hand, face, or near joints), or delayed presentation[5].

2. Antimicrobial Prophylaxis for Influenza/Flu

Antiviral prophylaxis for influenza is indicated in certain high-risk individuals within 48 hours of exposure to an infectious person. This includes close contact (within approximately 6 feet for >15minutes) during the infectious period (1 day before to 5 days after symptom onset in the index case) (Table 1). It reduces the likelihood of symptomatic influenza, thereby lowering hospitalization rates[6].

Table 1: At-risk individuals for influenza (Flu) prophylaxis upon exposure (Adapted from CDC)

Age 65 years and older
Children less than 2 years
People with chronic diseases
• Chronic lung diseases (asthma, Chronic obstructive lung disease, cystic fibrosis)
• Neurologic and neurodevelopmental conditions
• Blood disorders (like sickle cell disease)

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

• Endocrine disorders (like Diabetes mellitus)
• Heart disease (congenital heart disease, congestive heart failure, coronary artery disease)
• Kidney disorders
• Liver disorders
• Metabolic disorders (mitochondrial disorders)
• Body mass index ≥40kg/m^2
People on long term aspirin or salicylate containing medications and age <19 years
Immunocompromised individuals (People living with HIV, on chemo/radiotherapy)
History of stroke
People with difficulty in coughing, swallowing or clearing airway secretions

3. Doxy PEP for sexually transmitted infections

Giving the rising rates of syphilis, chlamydia, and gonorrhea, particularly among men who have sex with men and transgender women, doxycycline post-exposure prophylaxis (doxy PEP) has emerged as an effective strategy. Doxycycline taken within 72 hours after sex reduces syphilis and chlamydia infections by >70% and gonorrhea by ~50%[7].

4. HIV PEP

HIV PEP is crucial to prevent infection following exposure to blood or potentially infectious materials. NACO recommends PEP for exposures involving mucous membrane or compromised skin exposure with a large volume of infectious material, percutaneous injuries (e.g., superficial scratches, deep injuries with hollow-bore needles) involving infected material, irrespective of the source's viral load or CD4 count. It is also recommended in cases of small-volume exposure if the source patient has advanced HIV disease with a high viral load. It should ideally be started within 2 hours of exposure and can be considered up to 72 hours[8].

5. AP for pertussis and diphtheria

Pertussis remains endemic in parts of India, and its high infectivity justifies the use of AP among close contacts. Early initiation within 21 days of exposure is recommended to prevent clinical disease, particularly in vulnerable neonates and infants[9]. For diphtheria, the WHO recommends erythromycin for exposed individuals, along with active immunization with the diphtheria vaccine[10].

6. PEP for zoonotic diseases

During the peak transmission season of leptospirosis, doxycycline may be given to agricultural workers (e.g., paddy field workers), canal cleaning workers in endemic areas where clustering of cases has been reported[11]. For high-risk laboratory *Brucella* exposures (including direct personal exposure such as sniffing cultures, direct skin contact; working with cultures outside biosafety level 3 containment, or presence during aerosol-generating procedures involving the isolates), PEP with doxycycline and rifampicin for three weeks is recommended[12].

7. PEP for Hansen disease (or leprosy)

Similarly, AP is recommended by WHO for close contacts of Hansen disease (defined as having been in contact for 20 hours or more per week for over 3 months during the past year) as it reduces the risk of developing leprosy in contacts by 60%[13].

8. Others

Close contacts of persons with **meningococcal** disease warrants AP, irrespective of vaccination status. Close contacts include household members, day care centre staff, and any person directly exposed to an infected person's oral secretions in the 7 days before symptom onset. AP is recommended as soon as possible and no more than 48 hours after exposure[14].

Rifampicin is recommended for chemoprophylaxis in invasive *Haemophilus influenzae* type b disease as it achieves high concentrations in respiratory secretions. Prophylaxis is indicated for all household members with unvaccinated children aged less than 4 years or immunocompromised individuals aged less than18 years. It is not indicated for non-type b *H. influenzae* exposures[15].

PEP against anthrax should be offered to all individuals who have documented or suspected exposure to aerosolized *B. anthracis* to prevent inhalational anthrax[16]. PEP should start as soon as possible following exposure and ideally within 48 hours. For

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

unprotected face-to-face contact with pneumonic plague patients, PEP is given orally for seven days[17].

B. PRE EXPOSURE / TRAVEL PROPHYLAXIS

Traveler's diarrhoea remains common globally despite improvements in sanitation and hygiene, leading to disruptions and health risks. Routine AP is not recommended but may be considered in high-risk travellers (e.g., individuals with immunosuppression, inflammatory bowel disease or severe kidney disease). It helps prevent diarrhoea in roughly 58 to 88% of travelers[18].

In India, where *Plasmodium falciparum* **malaria** is predominantly chloroquine-resistant, current CDC and WHO guidelines recommend AP for travellers to those areas. Pregnant travellers should ideally avoid chloroquine-resistant malaria-endemic regions; if travel is unavoidable, mefloquine is the preferred chemoprophylaxis in chloroquine-resistant zones (doxycycline is contraindicated, and atovaquone-proguanil is not recommended during pregnancy) [19].

PrEP for **HIV** is highly effective when used correctly and consistently. It reduces the risk of HIV infection by over 90% from sexual exposure and around 70% from intravenous drug use. Sexually active, HIV- negative individuals who are at substantial risk and free of contraindications or acute HIV symptoms are eligible for PrEP[20].

C. SECONDARY PROPHYLAXIS IN RECURRENT/LATENT CONDITIONS

1. Antimicrobial prophylaxis in immunocompromised individuals

AP is recommended for patients at high risk for febrile neutropenia, including those expected to have profound, protracted neutropenia (< 100 neutrophils/cm3 for > 7 days), such as patients with acute myeloid leukemia/myelodysplastic syndromes or those undergoing HSCT treated with myeloablative conditioning regimens. A Fluoroquinolone (number needed to treat to prevent 1 death is 29) and triazole or echinocandin are recommended during period of expected neutropenia. HSV-seropositive patients undergoing allogeneic stem-cell transplantation or leukaemia induction should receive nucleoside analogs like acyclovir[21]. Brief overview of AP for patients undergoing solid organ transplantation is presented in table 2.

Table 2: Summary of all antimicrobial prophylaxis to be used in Indian medical setting.

Disease	Indication	Antimicrobial agent	Dose and duration of therapy	Reference
Post Exposure prophylaxis				
1. Bite wound infection	In individuals who are immunocompromised; asplenic; have advanced liver disease; have edema of the affected area; have moderate to severe injuries (hand or face); have injuries penetrating the periosteum or joint capsule.	Amoxicillin-clavulanate	500/125 mg TDS for 3 to 5 days	IDSA 2014(5)
2. H1N1	High risk population (pregnant women, age >65 years, chronic steroid use, lung, heart, liver or kidney disease, diabetes, cancer or HIV/AIDS)	Oseltamivir	75 mg OD for 07 days	CDC(6)
3. Sexually transmitted infections	Gay and bisexual men and transgender women who have had chlamydia, syphilis, or gonorrhoea in the last 12 months	Doxycycline	200mg single dose	CDC clinical guidelines 2024 (7)
4. Needle stick injury (HIV)	Exposure code 1 or more with positive or unknown Source person's HIV status	Tenofovir 300 mg + lamivudine 300 mg + dolutegravir 50 mg	28 days	National Guidelines for HIV care and treatment (8)
5. Pertussis	All household and close contacts of the index case. To be initiated within 21 days	Azithromycin/ Erythromycin	10mg/kg (Max 500mg) OD for 5 days	CDC Guidelines (9)
6. Diphtheria	Close contacts exposed to oral or respiratory secretions	Erythromycin	250 mg QID for 7 to 10 days	WHO position paper August 2017 (10)
7. Leptospirosis	During peak transmission season may be given to agricultural workers (eg, paddy workers), canal cleaning workers in endemic areas	Doxycycline	200 mg once weekly for 6 weeks	National Programme for Prevention and Control of leprosy (11)

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

8. Brucellosis	High risk laboratory exposures: direct personal exposure like sniffing cultures, skin contact, pipetting by mouth; working on open culture or outside biosafety level 3 containment; presence during aerosol generating procedure.	Doxycycline plus Rifampicin	100 mg BD plus 600 mg OD for 3 weeks	CDC (12)
9. Leprosy	Close contact with the index case for 20 hours or more per week for more than 3 months during the past 1 year; age >2 years	Rifampicin	600 mg single dose	WHO technical guidance for contact tracing and PEP in Hansen disease(37)
10. Meningococcus	Close contacts including household members, childcare centre contacts and anyone else directly exposed to an infected patient's oral secretions in the 7 days before symptom onset	Rifampicin or Ciprofloxacin	600 mg BD for 2 days or 500 mg single dose	National Centre for Disease Control (14)
11. Haemophilus influenza type b	All children and adults (except pregnant women) who spent > 4 hours with the index patients for at least 5 days before the day of hospitalisation	Rifampicin	20mg/kg (max 600mg) OD for 4 days	Advisory committee on Immunization practices 2014 (15)
12. Plague	Individuals with unprotected face-to-face contact (ie, within one to two metres) of patients with known or suspected pneumonic plague who have not received at least 48 hours of effective antimicrobial therapy	Doxycycline or ciprofloxacin	100 mg BD for 7 days	(17)
13. Anthrax	Documented or suspected exposure to aerosolized B. anthracis	Doxycycline, Ciprofloxacin, levofloxacin, or minocycline in descending order of preference as per CDC	100 mg BD/ 500 mg BD for 42 to 60 days	CDC (16)
Pre- Exposure/ Travel Prophylaxis				
14. Malaria	Travel to chloroquine resistant zones	a. Atovaquone-praguanil 250/100mg daily b. Doxycycline 100 mg daily c. Mefloquine 250 mg once wkly	a. 2 days before travel; till 4 wks after travel b. 2 days before travel; till 4 wks after travel c. 2 wks before travel; till 4 wks after travel	CDC(19)
15. Traveler's diarrhoea	Short term (e.g., <2 weeks) travellers with underlying medical condition (severe inflammatory bowel, immunocompromised state or vascular, severe cardiac or renal disease)	Rifaximin	200 mg TDS	Journal of travel Medicine (18)
16. HIV	HIV negative partner in Sero-discordant relationship; engaging in transactional sex; anal or vaginal sex, with multiple partners with inconsistent condom use; history of STI in last 6 months; repeated use of non-occupational post exposure prophylaxis; intravenous drug abuse; history of sex under alcohol, recreational drug influence	a. Tenofovir 300 mg + Emtricitabine 200mg b. Tenofovir 300 mg + lamivudine 300 mg	At least 7 days of consistent use for protection of anal receptive sex, 20 days for vaginal receptive sex	NACO (20)
Prophylaxis in recurrent/chronic/latent conditions				
17. Neutropenia	High risk for Febrile Neutropenia or profound, protracted neutropenia (eg, most patients with AML/myelodysplastic syndromes)	Fluoroquinolone plus oral triazole or parenteral echinocandin	During period of expected neutropenia	ASCO and IDSA clinical practice guideline 2018 (21)
	HSV- seropositive patients undergoing HSCT or leukaemia induction therapy	Acyclovir	Until recovery of the WBC count or resolution of mucositis	
18. Chronic systemic glucocorticoid use	Glucocorticoids doses above 20 mg/day equivalent for > 4 weeks and have another cause of immunocompromise (haematological malignancy or another immunosuppressive agent). People who have been successfully treated for PCP	Cotrimoxazole (trimethoprim-sulfamethoxazole)	Double strength tablet once daily as long as risk factors present	Prophylaxis against Pneumocystis jirovecii Pneumonia in adults (22)

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

19. Solid organ transplant recipients	PCP prophylaxis: All solid organ transplant recipients * Lung and small bowel transplant recipient, prior PCP infection- lifelong prophylaxis	Cotrimoxazole (trimethoprim-sulfamethoxazole)	Single strength tablet OD for 6-12 months	American Society of Transplantation Infectious Disease Community of Practice (38–40)
	Cytomegalovirus (CMV): a. CMV donor +ve, recipient -ve b. CMV donor -ve/+ve, Recipient +ve	Valganciclovir	900 mg OD. a. 3-6 months (kidney, pancreas, liver), 6-12 months (lung, intestinal, heart) b. 3 months	
	Herpes Simplex Virus: seropositive recipients not receiving CMV prophylaxis	Acyclovir	600-1000 mg/day in divided doses as short-term prophylaxis	
	Invasive Candidiasis: high risk patients in liver, small intestine and pancreas transplant	Fluconazole	Short- term post operative. Usually for 2 to 4 weeks	
20. People Living with HIV (PLHIV)	1. Pneumocystis pneumonia -CD4 count <350 cells/mm3 -WHO clinical stage 3 and 4 -After PCP treatment till CD4 count >350 for 6 months	Cotrimoxazole (trimethoprim-sulfamethoxazole)	Double strength tablet OD, Till CD4 count >350 cells/mm 3 on two different occasions 6 months apart and no WHO clinical stage 3 and 4 conditions	National Guidelines for HIV care and treatment(8)
	2. Tuberculosis - All adults with negative 4s - Children >1 year, with –ve 4s symptoms - Children <1 year, in contact with TB but unlikely to have active TB	Isoniazid	10 mg/kg (max 300mg) plus pyridoxine 50 mg daily for 6 months	
	3. Cryptococcal disease (if CrAg test is not available, may be given to HIV-positive whose CD4 cell count <100 cells/mm3)	Fluconazole	100 mg OD for 12 months	
	4. Mycobacterium avium complex: CD4 count < 50 cells/mm3, if there is delay in initiating ART or remain viremic on ART	Azithromycin	1200 mg once weekly till ART starts	
21. Tuberculosis infection/ LTBI	1. People living with HIV	Refer to section on PLHIV	10 mg/kg (max 300mg) plus pyridoxine 50 mg OD for 6 months	National TB Elimination Programme 2021 (23)
	2. Household contacts (HHC) < 5 years of PTB patients	Isoniazid		
	3. HHC (> 5 years) of PTB patients (among positive TST/IFRA after ruling out TB disease)	Isoniazid and Rifapentine (HP) Isoniazid	Once weekly for 3 months Daily for 6 months	
	4. Others risk groups- immunosuppressive therapy, silicosis, anti TNF treatment, dialysis, transplantation (among positive TST/IGRA)	Isoniazid and Rifapentine (HP) Isoniazid	Once weekly for 3 months Daily for 6 months	
22. Drug Resistant-Tuberculosis	HHCs of fluoroquinolone sensitive MDR-TB	Levofloxacin	1gram/day for 6 months	National TB Elimination Programme (41)
	HHCs of Isoniazid Resistant, Rifampicin sensitive DR- TB	Rifampicin	10mg/kg/day for 4 months	
23. Recurrent urinary tract infection	Non pregnant women with recurrent (≥3 per year), uncomplicated UTIs	*Nitrofurantoin, cotrimoxazole or fluroquinolones	*50-100 mg OD for 6 to 12 months	AUA/CUA/SUFU Guideline (24)
24. COPD	COPD with frequent exacerbations (≥2 per year) despite optimal medical management	Azithromycin	500 mg thrice weekly for 12 months	European Respiratory Society/ American Thoracic Soceity (25)
25. Bronchiectasis	Recurrent exacerbations* (≥3 per year) *Non -P.aeruginosa infection	Azithromycin	500 mg thrice weekly for 6/12 months or indefinitely	European Respiratory Society guidelines 2017(27)

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ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

26. Spontaneous bacterial peritonitis	1. Acute gastrointestinal bleeding	*Ceftriaxone (ciprofloxacin/Cotrimoxazole)	*1 gram IV BD for 7 days	American Association for the Study of Liver Diseases 2021 (28)
	2. Ascitic fluid protein <1.5gm/dl with any one of impaired renal (S. creatinine ≥1.2mg/dl or BUN ≥25mg/dl) or liver function (CTP ≥9 + bilirubin ≥3mg/dl) or S. sodium <130 mEq/L	Ciprofloxacin/ norfloxacin	500 mg OD/ 400 mg OD as long as ascites present	
	3. Prior history of SBP	Ciprofloxacin/ norfloxacin	500 mg OD/ 400 mg OD till ascites persists/ lifelong	
27. Recurrent Hepatic Encephalopathy	Adjunct to lactulose as secondary prophylaxis following ≥1 additional episodes of overt HE within 6 months of the first one	Rifaximin	550mg BD (discontinue after improvement of liver function and precipitating factor)	AASLD and EASL practice guidelines 2014 (29)
28. Rheumatic fever	1. Rheumatic fever without carditis	Benzathine penicillin G 1.2 MU every 3 to 4 weeks or Erythromycin 250 mg BD	For 5 years after last attack or 21 years of age (whichever is longer)	American Heart Association 2020 (30)
	2. With carditis but no residual valvular disease		For 10 years after last attack or 21 years of age	
	3. With persistent valvular disease, evident clinically or on ECHO		For 10 years after last attack or 40 years of age	
29. Infective endocarditis	Dental procedures where manipulation of gingival tissue or the periapical region or perforation of oral mucosa in high-risk cardiac lesions	Amoxicillin	2 grams orally one hour before procedure	American Heart Association 2021 (31)
30. Recurrent cellulitis	Two or more episodes of cellulitis in the previous 12 months despite attempts to treat or control predisposing factors	Penicillin V Erythromycin	250 mg BD 250 mg BD for 6-12 months (until predisposing factor present)	(33)
31. Asplenic or hyposplenic individuals	1. Sickle cell disease	*Penicillin V/ Erythromycin	*250mg BD until age 5 years and for at least 1 year following splenectomy (125 mg BD for age < 3years)	Cochrane Review Rankine-Mullings et al (35) British Committee for Standards in Haematology 2011 (34)
	2. Concurrent immunocompromised state	Penicillin V/ Erythromycin	Until age 18 years and often as long as immunocompromised state lasts	
	3. History of sepsis/ severe infection caused by encapsulated organisms	Penicillin V/ Erythromycin	Lifelong prophylaxis	

Patients receiving a glucocorticoid dose equivalent to ≥ 20 mg of prednisone daily (e.g., 3 mg dexamethasone) for one month or longer, along with another cause of immunosuppression (such as a hematologic malignancy or use of additional immunosuppressive agents like rituximab or checkpoint inhibitors), are considered high risk for *Pneumocystis pneumonia* (PCP) [22].

2. Antimicrobial prophylaxis in people living with HIV

People living with HIV (PLHIV) are susceptible to a multitude of opportunistic infections. Under the NACO guidelines, AP includes cotrimoxazole for PCP, isoniazid for tuberculosis (TB), and fluconazole for cryptococcal meningitis(8). Cotrimoxazole is indicated for adults and adolescents with CD4 counts <350 cells/mm^3 or those in WHO clinical stages 3 and 4 in PLHIV who completed treatment for PCP. It also provides protection against toxoplasmosis, bacterial pneumonias, nocardiosis, and isosporiasis[8].

Fluconazole is used for cryptococcal infection after successful completion of the maintenance phase, for at least 1 year or until CD4 count ≥ 100 cells/mm3 and HIV plasma viral load < 1000 copies/ml[8]. If there is a delay in initiating ART with CD4 <50 cells/mm3, azithromycin can be given for *Mycobacterium avium complex* prophylaxis.

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

3. Antimicrobial prophylaxis to prevent active tuberculosis

Tuberculosis preventive therapy (TPT) aims to prevent progression from latent TB infection to active disease, particularly in high-risk groups. TPT is recommended as it reduces the risk of TB disease by 60%(23). In household contacts of TB over 5 years and other high-risk groups such as those on immunosuppressive therapy, silicosis, anti-TNF treatment, dialysis, or transplantation, TPT is recommended only for those who test positive on TST/IGRA. In people living with HIV or household contacts of TB patients under 5 years isoniazid for 6 months is recommended irrespective of TST/IGRA results[23]. Isoniazid preventive therapy is not recommended if there is active TB, hepatitis, peripheral neuropathy, known MDR-TB exposure, or hepatotoxic drug use.

Preventive treatment for household contacts of bacteriologically confirmed pulmonary tuberculosis patients varies by the index patient's drug susceptibility. Six months of levofloxacin is advised when the index patient has multidrug-resistant tuberculosis (MDR-TB) that is sensitive to fluoroquinolones. For contacts of patients with isoniazid-resistant, rifampicin-sensitive tuberculosis, four months of rifampicin is recommended.[41]

4. Antimicrobial prophylaxis to prevent recurrent urinary tract infections

Recurrent urinary tract infection (rUTI), defined as two or more infections in six months or three or more in one year, is a common condition with a high economic burden affecting women globally. Around 20–40% of women with a prior UTI experience recurrence, 25–50% of whom have multiple episodes[24]. Daily AP (e.g., TMP-SMX, nitrofurantoin) for 6–12 months is effective. Post-coital prophylaxis, as a form of PEP, is beneficial for sexually related rUTIs with fewer adverse effects. Long-term prophylaxis beyond one year lacks strong evidence.

5. Antimicrobial prophylaxis in respiratory diseases

Acute exacerbations of chronic obstructive pulmonary disease are associated with increased hospitalization rates and mortality. Given that acute exacerbations are often triggered by heightened airway inflammation and bacterial infections, macrolides, due to their anti-inflammatory and antimicrobial properties, have emerged as a potential preventive strategy. Macrolides decrease the proportion of patients who develop exacerbations from 68% to 57%[25]. Bronchiectasis exacerbations are associated with progressive lung damage and mortality. AP is indicated for adults with bronchiectasis who experience ≥ 3 exacerbations per year. Azithromycin reduced exacerbations to 0.59 per patient, compared to 1.57 per patients for placebo during 6 months in the EMBRACE trial[26]. Inhaled antibiotics (gentamicin/colistin) are preferred for *P.aeruginosa* infection, with macrolides as alternatives or adjuncts. For adults with bronchiectasis not infected with *P.aeruginosa* infection macrolides are recommended, with other oral or inhaled antibiotics as later options[27].

6. Antimicrobial prophylaxis in chronic liver disease

Spontaneous bacterial peritonitis (SBP) prophylaxis aims to prevent both recurrence (68% with placebo vs 20% with norfloxacin) and first episode (60% vs 7%) due to the high risk of morbidity and mortality associated with SBP in cirrhotic patients(28). Secondary prophylaxis is indicated for patients recovering from a prior SBP episode, with oral norfloxacin being the preferred agent. In primary prophylaxis, antibiotics are reserved for certain high-risk patients. For those with cirrhosis and acute upper gastrointestinal bleeding, IV ceftriaxone is preferred. In patients with low ascitic fluid protein (<1.5 g/dL) combined with either renal dysfunction or advanced liver failure, norfloxacin is recommended as long as high risk factors are present[28]. Alternative options like rifaximin or sulfamethoxazole/trimethoprim have been explored, though evidence remains limited.

Hepatic encephalopathy (HE) is a frequent and debilitating complication of liver disease, profoundly impacting patients and caregivers. Lactulose is widely used to prevent recurrence of overt HE (OHE). Rifaximin can be an adjunct to lactulose for secondary prophylaxis following ≥1 additional episodes of OHE within 6 months of the first episode[29].

7. Antimicrobial prophylaxis in cardiac diseases

In rheumatic heart disease, long-term penicillin prophylaxis is essential to prevent recurrence of rheumatic fever. Depending on the presence and severity of carditis, the duration may extend to 10 years or lifelong[30].

AP is recommended only for patients at the highest risk of complications from viridans group Streptococcal infective endocarditis before dental procedure involving manipulation of gingival tissues, the periapical region of teeth, or perforation of the oral mucosa. Maintenance of good dental hygiene and regular dental care are more important than AP for preventing infective endocarditis (Table 3)[31].

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

Table 3: High-risk cardiac lesions for which endocarditis prophylaxis is suggested before dental procedures.

Prosthetic cardiac valve or material
Cardiac prosthetic valve
Cardiac valve repair with devices (like annuloplasty, rings, clips)
Left ventricular assist devices or implantable heart
Congenital Heart Disease
Unrepaired cyanotic congenital heart disease
Completely repaired a Congenital Heart defect during the first 6 months after the procedure
Repaired congenital heart disease with residual defects
Previous, relapse, or recurrent Infective Endocarditis
Cardiac transplant recipients who develop cardiac valulopathy

8. Antimicrobial prophylaxis to prevent recurrent cellulitis

Despite successful management, cellulitis - a bacterial infection of the skin and subcutaneous tissue - recurs frequently. Major risk factors for recurrence include a prior episode of cellulitis, chronic edema, dermatomycosis, venous insufficiency, obesity, diabetes, and peripheral vascular disease. AP can be considered when there are ≥ 2 episodes of cellulitis in the last one year. AP decreases recurrence by 69% (number needed to treat =6)[32, 33].

9. Antimicrobial prophylaxis in hypo-splenic/asplenic individuals

Individuals with absent or dysfunctional spleen are at increased risk of severe infections, particularly from encapsulated organisms including *Streptococcus pneumoniae*, *Haemophilus influenzae* type b and *Neisseria meningitidis*. Lifelong AP should be considered in individuals with high-risk factors for invasive pneumococcal disease (age <16 or >50 years, inadequate serological response to pneumococcal vaccination, previous invasive pneumococcal disease, sepsis, ongoing immunosuppression) [34]. Penicillin prophylaxis is recommended as it reduces pneumococcal infections (90 vs 33 per 1000 person-years) [35] in children under 5 with sickle cell disease, while the PROPS II trial found no significant increase in risk upon withdrawal of prophylaxis after 5 years[36].

DISCUSSION

This narrative review highlights the current recommendations and practices related to medical AP in India. Evidence-based guidelines, including those from the Indian ICMR, the WHO, and specialty societies, provide clear directives on indications, agent selection, dosage, and duration of prophylaxis in various medical conditions. However, translating these guidelines into routine practice remains a significant challenge. Variations in clinician awareness, access to appropriate antimicrobial agents, and monitoring systems often result in either underuse or inappropriate prolonged use of prophylaxis. Both scenarios contribute to adverse outcomes, including preventable infections or, conversely, AMR.

In the Indian healthcare landscape, where infectious diseases such as immunocompromised conditions, chronic organ diseases, tuberculosis, HIV, and rheumatic fever remain endemic, the judicious use of medical prophylaxis is particularly crucial. The emergence of MDRs further reinforces the need for stringent adherence to prophylaxis protocols. Local data on resistance patterns, however, remain limited for certain prophylactic indications, and there is often reliance on international evidence that may not entirely reflect the Indian scenario.

Additionally, there is a need to strengthen antimicrobial stewardship initiatives that encompass not just therapeutic but also prophylactic use. Educational interventions for healthcare providers, development of institutional protocols, and regular audits could enhance compliance and ensure that prophylaxis contributes positively to public health outcomes without exacerbating AMR.

CONCLUSIONS

Medical AP is a cornerstone of preventive medicine, especially crucial in India's diverse, high- burden healthcare setting. For HCWs, understanding indications and adhering to evidence-based protocols for appropriate regimens are critical. Table 2 summaries common conditions with indications of AP and drug regimens. Patient awareness and compliance are key to preventing complications and improving long-term outcomes. Effectively integrating these strategies into routine practice across India will significantly bolster public health, reduce disease impact, and crucially help curb the escalating threat of

ISSN: 3048-4510 (Online)
DOI:10.62541/jaspi084

AMR. To optimize its benefits and mitigate risks, a coordinated integral approach involving guideline dissemination, surveillance, research, and stewardship is essential.

ACKNOWLEDGEMENT
None

CONFLICTS OF INTEREST STATEMENT
The authors declare no conflict of interest

SOURCE OF FUNDING
None

ETHICS STATEMENT INCLUDING PATIENT CONSENT
Not applicable

AUTHOR'S CONTRIBUTION
PKP, VT: Conceptualization; Data collection; Analysis; Writing the draft; Critical review; Approve

AI DECLARATION
No AI tool was used to generate research data, perform data analysis, interpret findings, formulate scientific conclusions, or make editorial decisions. All AI-assisted content was critically reviewed, verified, and revised by the authors. The authors take full responsibility for the accuracy, originality, integrity, and final content of the manuscript.

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