Evaluation of Anti-Infectives on Acute Respiratory Infection in Patients at Three Primary Health Cares Centres in Depok, Indonesia

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ABSTRACT

Introduction: The high prevalence of Acute Respiratory Infection (ARI) in Indonesia can increase anti-infective use and affect their patterns of use. Objective: This study aimed to evaluate anti-infective use in 2015 at 3 primary health care centres, Limo Primary Health Care (LPHC), Bojongsari Primary Health Care (BPHC), and Cipayung Primary Health Care (CPHC). **Material and methods:** This study was descriptive analytic research using retrospective data. Samples consisted of 20,441 ARI patients' prescriptions containing anti-infective drugs during 2015. Anti-infective drugs were classified using the anatomical therapeutic chemical (ATC) classification system. Drug use was measured as Daily Defined Dose (DDD)/1000 patients/day. Drug use 90% and adherence to the National Formulary was evaluated as an indicator of the quality of prescribing drugs. **Results:** The highest amount of anti-infective use for ARI patients was at CPHC with a total quantity of 0.95 DDD/1000 patient/day. While at the LPHC amount of anti-infective use was 0.76 DDD/1000 patients/day and at BPHC was only 0.65 DDD/1000 patients/day. The most anti-infectives use at all primary health cares was amoxicillin. Ten anti-infectives were use at LPHC, 11 at BPHC and 7 at CPHC. Anti-infectives in the DU 90% segment at LPHC

were amoxicillin, co-trimoxazole, and cefadroxil while amoxicillin was the only DU90% anti-infective used at CPHC and BPHC. The adherence to National Formulary were 70.00% at LPHC, 71.43%, at BPHC, and 63.64% at CPHC. **Conclusion:** The use of anti-infective varied and it showed that some did not adhere to National Formulary guidelines.

Key words: Adherence, Anti-infective, ATC/DDD, National Formulary, Primary health care

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INTRODUCTION

The prevalence of acute respiratory infection (ARI) in Indonesia was 25.0% in 2013, similar to 25.5% in 2007.[1] ARI was the most common infection according to the classification of outpatient illness cases at primary health care centres in Depok for the 0-44 year age range. ARI was the second most common illness for the age range of 45->75 years after cases of primary hypertension.[2]

The high prevalence of ARI in Indonesia can increase anti-infective use and affect their patterns of use. In addition, excessive use of anti-infectives may increase the resistance incidence. Therefore, evaluation of the quantity and quality of anti-infective usage is required to improve its rationality. The World Health Organisation (WHO) has suggested an evaluation of drug use utilising the Anatomical Therapeutic Chemical (ATC) Classification System and Defined Daily Doses (DDD) as a measure of drug use.[3] ATC/DDD methods were employed to study drug use to improve the quality of drugs use.[4]

This study aimed to evaluate anti-infective use at 3 primary health care centres, Limo Primary Health Care (LPHC), Bojongsari Primary Health Care (BPHC), and Cipayung Primary Health Care(CPHC). This evaluation covers DU90% and adherence to the National Formulary as an indicator of the quality of prescribing drugs.

MATERIALS AND METHODS

This study was descriptive analytic research. The data used were retrospective data consisting of recapitulation data of anti-infective prescriptions on ARI patients at 3 primary health care centres in Depok from

January to December 2015 and were taken from the Drug Management Information System (DMIS) and Management Information Systems Primary Health Care (MISPHC). The data were collected between February and May 2016. Samples were the patients' prescriptions that had a disease code for ARI with inclusion criteria of prescriptions containing anti-infective given orally; data were excluded if the prescriptions were illegible or did not have the disease code.

Anti-infective drugs were classified using the anatomical therapeutic chemical (ATC) classification system. Drug use was measured as Daily Defined Dose (DDD)/1000 patients/day. Measurement of quantitative data was accomplished by classifying anti-infective based on the ATC code and converting the quantity of anti-infective use into DDD units.[4] In addition, the adherence of anti-infective use to National Formulary standards was evaluated as an indicator of the quality of use.

RESULTS

The Quantity of Drug use

The highest amount of anti-infective usage for ARI patients was at CPHC; anti-infective use involved 11 medication types with a total quantity of 0.95 DDD/1000 patient/day. The amount of anti-infective use was lower at LPHC than CPHC; the quantity reached only 0.76 DDD/1000 patients/day of 10 anti-infective types being used. The amount of anti-infective use at BPHC was the lowest of the 3 centres and was only 0.65

DDD/1000 patients/day of 7 anti-infective types being used. The amount of DDD/1000 patients/day for each centre is shown in Table 1.

Amoxicillin was the most frequently used anti-infective for ARI therapy at each centre. The highest amoxicillin use was at CPHC at a statistical amount of 0.98 DDD/1000 patients/day, meaning that 0.09 % of the total patients per day at CPHC were prescribed amoxicillin. The quantity of amoxicillin use at BPHC was much lower, reaching only 0.59 DDD/1000 patients/day, meaning that only 0.058% of amoxicillin per day was prescribed to patients at BPHC. Meanwhile, the lowest quantity of amoxicillin usage occurred at LPHC, 0.2816 DDD/1000 patients/day, which meant that only 0.028% patients per day were prescribed amoxicillin.

The quality of drugs used

The anti-infection forming DU 90% segment can be seen on Figure 2. Ten anti-infectives were use at LPHC, 11 at BPHC and 7 at CPHC. Anti-infectives in the DU 90% segment at LPHC were amoxicillin, co-trimoxazole, and cefadroxil while amoxicillin was the only DU90% anti-infective used at CPHC and BPHC.

The adherence percentage of antiinfection usage to national formulary was shown in Table 2. At LPHC, the adherence of anti-infective usage on ARI patients was 70.00% and non-adherence was 30.00%, as cefadroxil, cefixime, and thiamphenicol were not in accordance with the National Formulary. At CPHC, the adherence of anti-infective use on ARI patients was smaller compared to LPHC; it had only 63.64% adherence while non-adherence reached 36.36% since cefadroxil, thiamphenicol, and azithromycin were not in accordance with the National Formulary. BPHC had the highest adherence at 71.43% with non-adherence only 28.57%; this was due to the useof cefadroxil and levofloxacin, which were not in accordance with the National Formulary.

DISCUSSION

The quantity of anti-infective use could not be compared according to DDD statistical amounts due to the difference in healthcare service hours at 1 of the primary health care centres being observed. This ultimately led to a condition in which the total amount of anti-infective usage at 1 primary health care facility was so different from the other 2 primary health care centres that the quantity of anti-infective usage was computed using DDD/1000 patients/day in order to compare its value to each primary health care centre.[4]

The quantity of anti-infective use in ARI patients at CPHC, LPHC, and BPHC in 2015 showed various differing amounts (Figure 1), either the DDD statistical amount or the number of drug types. CPHC had the highest use of anti-infectives in 2015 compared to the 2 other centres because it performed services 24 hours a day. The quantity of anti-infective use at BPHC and LPHC was nearly the same, at 0.65 DDD/1000 patients/day and 0.76 DDD/1000 patients/day, respectively.

Due to its wide spectrum, amoxicillin was used at 70.30% to relieve respiratory tract and other infections.[5] It was not surprising that amoxicillin was the most frequently used anti-infective for ARI therapy at each centre in this study. The results of this study were in agreement with Retnosari's finding in 2012 indicating that amoxicillin was the most frequently presribed antibiotic in eleven primary health centers in Depok.[6] However ampicillin was the most frequently antibiotic at six primary health centers in South Sumatra, Indonesia.[7]

Although amoxicillin was the most frequently use at at three primary health centers in this study however, the quantity of amoxicillin use was quite different 0.98 DDD/1000 patients/day, 0.59 DDD/1000 patients/day, 0.28 DDD/1000 patients/day respectively (Figure 1). Small quantity of amoxicillin use at two others primary health centers probably could be explain by the finding of previous study[6] that duration of antibiotic administration was frequently too short. Similar to quantity of amoxicillin at CPHC in our finding, a study at Krishna Hospital in India showed that 0.8942 DDD/1000 patients/day of amoxicillin were used for medical therapy of upper respiratory tract infections.[8]

Amoxicillin was the only DU90% anti-infective used at CPHC and BPHC. Neither of these centres used ampicillin since it has the same indicationas amoxicillin; these centres tended to use amoxicillin, which has been widely employed for ARI therapy and is categorised in the DU90% segment. Observational studies in community health service centres in the North Gorontalo Districtalso showed that amoxicillin was the anti-infective used on non-pneumonia ARI patients at all primary health care centres there;it is included in DU90%.[9]

Table 1: Anti-infection use rate at three primary health cares

| Anti-infection | ATC code | Limo | | Cipayung | | Bojongsari | |
| | | Primary Health Care | | Primary Health Care | | Primary Health Care | |
		DDD	DDD/1000 patients/day	DDD	DDD/1000 patients/day	DDD	DDD/1000 patients/day
Amoksisilin	J01CA04	3294.00	0.2816	19114.00	0.8792	7058.75	0.5894
Ampisilin	J01CA01	230.00	0.0197	-	-	-	-
Asiklovir	J05AB01	3.90	0.0003	7.40	0.0003	3.00	0.0003
Azitromisin	J01FA10	-	-	8.33	0.0004	-	-
Dosisiklin	J01AA02	15.00	0.0013	10.00	0.0005	-	-
Eritromisin	J01FA01	37.50	0.0032	35.00	0.0016	120.00	0.0100
Kloramfenikol	J01BA01	-	-	5.83	0.0003	-	-
Kotrimoksazol	J01EC01	3243.90	0.2773	647.28	0.0298	176.64	0.0147
Levofloksasin	J01MA12	-	-	-	-	5.00	0.0004
Sefadroksil	J01DB05	1118.25	0.0956	581.75	0.0268	171.00	0.0143
Sefiksim	J01DD08	155.75	0.0133	90.00	0.0041	-	-
Siprofloksasin	J01MA02	765.00	0.0654	100.00	0.0046	230.00	0.0192
Tiamfenikol	J01BA02	15.33	0.0013	43.67	0.0020	-	-
Total		8878.63	0.7590	20643.26	0.9496	7764.39	0.6483

Description	LPHC	CPHC	BPHC
Adhere	7 (70.00 %)	7 (63.64%)	5 (71.43%)
Not adhere	3 (30.00%)	4 (36.36%)	2 (28.57%)
Total	10 (100%)	11 (100%)	7 (100%)

LPHC: Limo Primary Health Care
CPHC: Cipayung Primary Health Care
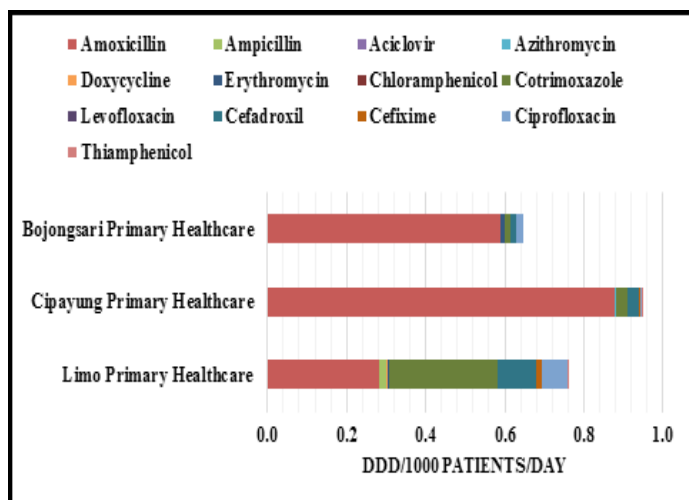BPHC: Bojongsari Primary Health Care

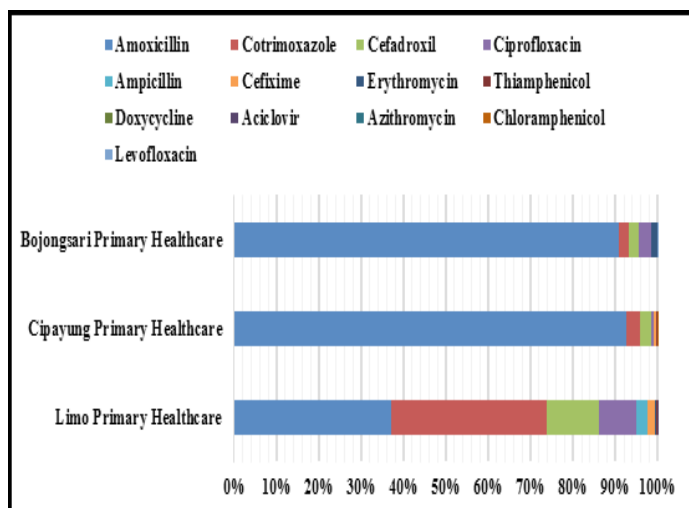**Figure 1:** Value of DDD/1000 patients/ day.

Figure 2: Anti-infection that form DU 90%.

Anti-infectives in LPHC were amoxicillin (J01CA04), co-trimoxazole (J01EC01), and cefadroxil (J01DB05). Amoxicillin had a 37.10% usage percentage at LPHC. Anti-infectives with the same indication as amoxicillin were also used at LPCH, namely ampicillin. The anti-infection forming DU 90% segment can be seen on Figure 2. Another drug classified as DU90% at LPHC was co-trimoxazole (sulfonamide group). which is a combination of 2 kinds of drugs, trimethoprim and sulfamethoxazole,which have a wide spectrum;this drug can be used as the empiric therapy for various kinds of infections. Various research has proven the effectiveness of co-trimoxazole indecreasing fatality and sickness rates by reducing the incidence of infections caused by bacteria.[10] This is the same as research conducted in 2015 monitoring the use of antibiotics at Abepura Hospital in Jayapura. Results indicated that co-trimoxazole is in the first rank of the DU90% segment.[11]

Cefadroxil was another DU90% anti-infective used on ARI patients at LPHC, although in small quantities. Cefadroxil is an antibacterial utilised for systemic consumption; it belongs to the beta-lactam group and is commonly used in infection therapy. In 2010, cefadroxil was included in 18 types of DU90% antibiotics according to previous research.[12]

The quality of drug use was measured by analysing the adherence of drug use with the list of drugs inthe National Formulary. The use of the National Formulary as the guideline for drug usage is an effort to assure rational and appropriate drug consumption.[13]

At LPHC, the adherence of anti-infective usage on ARI patients was 70.00% and non-adherence was 30.00%, as cefadroxil, cefixime, and thiamphenicol were not in accordance with the National Formulary. At CPHC, the adherence of anti-infective use on ARI patients was smaller compared to LPHC;it had only 63.64% adherence while non-adherence reached 36.36% since cefadroxil, thiamphenicol, and azithromycin were not in accordance with the National Formulary. BPHC had the highest adherence at 71.43% with non-adherence only 28.57%; this was due to the useof cefadroxil and levofloxacin, which were not in accordance with the National Formulary .

Anti-infectives used on ARI patients at LPHC that were not in accordance with the National Formulary since they were not intended for a primary health center or were not listed in the National Formulary included cefadroxil (J01DB05) and cefixime(J01DD08), which are first- and third-generation cephalosporins. These anti-infectives were also used at CPHC, while BPHC used only cefadroxil. However, cefadroxil and cefixime were on the WHO's *Essential Medicines List* of 2013. Cefadroxil and cefixime were used by LPHC and cefadroxil was used by BPHC.

LPHC used thiamphenicol as an alternative anti-infective even though it is not in accordance with the National Formulary. However, it was in the Basic Treatment Guidelines in Primary Health Care 2007,so it was used. CPHC used thiamphenicol as an anti-infective on ARI patients, but CPHC also used chloramphenicolas an anti-infective for ARI therapy.

CPHC also used azithromycin (J01FA01), which is not listed in the National Formulary but is mentioned in the Basic Treatment Guidelines in Primary Health Care 2007. LPH and BPHC preferred to use erythromycin (J01FA01) as it is listed in the National Formulary.

Non-adherence of the anti-infective usage on ARI patients also occurred at BPHC. The quinolone group has the same indication as ciprofloxacin (J01MA02) and levofloxacin (J01MA12). Levofloxacin is not mentioned in the National Formulary for primary health centre, National E*ssential Medicines List (*DOEN) 2013, or in the Basic Treatment Guidelines in Primary Health Care 2007. Levofloxacin was not used by LPHP and BPHP as they preferred ciprofloxacin, which has the same indication as levofloxacin and is listed in the National Formulary. Table 2 contains details about the adherence of anti-infective use at CPHC, LPHC, and BPHC.

The use of anti-infectives on ARI patients according to DDD/1000 patients/day from the highest rank to the lowest rank was CPHC, LPHC, and BPHC. The DU90% anti-infectives used on ARI patients at LPHC were amoxicillin, co-trimoxazole, and cefadroxil, while amoxicillin was used at CPHP and BPHC. The adherence percentage of use of anti-infectives that conformed to National Formulary standards from the highest to the lowest was BPHP, LPHP, and CPHP.

CONCLUSION

The use of anti-infectives at CPHC, LPHC, and BPHC varied and some did not adhere to National Formulary guidelines.

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CONFLICT OF INTEREST

No conflict of interest are declare.

ABBREVIATIONS USED

ARI: Acute Respiratory Syndrome; **LPHC:** Limo Primary Health Care; **BPHC:** Bojongsari Primary Health Care; **CPHC:** Cipayung Primary Health Care; **ATC:** Anatomical Therapeuticc Chemical; **DDD:** Daily Defined Dose.

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