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Original research

Reporting on antibiotic use patterns using the WHO Access, Watch, Reserve classification in the Caribbean

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ABSTRACT

Objective. To assess antibiotic use in three hospitals in three Caribbean countries based on data from 2013 and 2018 using the World Health Organization Essential Medicines List "Access, Watch, Reserve" (AWaRe) classification.

Methods. A retrospective observational study, which analyzed the World Health Organization Point Prevalence Survey data from three hospitals in three Caribbean countries, to examine proportional AWaRe group antibiotic use for the top ten inpatient indications. The Access-to-Watch ratio was calculated, and the top three antibiotics prescribed in each hospital were determined.

Results. The final data set included 376 prescriptions for the top ten indications in 766 inpatients. The hospital antibiotic use point prevalence for Hospital 1 was 35.6%, Hospital 2 was 48.6%, and Hospital 3 was 47.1%. The Access-to-Watch ratio for the top ten indications was 2.45, 1.36, and 1.72 in the three hospitals. Access group prevalence was 71.0% in Hospital 1, 57.6% in Hospital 2, and 63.2% in Hospital 3. There were no Reserve antibiotics prescribed in any of the institutions. The most common indication for Watch prescription was skin and soft tissue infections in Hospital 1 and pneumonia in Hospital 2 and 3.

Conclusions. This study draws urgent attention to evidence of a high proportion of Watch antibiotic prescribing and lack of Reserve group antibiotics in three Caribbean countries. This research provides data that may inform national formulary and antimicrobial stewardship policy-making across the settings analyzed and the wider region.

Keywords Anti-infective agents; antimicrobial stewardship; drug resistance, microbial; pharmacopoeia; access to essential medicines and health technologies; Caribbean region.

The growing global threat of antimicrobial resistance (AMR) disproportionately affects low- and middle-income countries, like 79% of those in Latin America and the Caribbean (1, 2). Following the collective commitment by the Caribbean Community (CARICOM) to develop national action plans on AMR by 2017, the Pan American Health Organization (PAHO) has supported a series of strategic activities for focused outcomes in the health of people, animals, and ecosystems (3–5). PAHO thus recognized a need to conduct a pre-implementation assessment of antibiotic use in acute care settings using the World Health Organization (WHO) Point Prevalence Survey (PPS), developed to guide decision-making (2). In acute care institutions across Latin America, this tool has sensitized prescribers to important AMR indicators, consequently adding credibility and context to the AMR plans of action among policymakers and decision-makers (4).

Sharland et al. (6) categorized the 180 antimicrobials on the WHO Essential Medicines List (EML) using the Access, Watch, and Reserve (AWaRe) classification as a tool to guide their safe and effective prescription. The drugs in the Access (green) group of antimicrobials are first- or second-line agents meant to be widely available, as they are recommended in the empiric treatment of several common infectious diseases (6, 7). The antibiotics in the Watch (amber) group, such as carbapenems, have shown a greater risk of selecting for resistance, and so are recommended as first- or second-line drugs for a limited number

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of indications (6, 7). The third Reserve (red) group comprises antibiotics of last resort that should only be used in specific life-threatening clinical scenarios (6, 7). Furthermore, medicines in the Watch and Reserve groups must be closely monitored through antimicrobial stewardship programs to ensure their continued effectiveness (8).

The WHO global action plan (9) highlights a need for AMR surveillance networks and centers that collaborate to create or strengthen regional and international surveillance and response. Systematic Global PPS reviews have subsequently combined and categorized overall and condition-specific antibiotic use patterns by AWaRe classification worldwide (7, 10). This research suggests that AWaRe classification might be a more straightforward metric to monitor patterns of antibiotic use and an evaluative antimicrobial stewardship tool to guide institutional and national policy advancement. Reporting proportional AWaRe use aids the assessment of prescriber patterns, highlighting educational gaps, stock-outs, and questions of access and appropriateness, to support guideline recommendations (6, 8).

However, data on proportional AWaRe use in the English-speaking Caribbean is limited, as countries with PPS data from fewer than three hospitals are sometimes excluded from global analyses (10). Consequently, standardized antimicrobial stewardship program recommendations based on AWaRe are not supported or advanced by data from the subregion; therefore, a study of this type is both novel and timely.

We utilized secondary WHO PPS data from tertiary care institutions obtained between 2013 and 2018 from three CARICOM States that were early adopters of this tool to illustrate and analyze proportional AWaRe use in acute care inpatients. We aim to describe prescriber patterns using this recommended classification system for the most common indications, outlining the strengths and challenges at this level of patient care. In addition, we underline key opportunities for AMR action from the analyses to inform the development of access-centered policy in the Caribbean and contribute to global antimicrobial stewardship activities.

MATERIALS AND METHODS

Study setting and data collection

This retrospective observational study utilized data from previous WHO PPS research carried out in the three countries outlined in Table 1. Institutions were anonymized to avoid overt comparisons. A PAHO-affiliated survey research team at the three hospitals under review (Hospital 1 in 2013, Hospital 2 in 2018, Hospital 3 in 2018) had been established for each institution. There was at least one individual with clinical expertise and familiarity with the setting on each team. Each inpatient at the time of the study was targeted for inclusion unless they did not meet the necessary criteria of the PAHO Hospital Antimicrobial Use PPS (HAMU-PPS) methodology (2). Survey data were collected using the Research Electronic Data Capture tool (REDCap) developed by researchers at Vanderbilt University (15).

Data analysis

All data collected at these hospitals in 2013 and 2018 were analyzed. Descriptive analyses were performed separately for each institution, exporting the data from REDCap to a Microsoft Excel 2016 database (Microsoft Corporation, Redmond, WA) and R software. Categorical variables were presented as frequencies and percentages, and 95% confidence intervals (CI) were calculated. Prevalence of antibiotic use was defined as the ratio of the number of patients on antibiotics to the total number of eligible patients included in the survey sample. Based on the 2019 EML AWaRe criteria, antibiotics were classified as Access, Watch, or Reserve. Antimycotics, antifungals, tuberculosis (TB) drugs, antivirals, intestinal anti-infectives, antimalarials, and other antiprotozoals were not analyzed. Proportional AWaRe use and Access-to-Watch ratios were calculated for each institution's top ten treatment indications (WHO disease classification). Proportional Access, Watch, and Reserve use was assessed by calculating the number of prescriptions in each category relative

TABLE 1. Country and hospital summary profiles

Country	Barbados	Guyana	Saint Lucia
Population (11)	280 000	780 000	180 000
Income level (GDP per capita 2020) (1)	High income (~15 000)	Upper middle income (~7 000)	Upper middle income (~9 000)
Date of NAP on AMR	2017	2017	2017
	Hospital 1	**Hospital 2**	**Hospital 3**
Tertiary care facility under review (self-reported at the time of PPS)	• University-affiliated teaching hospital • Research hospital • National referral hospital • 519-bed capacity • Governance: Ministry of Health (public) • In-house laboratory and pharmacy	• University-affiliated teaching • hospital • Research hospital • National referral hospital • 600-bed capacity • Governance: Ministry of Health (public) • In-house laboratory and pharmacy	• Teaching hospital affiliated with nursing school • Not a research hospital • National referral hospital • 162-bed capacity • Governance: Ministry of Health (public) • In-house laboratory and pharmacy
Hospital specialist services (12–14)	• Oncology and nuclear medicine (2012) • IPC specialist on-staff • Peritoneal dialysis unit (2013) • Surgical ICU • Adult medical, pediatric, and neonatal ICU	• Oncology unit (2006) • IPC specialist on-staff • 7-bed multidisciplinary adult ICU • Renal dialysis unit • Neonatal ICU (2012)	• No oncology unit • No IPC specialist on-staff • 3-bed multidisciplinary ICU • Renal dialysis unit • Chest ward (tuberculosis) • Neonatal ICU
Date of PPS	2013	2018	2018

Notes: NAP, national action plan; AMR; antimicrobial resistance; PPS, point prevalence survey; IPC, infection prevention and control; ICU, intensive care unit.
Source: Prepared by the authors, including data from references (1, 11–14).

to the total number of prescriptions in the top ten clinical indications. A unique prescription was defined as one antibiotic given by one route of administration. The top three antibiotic prescriptions with their AWaRe categories are reported.

Ethical clearance

The data were used under approval from the Ethics Review Committee of PAHO. Each participating ministry and hospital governing body approved the secondary data usage.

RESULTS

The total reported inpatients for Hospital 1 was 312, Hospital 2 had 333, and Hospital 3 had 121. The final data set included 376 prescriptions for the top ten indications in 766 inpatients: 131 in Hospital 1, 177 in Hospital 2, and 68 in Hospital 3. The hospital antibiotic use point prevalence for Hospital 1 was 35.6%, 95% CI (30.5, 41.0); Hospital 2 was 48.6% (43.3, 54.0); and Hospital 3 was 47.1% (38.4, 56.0) (Table 2). Proportional AWaRe use for the top ten indications is outlined in Figure 1 and Table 3. Access group prevalence was 71.0%, 95% CI (62.7, 78.0) in Hospital 1; 57.6% (50.3, 64.7) in Hospital 2; and 63.2% (51.4, 73.7) in Hospital 3. There were no Reserve antibiotics prescribed in any of the institutions.

TABLE 2. Antibiotic point prevalence

Category	Hospital 1	Hospital 2	Hospital 3
Inpatients	312	333	121
On antibiotics	111	162	57
Antibiotic point prevalence (95% confidence interval)	35.6 (30.5, 41.0)	48.6 (43.3, 54.0)	47.1 (38.4, 56.0)
Prescriptions	159	262	87
Prescriptions[a] for top ten indications	131	177	68

Note: [a] Some patients with more than one prescription.
Source: Prepared by the authors based on the study data.

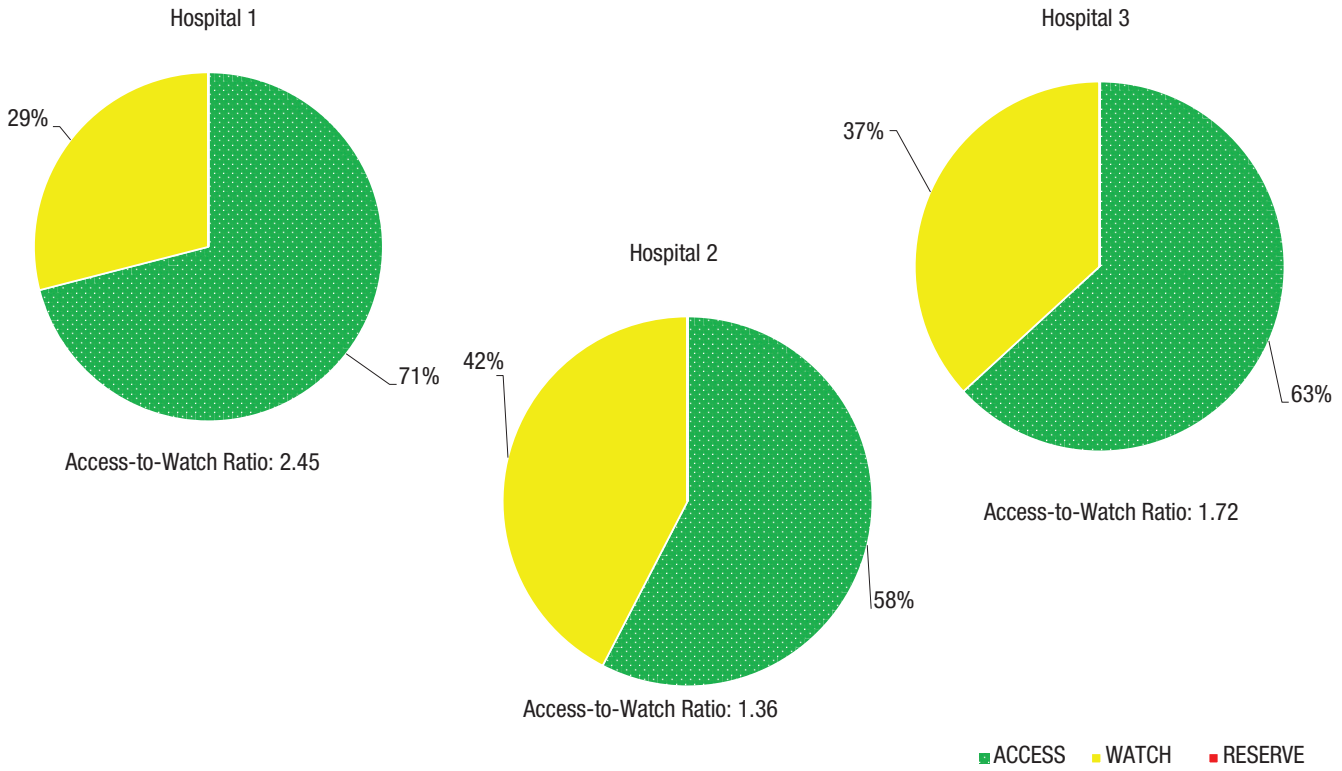
Top indications

The top ten indications for antibiotic prescription represented 82.4%, 67.6%, and 78.2% of total prescriptions in Hospital 1, 2, and 3, respectively. The Access-to-Watch ratio for the top ten indications was 2.45, 1.36, and 1.72 in Hospital 1, 2, and 3, respectively. Overall, cellulitis, wound, and deep soft tissue not involving bone, not related to surgery (SST-O) was the most common indication for antibiotic prescription in Hospital 1, accounting for 22.1% (n = 29) of top prescriptions. Clinical sepsis (CSEP) was the most common indication for antibiotic prescription in Hospital 2 and 3, accounting for 28.2% (n = 50) of top prescriptions in Hospital 2 and 20.6% (n = 14) in Hospital 3. The most common indication for Watch prescription was SST-O in Hospital 1 and pneumonia (PNEU) in Hospital 2 and 3 (Table 3).

Top prescriptions

Amoxicillin/clavulanic acid (Access), ciprofloxacin (Watch), and metronidazole (Access) were the top three antibiotic

FIGURE 1. AWaRe use proportions



Source: Prepared by the authors based on the study data.

TABLE 3. Access, Watch, and Reserve group prevalence for the top ten indications from each hospital

WHO Point Prevalence Survey diagnostic code	Hospital 1		Hospital 2		Hospital 3	
	% (*n*)		% (*n*)		% (*n*)	
	ACCESS	WATCH	ACCESS	WATCH	ACCESS	WATCH
SST-O: cellulitis, wound, deep soft tissue not involving bone (not related to surgery)	72.4 (21)	27.6 (8)	63.3 (19)	36.7 (11)	90.9 (10)	9.1 (1)
CYS/PYE: symptomatic upper or lower urinary tract infection	83.3 (15)	16.7 (3)	25.0 (2)	75.0 (6)	50.0 (3)	50.0 (3)
BAC: laboratory-confirmed bacteremia	56.3 (9)	43.7 (7)	66.7 (4)	33.3 (2)	--	--
PNEU: pneumonia	61.5 (8)	38.5 (5)	45.7 (16)	54.3 (19)	20.0 (2)	80.0 (8)
OBGYN: obstetric or gynecological infections, sexually transmitted disease in women	100.0 (13)	0.0 (0)	66.7 (8)	33.3 (4)	80.0 (8)	20.0 (2)
IA: intra-abdominal sepsis, including hepatobiliary	50.0 (6)	50.0 (6)	--	--	57.1 (4)	42.9 (3)
CSEP: clinical sepsis, excluding febrile neutropenia	80.0 (8)	20.0 (2)	68.0 (34)	32.0 (16)	64.3 (9)	35.7 (5)
SST-SSI: surgical site infection involving skin or soft tissue but not bone	71.4 (5)	28.6 (2)	57.9 (11)	42.1 (8)	--	--
BJ-O: septic arthritis, osteomyelitis (not related to surgery)	57.1 (4)	42.9 (3)	--	--	--	--
BJ-SSI: septic arthritis, osteomyelitis of surgical site	66.7 (4)	33.3 (2)	66.7 (2)	33.3 (1)	0.0 (0)	100.0 (1)
BRON: acute bronchitis or exacerbations of chronic bronchitis	--	--	25.0 (1)	75.0 (3)	--	--
SIRS: systemic inflammatory response with no clear anatomical site	--	--	--	--	100.0 (4)	0.0 (0)
CNS: infections of the central nervous system	--	--	50.0 (5)	50.0 (5)	50.0 (1)	50.0 (1)
GI: gastrointestinal infections (e.g., salmonellosis, antibiotic-associated diarrhea)	--	--	--	--	67.0 (2)	33.0 (1)
Total	71.0 (93)	29.0 (38)	57.6 (102)	42.4 (75)	63.2 (43)	36.8 (25)
95% confidence interval	62.7, 78.0	21.9, 37.3	50.3, 64.7	35.3, 49.7	51.4, 73.7	26.3, 48.6
Access-to-Watch ratio	2.45		1.36		1.72	

Notes: -- not applicable.
Source: Prepared by the authors based on the study data.

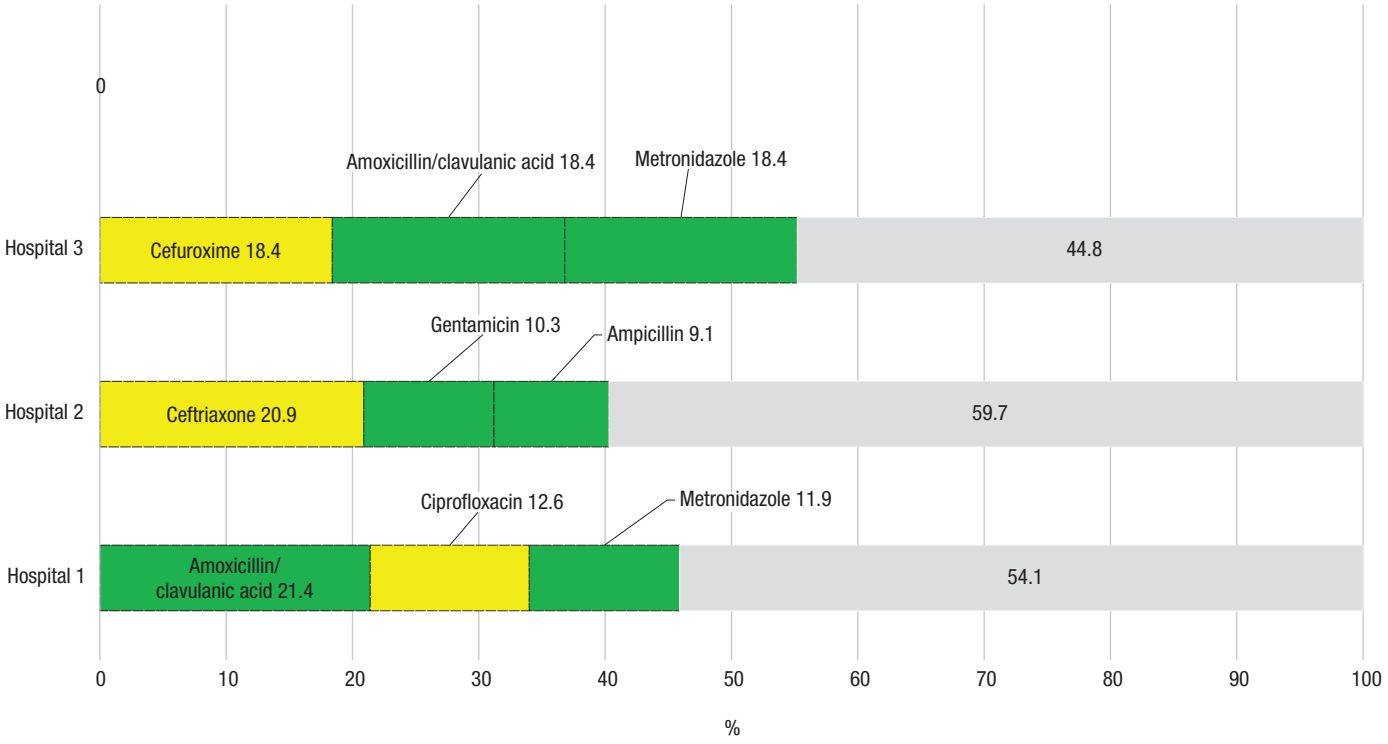
prescriptions in Hospital 1, representing 21.4%, 12.6%, and 11.9% of total prescriptions, respectively. Ceftriaxone (Watch), gentamicin (Access), and ampicillin (Access) were the top three antibiotic prescriptions in Hospital 2, representing 20.9%, 10.3%, and 9.1% of total prescriptions, respectively. Amoxicillin/clavulanic acid (Access), cefuroxime (Access), and metronidazole (Access) were the top three antibiotic prescriptions in Hospital 3, representing 18.4%, 18.4%, and 18.4% of total prescriptions, respectively (Figure 2).

DISCUSSION

Access, Watch, and Reserve prescribing

We used the AWaRe classification as a framework to assess narrow- and broad-spectrum antibiotic use patterns in three Caribbean hospitals. To our knowledge, this study is the first to report on proportional AWaRe use in the Caribbean subregion. The alternative of using institutional antimicrobial consumption as a measure poses technical and logistical challenges and excludes pediatric patient populations (7). One of the goals of the WHO essential medicines campaign is to increase the proportion of antibiotics consumed globally from the Access category to 60% (16). Based on the reported Access-to-Watch ratios, prescribers in these settings appear to utilize Access medicines more frequently. One limitation of reporting on this Access-to-Watch ratio alone, however, is that it illustrates an oversimplification of AWaRe group usage. For instance, Watch antibiotics were among the top three medicines used overall across these institutions. In Hospital 2 and 3, cephalosporins were the most prescribed antibiotics overall. Ceftriaxone, a third-generation cephalosporin and Watch antibiotic, was prescribed in one-fifth of indications in Hospital 2 (Figure 2). This finding is in keeping with a region-wide PPS and laboratory surveillance study carried out in 2017 in 12 hospitals across nine Caribbean countries and territories (not including those in this study), which revealed that beta-lactams were by far the most-used intravenous antimicrobials, representing 60.6% of those prescribed (17). A significant proportion of the isolates from the same study were resistant to fluoroquinolones and trimethoprim, which represent critical antibiotic classes used in treating Gram-negative priority infections (17, 18). A high number of Watch antibiotic fluoroquinolone prescriptions for indications such as skin and soft tissue infections and pneumonia (see Table 2) is of particular concern in TB-endemic countries, where

FIGURE 2. Top three antibiotics prescribed in each institution (%)



Source: Prepared by the authors based on the study data.

these medicines remain crucial in the treatment of multidrug-resistant TB (19).

There was no documented use of Reserve antibiotics based on the 2019 AWaRe classification. From a recent global assessment of national EMLs, those of Barbados and Saint Lucia did not contain Reserve antibiotics, and the Guyana national EML included only one (20). Although these countries have access to antibiotic treatment for priority infections, this lack of Reserve antibiotics is alarming, as countries in the Caribbean are already facing widespread multidrug resistance.

In Hospital 1, fluoroquinolones (the commonest Watch medication used in this institution; 12.6%) predicted carbapenem-resistant *Klebsiella pneumoniae* carriage in a one-year prevalence study that followed this WHO PPS research in 2013 (21). Researchers in a Caribbean-wide, 15-hospital laboratory evaluation of *K. pneumoniae* describe a high number and diversity of acquired drug resistance in extended-spectrum β-lactamase genes and carbapenemases among isolates (17). Carbapenem-resistant *K. pneumoniae* is among the WHO critical priority pathogens, and hypervirulent strains may cause severe community-acquired infections such as pneumonia and meningitis (17, 22). Carbapenemases increase patient mortality by over 50%, extend hospital stay by almost 50%, and increase the cost of hospitalization by 50% (23–26). Detailed mapping of antibiotic use, coupled with laboratory surveillance to inform locally applicable guidelines, could positively affect patient outcomes. Ultimately, these figures underline the importance of securing Reserve antibiotics on national formularies for use as last-resort options in treating life-threatening MDR infections.

Opportunities in the context of COVID-19

The COVID-19 pandemic presents an opportunity for more comprehensive antimicrobial use surveillance. In the clinical management of COVID-19, increases in unnecessary antimicrobial use could potentiate future AMR risks by driving the selection of multidrug resistant and extensively drug-resistant organisms (4, 27). Through an international web-based survey of physicians involved in the treatment of COVID-19, Beovi et al. (28) concluded early in the pandemic that broad-spectrum antibiotic use in patients with COVID-19 was widespread. In a November 2021 Latin America and Caribbean update, PAHO data indicated that over 90% of inpatient COVID-19 cases were treated with antimicrobials, while only 7% had a secondary infection (29). Among the most common antibiotics used were piperacillin-tazobactam (AWaRe Watch), which Forde et al. demonstrated in 2013 was a predictor for carbapenem-resistant *K. pneumoniae* carriage in the Caribbean (4, 21).

Limitations

The increasingly expansive AMR threat requires multilateral, transnational coordination, particularly in the Caribbean—a setting with an interconnected population situated between the regions of North America and South America and considered endemic for several resistant strains (17, 30). The findings from this study contribute to a knowledge catalog to address antimicrobial overuse. However, the data we have analyzed are from years ago—approaching a decade for Barbados. Furthermore,

at least two of these institutions—through their national action plans and guided by earlier PPS findings—have designed and implemented antimicrobial stewardship programs (21, 31). Therefore, revisiting this AWaRe group quality target in evaluating stewardship strategies would be worthwhile.

Another limitation was an inability to disaggregate data to highlight the variation of antibiotic use between community-acquired infection (CAI) and hospital-acquired infection (HAI). These epidemiological data were variably reported using the PPS tool for all three institutions, in keeping with the experiences of other regional investigators. From pilot studies in four Mexican hospitals, Zumaya-Estrada et al. (32) suggest that making estimations and missing HAI/CAI data from WHO PPS could prove misleading. HAI/CAI data remain relevant indicators in antimicrobial use/consumption surveillance, mainly where there are no local guidelines; therefore, improving the capture of this variable in the WHO PPS methodology contributes to public health initiatives.

Conclusion

We have highlighted the patterns of antibiotic use with the WHO AWaRe classification and, in doing so, uncovered opportunities in the new iterations of the WHO PPS methodology, particularly in the COVID-19 pandemic, to interrogate this indicator of quality in healthcare settings in the Caribbean. Our study draws urgent attention to evidence of gaps impacting prudent prescription practices, such as the high proportion of Watch antibiotics and lack of Reserve group antibiotics, providing data that may inform national formulary and antimicrobial stewardship policy-making across the settings analyzed and the wider region. Using the latest iteration of the WHO PPS tool could address shortcomings in data reporting and ensure that critical analyses such as antimicrobial use in HAI/CAI are considered in short- and intermediate-term goal setting. As the WHO Global Policy on AMR emphasizes, regional coordination, such as through CARICOM and its public health arm, may promote AMR research, enhancing the quality of care and health equity.

Author contributions. TR conceived the original idea. PRP, NEO, and JH contributed to the data collection in these hospitals. TR and JH managed and analyzed the datasets. TR and REQ interpreted the results. TR wrote the paper with contributions and revisions from all authors. All authors reviewed and approved the final version.

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Conflict of interest. None declared.

Disclaimer. Authors hold sole responsibility for the views expressed in the manuscript, which may not necessarily reflect the opinion or policy of the *RPSP/PAJPH* and/or those of the Pan American Health Organization (PAHO).

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Presentación de informes sobre los patrones de consumo de antibióticos mediante la clasificación de acceso, control y reserva (AWaRe) de la OMS en el Caribe

RESUMEN

Objetivo. Evaluar el consumo de antibióticos en tres hospitales de tres países del Caribe según datos del período 2013-2018 mediante la clasificación de acceso, control y reserva (AWaRe, por su sigla en inglés) de la lista de medicamentos esenciales de la Organización Mundial de la Salud.

Métodos. Se realizó un estudio observacional retrospectivo, que analizó los datos de la encuesta de prevalencia puntual de la Organización Mundial de la Salud de tres hospitales en tres países del Caribe, a fin de evaluar el consumo proporcional de antibióticos por grupo de la clasificación AWaRe para las diez principales indicaciones en pacientes hospitalizados. Se calculó la relación entre los grupos de acceso y de control y se determinó cuáles eran los tres principales antibióticos prescritos en cada hospital.

Resultados. El conjunto final de datos incluyó 376 recetas para las diez indicaciones principales en 766 pacientes hospitalizados. La prevalencia puntual del consumo de antibióticos en el hospital 1 fue 35,6%, en el hospital 2 fue 48,6% y en el hospital 3 fue 47,1%. La relación entre los grupos de acceso y de control correspondientes a las diez principales indicaciones fue 2,45, 1,36 y 1,72 en los tres hospitales. La prevalencia del grupo de acceso fue 71,0% en el hospital 1, 57,6% en el hospital 2 y 63,2% en el hospital 3. No se prescribieron antibióticos del grupo de reserva en ninguna de las instituciones. La indicación más común para la prescripción de antibióticos en el grupo de control fue infecciones en la piel y los tejidos blandos en el hospital 1 y neumonía en los hospitales 2 y 3.

Conclusiones. Este estudio busca llamar la atención urgentemente sobre la evidencia de una alta proporción de prescripción de antibióticos del grupo de control y la carencia de antibióticos del grupo de reserva en tres países del Caribe. Esta investigación proporciona datos que pueden fundamentar el formulario nacional y la elaboración de políticas para la optimización del uso de antimicrobianos en los entornos analizados y en la región en general.

Palabras clave Antiinfecciosos; programas de optimización del uso de los antimicrobianos; farmacorresistencia microbiana; farmacopea; acceso a medicamentos esenciales y tecnologías sanitarias; región del Caribe.

Relatório sobre padrões de uso de antibióticos no Caribe usando a classificação Acesso, Vigilância e Reserva da OMS

RESUMO

Objetivo. Avaliar o uso de antibióticos em três hospitais de três países do Caribe, com base em dados de 2013 e 2018, usando a classificação "Acesso, Vigilância e Reserva" (AWaRe) da Lista de Medicamentos Essenciais da Organização Mundial da Saúde.

Métodos. Estudo observacional retrospectivo com análise de dados do Estudo de Prevalência Pontual da Organização Mundial da Saúde, coletados em três hospitais de três países do Caribe para examinar o uso proporcional de antibióticos dos grupos AWaRe para as dez indicações mais frequentes em pacientes internados. A razão entre os grupos Acesso e Vigilância foi calculada e determinou-se quais eram os três antibióticos mais prescritos em cada hospital.

Resultados. O conjunto final de dados incluiu 376 medicamentos prescritos para as dez indicações mais frequentes em 766 pacientes internados. A prevalência pontual de uso de antibióticos foi de 35,6% no hospital 1, 48,6% no hospital 2 e 47,1% no hospital 3. A razão entre Acesso e Vigilância nas dez indicações mais frequentes foi 2,45, 1,36, e 1,72 nos três hospitais. A prevalência do grupo Acesso foi de 71,0% no hospital 1, 57,6% no hospital 2 e 63,2% no hospital 3. Nenhum antibiótico da categoria Reserva foi prescrito em nenhuma das instituições. A indicação mais comum dos medicamentos prescritos no grupo Vigilância foram infecções de pele e tecidos moles no hospital 1 e pneumonia nos hospitais 2 e 3.

Conclusões. Este estudo chama urgentemente a atenção para evidências de uma grande proporção de antibióticos prescritos no grupo Vigilância e a carência de antibióticos do grupo Reserva em três países do Caribe. Esta pesquisa fornece dados que podem guiar a criação de políticas para o formulário terapêutico nacional e o uso racional de antimicrobianos nos cenários analisados e na região como um todo.

Palavras-chave Anti-infecciosos; gestão de antimicrobianos; resistência microbiana a medicamentos; farmacopeia; acesso a medicamentos essenciais e tecnologias em saúde; região do Caribe.