Trends in cardiovascular medicine use in 65 middle-and high-income countries

Brief title: Cardiovascular medicine use in middle- and high-income countries

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Data sharing
The statements, findings, and suggestions in this Article are based on data obtained under license from IQVIA: IQVIA-MIDAS monthly sales data, 2008–2018; all rights reserved. The statements, findings, and suggestions are not necessarily those of IQVIA or any of its affiliated or subsidiary entities. We alone are responsible for the views expressed in this Article and they do not necessarily represent the views, decisions, or policies of the institutions with which we are affiliated.

Abbreviations
ATC = WHO Anatomic Therapeutic Chemical code
CAGR = compound annual growth rate
CVD = cardiovascular disease
DDDTID = defined daily dose per 1000 inhabitants per day
HICs = high-income countries
IQVIA-MIDAS = IQVIA Multinational Integrated Data Analysis System
MICs = middle-income countries
WHO = World Health Organization

Introduction

Access to cardiovascular medicines remains a global health challenge.(1) By 2025, the World Health Organization (WHO) Global Action Plan aims for at least 50% of eligible people to receive drug therapy for the prevention of myocardial infarction and stroke. Yet, the accessibility and affordability of cardiovascular medicines varies across countries with different income levels (2) posing barriers to the prevention and treatment cardiovascular diseases (CVDs). Timely monitoring of cardiovascular medicine consumption can help identify potential treatment gaps and track implementation of WHO's global targets. Therefore, we aimed to describe recent trends in cardiovascular medicine consumption in middle-income countries (MICs) and high-income countries (HICs).

Methods

We conducted a descriptive study using aggregated pharmaceutical sales data from the IQVIA Multinational Integrated Data Analysis System (IQVIA-MIDAS). IQVIA-MIDAS captures the volume of medicines sold to retail and hospital pharmacies from wholesalers in different countries and unifies the data to facilitate global-level analysis. In countries with limited raw data, projections have been applied in IQVIA-MIDAS to represent 100% of the total market sales volume based on knowledge of market share. Patient-level data is not available in IQVIA-MIDAS; hence this study was exempt from ethics approval by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster.

We included data from 2008 to 2018 in 65 countries. Countries were stratified into 38 HICs and 27 MICs (6 lower-middle and 21 upper-middle income) according to the World Bank income classification 2018. We obtained population estimates from the UN World Population Prospects (2019 Report). We included medicines belonging to the *cardiovascular*

system and *antithrombotic agents* classes in the WHO Anatomic Therapeutic Chemical (ATC) Classification System.

Sales volume was expressed in defined daily dose per 1000 inhabitants per day (DDDTID), which estimates the proportion of population receiving a particular medicine daily in a particular year, accounting for differences in population and medicine dosage. The compound annual growth rate ($CAGR = \left(\sqrt[10]{\frac{Annual\ consumption\ (DDDTID)\ in\ 2018}{Annual\ consumption\ (DDDTID)\ in\ 2008}} - 1\right) \times 100$) was used to quantify changes in consumption over time. Data were analyzed using R (version 3.6.1).

Results

Consumption of all cardiovascular medicines increased from 113.58 DDDTID in 2008 to 153.52 DDDTID in 2018, corresponding to 3.06% annual growth. Consumption and growth of cardiovascular medicines classes differed in MICs and HICs (Figure 1). The CAGR for all cardiovascular medicines was greater in MICs (9.96%) than HICs (0.98%). Total consumption was about 15-fold higher in HICs than MICs in 2008 (HICs: 410.54 DDDTID, MICs: 27.69 DDDTID), and remained 6-fold higher in 2018 (HICs: 452.52 DDDTID, MICs: 71.57 DDDTID).

Discussion

From 2008 to 2018, consumption of cardiovascular medicines increased by approximately 3% each year, outpacing the estimated 2.5% annual increase in global CVD prevalence.(3) This may suggests expanded access and availability of cardiovascular medicines in the included countries. Despite higher growth in cardiovascular medicine consumption in MICs than HICs, consumption of cardiovascular medicines remained about 6-fold higher in HICs than MICs in 2018. In contrast, the prevalence of CVDs in HICs was

only about 2-fold of that in MICs,(3) suggesting that factors other than CVD prevalence contribute to differences in consumption between HICs and MICs.

Limited access to cardiovascular medicines creates additional barriers to treatment and prevention of CVDs in MICs. Previous studies indicate the availability of four cardiovascular medicines in urban communities was higher in HICs (95%) than upper MICs (80%) and lower MICs (62%) and were potentially unaffordable in one-third of households in MICs.(2) Furthermore, few patients with CVDs in 17 lower-middle income countries received antiplatelets (25.3%), beta-blockers (17.4%), renin-angiotensin system (RAS) blockers (19.5%), or statins (14.6%).(4) Our results support previous findings that country income influences use of cardiovascular medicines more than patient-based factors such as age, sex, body mass index, hypertension.(4)

This study is limited in that it did not use patient-level data and did not include low-income countries, where further research is needed.

Conclusion

Despite recent improvement, a treatment gap persists for cardiovascular medicines between HICs and MICs. To meet the goals in the WHO action plan, additional efforts are needed to improve access to cardiovascular medicines, particularly in MICs.

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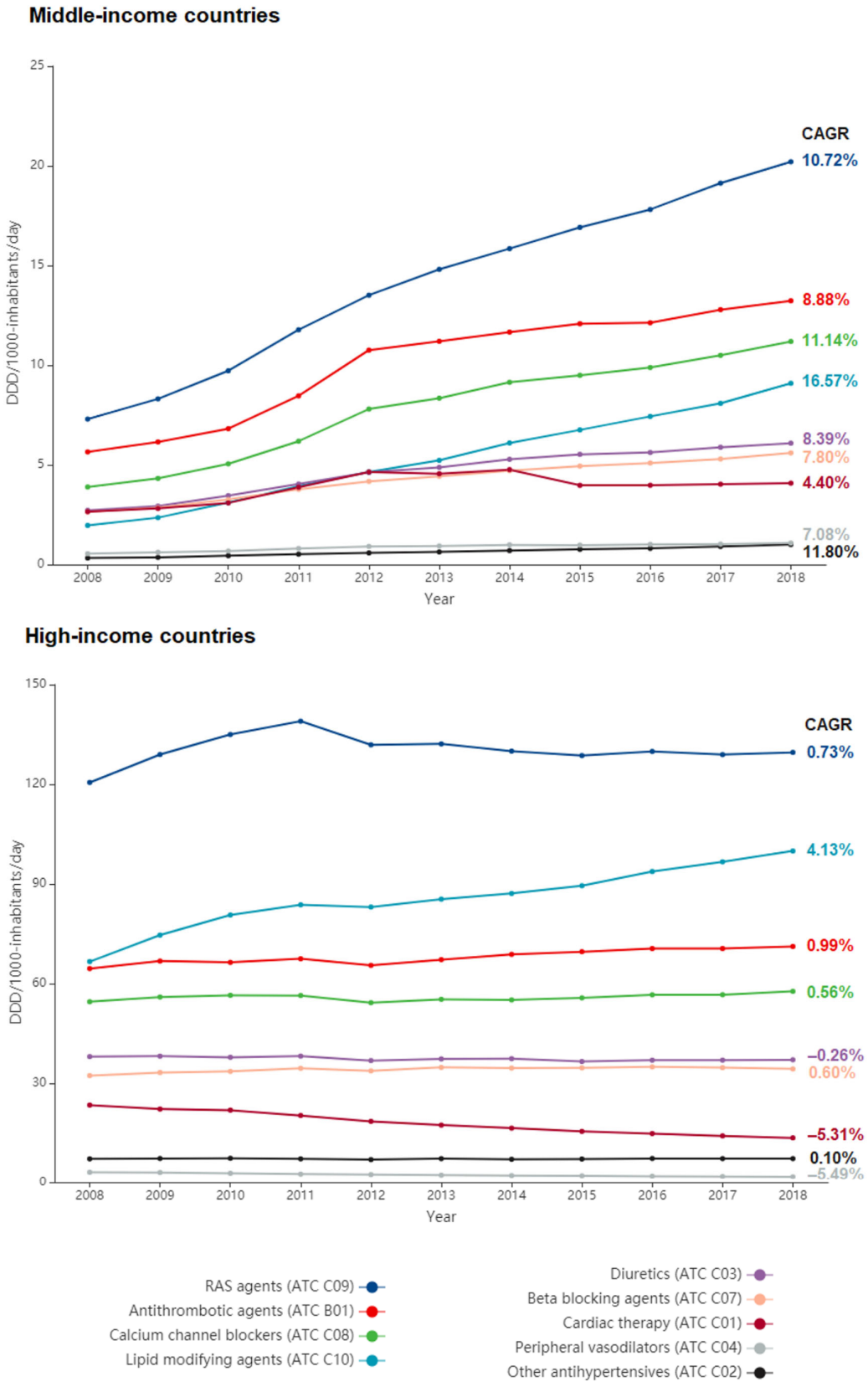
Figure legend

Figure 1: Global trends of cardiovascular medicine consumption in middle- and high-income countries, 2008-2018

RAS: renin-angiotensin system, CAGR: compound annual growth rate. Drug classes were defined in WHO ATC index (https://www.whocc.no/atc_ddd_index/).


Middle-income countries
DDD/1000-inhabitants/day
Year
CAGR
10.72%
8.88%
11.14%
16.57%
8.39%
7.80%
4.40%
7.08%
11.80%
High-income countries
DDD/1000-inhabitants/day
Year
CAGR
0.73%
4.13%
0.99%
0.56%
–0.26%
0.60%
–5.31%
0.10%
–5.49%
RAS agents (ATC C09)
Antithrombotic agents (ATC B01)
Calcium channel blockers (ATC C08)
Lipid modifying agents (ATC C10)
Diuretics (ATC C03)
Beta blocking agents (ATC C07)
Cardiac therapy (ATC C01)
Peripheral vasodilators (ATC C04)
Other antihypertensives (ATC C02)