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National drug utilisation patterns of antithrombotic and anti-inflammatory therapies: a cross-national comparison between Switzerland and Germany

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Summary

STUDY AIMS: Prolonged low-dose antithrombotic and anti-inflammatory therapies have been shown to reduce cardiovascular events and are guideline-recommended in patients with coronary artery disease at high ischaemic risk. However, their real-world dispensing patterns at the population level remain insufficiently characterised. This study aimed to quantify national dispensing volumes and compare the use of these therapies in Switzerland and Germany between 2022 and 2024.

METHODS: We analysed national pharmaceutical delivery data from Switzerland and outpatient prescription data from Germany for low-dose monotherapy products containing aspirin (100 mg), clopidogrel (75 mg), prasugrel (5 mg and 10 mg), ticagrelor (60 mg and 90 mg), rivaroxaban (2.5 mg) and colchicine (0.5 mg in Germany, 1 mg in Switzerland). Drug utilisation was standardised as the number of tablets per 1000 persons per year. This metric reflects population-level exposure: based on epidemiological data indicating a substantial burden of cardiovascular disease and evidence that a relevant proportion of these patients may qualify for intensified long-term preventive therapy, dispensing volumes of long-term antithrombotic and anti-inflammatory therapies might be expected to reach a meaningful fraction of aspirin use (>10%). Values substantially below this illustrative threshold may suggest limited population-level uptake.

RESULTS: Aspirin 100 mg was the most frequently dispensed drug in both Switzerland and Germany (both >8000 tablets/1000 persons/year). Clopidogrel ranked second in both countries. Ticagrelor (60 mg and 90 mg) was more frequently dispensed in Switzerland, whereas prasugrel 10 mg was more frequently dispensed in Germany. However, absolute use of both agents remained low (all <500 tablets/1000 persons/year). Rivaroxaban 2.5 mg was the only agent that showed a consistent increase over time (+54.4% Switzerland; +40.4% Germany), although overall dispensing remained modest (538–577 tablets/1000 persons/year). Colchicine use was low in both countries (124–163 tablets/1000 persons/year). Across both countries, the combined dosing-adjusted dispensing volume of intensified long-term antithrombotic and anti-inflammatory therapies was close to or below the illustrative 10% benchmark relative to aspirin use, reaching 10.1% in Germany and 4.5% in Switzerland, suggesting limited population-level uptake, particularly in Switzerland.

CONCLUSION: Despite minor country-specific differences in cardiovascular disease prevalence, the observed dispensing patterns suggest that the population-level uptake of low-dose antithrombotic and anti-inflammatory therapies may be lower than expected when interpreted relative to aspirin.

Introduction

Despite major advances in revascularisation and secondary prevention, patients with chronic coronary syndrome (CCS) or a history of acute coronary syndrome (ACS) remain at considerable residual risk for recurrent cardiovascular events [1]. Several trials have demonstrated that intensification of antithrombotic therapy can reduce ischaemic events beyond standard treatment [2-4]. Combining low-dose rivaroxaban with aspirin significantly lowered the risk of cardiovascular death, stroke or myocardial infarction in patients with stable atherosclerotic cardiovascular disease (ASCVD), although at the cost of an increased bleeding risk [3]. Likewise, the prolonged use of ticagrelor in addition to aspirin in post-myocardial infarction patients has been shown to reduce recurrent events, with an acceptable safety profile [2]. Extended dual antiplatelet therapy (DAPT) with clopidogrel or prasugrel beyond 12 months following drug-eluting stent implantation also reduced ischaemic complications [4]. A prasugrel-based de-escalation strategy after acute coronary syndrome was non-inferior in terms of ischaemic outcomes and led to fewer bleeding events, supporting its use in long-term secondary prevention [5, 6]. In addition to traditional risk factors, chronic low-grade inflammation is also a driver of ASCVD progression [7]. Reflecting this, low-dose colchicine (0.5 mg daily) can reduce the risk for myocardial infarction, stroke and repeat revascularisation in patients with chronic coronary syndrome [8-10]. In response, the European guidelines recommend prolonged DAPT and/or low-dose colchicine for selected high-risk patients [11, 12]. However, despite the large body of evidence and guideline endorsements, real-world adoption of these therapies in Germany is limited [13].

Yet, it remains unclear whether this limited adoption is similarly observed in other countries. We hypothesised that the poor adherence to guideline recommendations in Germany may, at least in part, be attributable to financial constraints in outpatient care and potentially suboptimal medical training. To test this hypothesis, we conducted a direct comparison with Switzerland, a country that invests approximately 40% more per capita in healthcare, including outpatient services and medical education. This study aimed to quantify national dispensing volumes of antithrombotic and anti-inflammatory therapies and to compare their use in Switzerland and Germany between 2022 and 2024. In addition, using published epidemiological estimates of disease burden and treatment eligibility, we sought to explore whether observed dispensing patterns are broadly consistent with the expected uptake of these therapies in routine clinical practice.

Methods

Data sources

This analysis used national pharmaceutical delivery data from Switzerland obtained from the IQVIA Subnational Sell-In Data set for the years 2022 to 2024 (https://www.iqvia.com). The database captures aggregated delivery volumes of medications from wholesalers, mail-order pharmacies and physician suppliers to pharmacies, drugstores (“Drogerien” in Switzerland), physician offices and hospitals across Switzerland. The data are collected via various wholesaler operating systems and reported as the number of packs delivered. The dataset does not include information on individual prescriptions, dispensing physicians, patient characteristics or treatment indications. As such, the analysis reflects supply-side data (“sell-in”).

For Germany, national outpatient prescription data were obtained from the German Institute for Drug Use Evaluation (Deutsches Arzneiprüfungsinstitut e.V., DAPI) for the period 2022 to 2024. The database contains anonymised dispensing data from over 95% of community pharmacies in Germany, based on prescriptions claimed at the expense of the statutory health insurance (SHI) funds. Data were extrapolated to reflect the entire SHI-insured population, representing approximately 87% of the total German population. The database does not contain inpatient data and prescriptions for privately insured patients (table 1).

Table 1: Comparison of data sources used in Switzerland and Germany.

Characteristic	Switzerland	Germany
Data provider	IQVIA Subnational Sell-In Database	German Institute for Drug Use Evaluation (DAPI)
Observation period	2022–2024	
Data type	Pharmaceutical delivery data ("sell-in")	Outpatient prescription dispensing data
Data origin	Wholesalers, mail-order pharmacies, physician suppliers delivering to pharmacies, drugstores ("Drogerien" in Switzerland), physicians and hospitals	Community pharmacies dispensing prescriptions reimbursed by statutory health insurance (SHI)
Coverage	Nationwide aggregated delivery volumes	>95% of community pharmacies; extrapolated to SHI-insured population
Population reference	Entire Swiss population	SHI-insured population (~87% of residents)
Healthcare sector included	Outpatient and inpatient supply chains captured indirectly via deliveries	Outpatient prescriptions only
Healthcare sector excluded	No direct patient-level dispensing information	Inpatient drug use, privately insured patients, self-pay sales
Level of data aggregation	Pack-level aggregated supply volumes	Prescription-level dispensing data aggregated nationally
Clinical information available	None (no patient characteristics, indications or prescribing physicians)	
Ability to distinguish treatment duration	Not possible	
Potential source of bias	May overestimate use if stockpiling occurs, though ordering usually reflects demand	May underestimate total use due to missing inpatient and private prescriptions
Key comparability limitation	Supply-side data rather than dispensing data	Restricted to SHI outpatient prescriptions
Overall interpretation	Proxy for national medication availability and demand	Proxy for outpatient prescribing behaviour

Consent

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. As no individual patient-level information was accessed, neither ethical approval nor informed consent were required.

Included drugs

The analysis included all oral, solid dosage forms of low-dose monotherapy products containing acetylsalicylic acid (aspirin, ASS, 100 mg), clopidogrel (75 mg), prasugrel (5 mg and 10 mg), ticagrelor (60 mg and 90 mg), rivaroxaban (2.5 mg) and colchicine (0.5 mg and 1 mg) that were marketed in Switzerland or Germany between 2022 and 2024 (table 2). All available products were included regardless of manufacturer.

Table 2: Included drugs and analysed doses and indications (oral solid dosage forms).

Drug	Dose / daily Dose	Indication/ comment
Aspirin (acetylsalicylic acid)	100 mg / 100 mg	Used for prevention of arterial thrombotic events, including after TIA/Stroke, unstable angina, acute myocardial infarction, after coronary bypass or PCI, after vascular surgery, and in peripheral arterial disease; may also be used in patients at very high cardiovascular risk (primary prevention).
Ticagrelor	60 mg / 120 mg	Used with aspirin for extended prevention of atherothrombotic events in patients with prior myocardial infarction and high risk of recurrent atherothrombotic events.
Ticagrelor	90 mg /180 mg	Used with aspirin for prevention of atherothrombotic events in patients with acute coronary syndrome, including unstable angina, NSTEMI and STEMI.
Prasugrel	5 mg / 5 mg	Used with aspirin for prevention of atherothrombotic events in patients with acute coronary syndrome undergoing PCI; lower maintenance dose used in selected patients (low body weight or elderly patients when treatment is considered necessary).
Prasugrel	10 mg / 10 mg	Used with aspirin for prevention of atherothrombotic events in patients with acute coronary syndrome, including unstable angina, NSTEMI and STEMI.
Clopidogrel	75 mg / 75 mg	Used for prevention of atherothrombotic events in patients with peripheral arterial disease, recent ischaemic stroke or recent myocardial infarction; in combination with aspirin after acute coronary syndrome, after fibrinolysis for STEMI, after coronary stent implantation.
Rivaroxaban	2.5 mg / 5 mg	Used with aspirin for prevention of atherothrombotic events in patients with coronary artery disease or symptomatic peripheral artery disease at high ischaemic risk.
Colchicine	0.5 mg / 0.5 mg	During 2022–2024, only available in Germany but not in Switzerland in the datasets analysed. Indications include acute gout flare, prophylaxis of gout flares during urate-lowering therapy, acute or recurrent pericarditis, familial Mediterranean fever and coronary artery disease (FDA-approved in the United States).
Colchicine	1 mg / 0.5 mg	During 2022–2024, only available in Switzerland but not in Germany in the datasets analysed. Tablets may be divisible depending on formulation. Indications include acute gout flare, prophylaxis of gout flares during urate-lowering therapy, acute or recurrent pericarditis, familial Mediterranean fever and coronary artery disease (FDA-approved in the United States).

Indications and approvals may differ between countries and over time. The listed indications summarise clinically relevant approved or commonly used indications and do not necessarily reflect the exact regulatory label in each country during the entire study period.

FDA: United States Food and Drug Administration; NSTEMI: non-ST-segment elevation myocardial infarction; PCI: percutaneous coronary intervention; STEMI: ST-segment elevation myocardial infarction; TIA: transient ischaemic attack.

Colchicine was included in the analysis using available national formulations. In Germany, only 0.5 mg tablets were available and included in the analysis, whereas in Switzerland, only 1 mg tablets were marketed and captured in the dataset during the study period. The 1 mg formulation was therefore used for the Swiss data. For comparability, it should be noted that the recommended daily dose for secondary prevention in chronic coronary syndrome is 0.5 mg, thus each 1 mg tablet corresponds to two defined daily doses. According to manufacturer information, the 1 mg tablets marketed in Switzerland are scored and suitable for halving [14].

Analytical approach

To account for potential differences in marketed pack sizes, the number of packs was multiplied by the number of tablets contained in each pack to derive the total number of dispensed tablets. Drug delivery volumes were aggregated by calendar year and standardised as (i) number of tablets per 1000 persons per year (number of tablets/1000 inhabitants/year for Switzerland and number of tablets/1000 SHI-insured persons/year for Germany) and (ii) number of packs per 1000 persons per year. For Switzerland, annual population estimates published by the Swiss Federal Statistical Office were used (reference dates: 31 December of 2021, 2022 and 2023) [15]. For Germany, all persons insured by SHI were used as a reference, with the relevant figures provided by the Federal Ministry of Health [16]. In addition, the relative difference in delivery volume (tablets per 1000 persons per year) between Switzerland and Germany was calculated for each substance to allow direct comparison of cross-national utilisation patterns. Temporal trends were assessed by calculating the percentage change in annual tablet volume per 1000 persons between 2022 and 2024. We also compared the average number of tablets per pack for each substance between countries to identify differences in marketed pack sizes. All figures were created using RStudio (Posit PBC, Boston, MA, USA).

Contextual epidemiological assumptions for interpreting population-level dispensing metrics

The present analysis used aggregated dispensing data and therefore does not allow direct inference about treatment eligibility at the patient level. To facilitate interpretation of the observed population-level dispensing volumes, we defined epidemiological assumptions intended solely for con-

textualisation rather than causal inference or formal modelling. Previous analyses from Germany have already suggested limited uptake of guideline-recommended intensified secondary prevention strategies, including low-dose rivaroxaban or prolonged ticagrelor therapy [13]. To explore whether the Swiss data are broadly consistent with this observation, we used population-level epidemiological estimates to derive illustrative reference ranges. In 2022, 20.2% of the Swiss population reported having ever been diagnosed with a cardiovascular disease [17]. Although not all of these individuals have an indication for intensified antithrombotic therapy, aspirin dispensing volumes provide a pragmatic population-level anchor, as aspirin is predominantly prescribed for atherosclerotic cardiovascular disease, particularly coronary artery disease. Real-world analyses indicate that a substantial proportion of patients with coronary or atherosclerotic cardiovascular disease may qualify for intensified long-term antithrombotic therapy. Large observational cohorts have shown that approximately 37–45% of patients fulfil COMPASS eligibility criteria [18, 19], while 41–78% of post-myocardial infarction patients meet PEGASUS criteria [20, 21]. However, these estimates are likely to overestimate the proportion of patients suitable for treatment in clinical practice, because bleeding risk, frailty, drug interactions and other contraindications are often incompletely captured in such datasets. In addition, although aspirin 100 mg is predominantly used for secondary prevention of atherosclerotic cardiovascular disease, a proportion of aspirin dispensing may reflect primary prevention or other indications, which cannot be distinguished in the available aggregated data. We therefore did not use these eligibility estimates directly. Instead, we applied a deliberately more conservative illustrative threshold of approximately 10% of aspirin-level dispensing, referring to the combined population-level uptake of intensified long-term antithrombotic and anti-inflammatory therapies, including prasugrel, ticagrelor, rivaroxaban 2.5 mg and colchicine, rather than to each individual drug separately. For colchicine, no separate benchmark was derived, as robust population-level estimates of colchicine-specific eligibility in patients with chronic coronary syndrome, or prior acute coronary syndrome, are lacking. Therefore, colchicine was included only as part of the conservative combined benchmark for intensified long-term antithrombotic and anti-inflammatory therapies. This threshold was intended solely as a contextual lower-bound reference. For once-daily therapies, including clopidogrel, prasugrel and colchicine, percentages were calculated directly relative to aspirin. For twice-daily therapies, including ticagrelor and rivaroxaban 2.5 mg, both the crude percentage and a dosing-adjusted estimate, divided by two to reflect daily treatment exposure, are reported.

Results

An overview of the annual delivery volumes for all included substances between 2022 and 2024 in both countries is provided in figure 1 and table 3. In Switzerland, the most frequently delivered antiplatelet agent in 2024 was aspirin 100 mg, with 1.83 million (mn) packs dispensed. This corresponded to 175.4 mn tablets, or 19,571 tablets per 1000 persons in 2024. In Germany, 6.7 mn packs were dispensed to SHI-insured persons, amounting to 660.3 mn tablets or 8929 tablets per 1000 persons per year (2024). The second most frequently used substance in Switzerland was clopidogrel 75 mg, with a utilisation rate of 2118 tablets per 1000 persons per year in 2024. This was slightly higher than in Germany, where 1995 tablets per 1000 persons per year were dispensed in the same year. All other substances showed markedly lower dispensing volumes in Switzerland: rivaroxaban 2.5 mg (538 tablets per 1000 persons), ticagrelor 90 mg (482), prasugrel 10 mg (170), ticagrelor 60 mg (63) and prasugrel 5 mg (14). In Germany, dispensing rates for these agents were similarly low, with the exception of prasugrel 10 mg, which was used slightly more frequently with 274 tablets per 1000 persons in 2024. A total of 1.46 mn tablets of colchicine 1 mg were sold in Switzerland in 2024, corresponding to 163 tablets per 1000 persons per year, placing it behind prasugrel 10 mg in terms of overall volume. In Germany, 9.2 mn tablets of colchicine 0.5 mg were prescribed, equivalent to 124 tablets per 1000 persons per year. Due to differences in available dosage forms between countries (1 mg in Switzerland vs 0.5 mg in Germany), a direct comparison is not possible and data should be interpreted with caution.

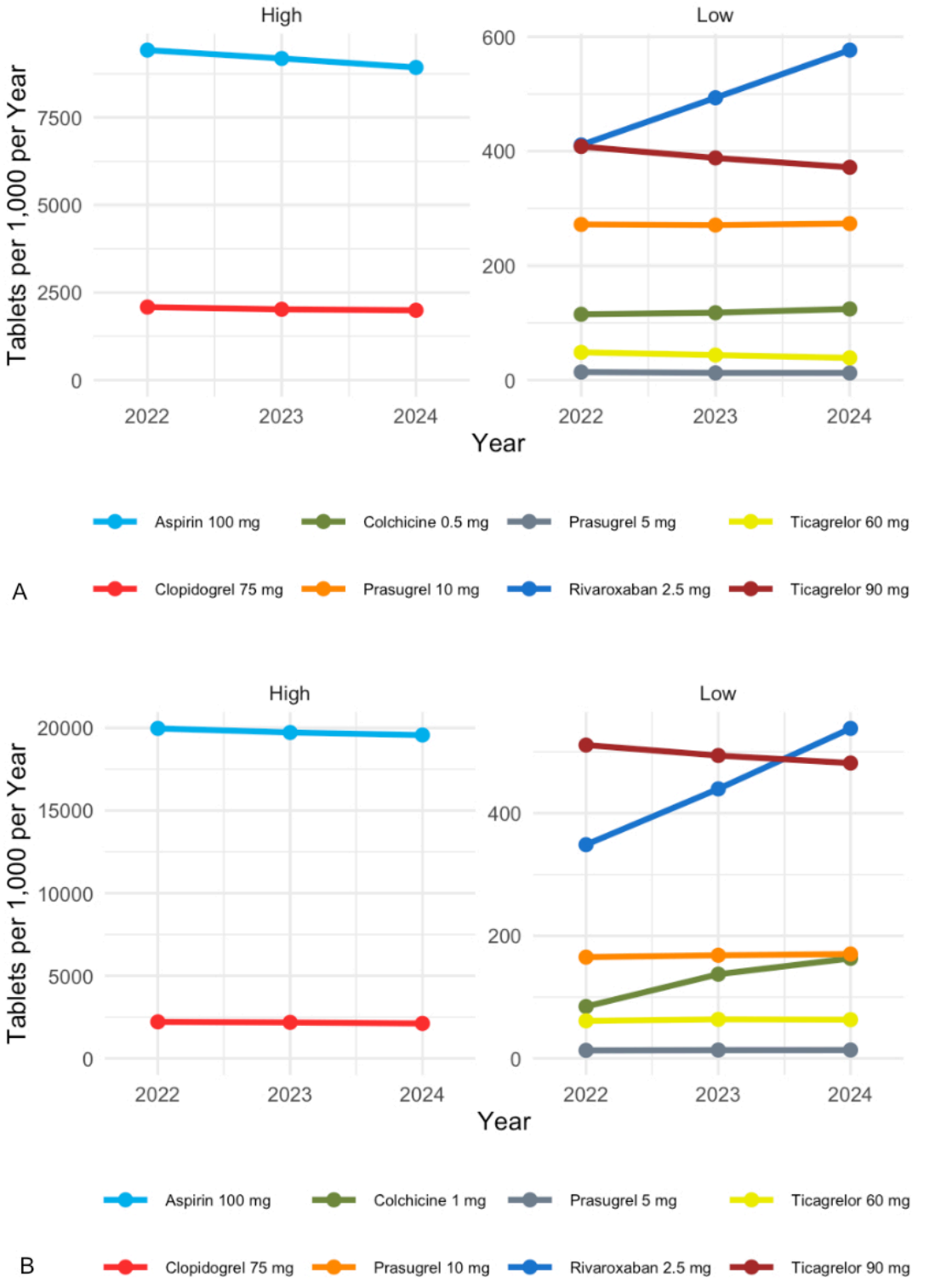


Figure 1: Temporal trends in dispensed/sold tablets per 1000 persons per year in Germany and Switzerland (2022–2024). Panel A shows prescription trends in Germany (per 1000 statutory health insurance persons per year) and Panel B shows the corresponding data from Switzerland (per 1000 inhabitants per year). For clarity, aspirin 100 mg and clopidogrel 75 mg, which have substantially higher dispensing volumes, are displayed separately (left panels), while all other substances (including prasugrel 10 mg and 5 mg, ticagrelor 90 mg and 60 mg, rivaroxaban 2.5 mg and colchicine (0.5 mg in Germany / 1 mg in Switzerland) are depicted in the right-hand panels.

Table 3: Dispensing volumes of low-dose antithrombotic and anti-inflammatory therapies in Germany and Switzerland (2022–2024).

		Germany				Switzerland			
Year	**Substance**	**Packages (in mn)**	**Tablets (in mn)**	**Packages per 1000 SHI-insured persons per year**	**Tablets per 1000 SHI-insured persons per year**	**Packages (in mn)**	**Tablets (in mn)**	**Packages per 1000 inhabitants per year**	**Tablets per 1000 inhabitants per year**
2022	Aspirin 100 mg	6.98	689.02	95.53	9424	1.82	174.53	207.77	19,972
2023		6.87	677.14	93.17	9186	1.81	173.89	205.44	19,726
2024		6.70	660.29	90.62	8929	1.83	175.40	203.78	19,571
2022	Clopidogrel 75 mg	1.63	152.55	22.27	2087	0.260	19.33	29.75	2212
2023		1.60	149.07	21.70	2022	0.258	19.22	29.28	2180
2024		1.59	147.51	21.51	1995	0.257	18.98	28.72	2118
2022	Colchicine 0.5 mg	0.280	8.41	3.84	115				
2023		0.289	8.68	3.93	118				
2024		0.306	9.19	4.14	124				
2022	Colchicine 1 mg					0.074	0.740	8.46	85
2023						0.121	1.21	13.73	137
2024						0.142	1.46	15.89	163
2022	Prasugrel 10 mg	0.216	19.89	2.96	272	0.018	1.44	2.10	165
2023		0.218	19.97	2.96	271	0.018	1.48	2.04	168
2024		0.221	20.23	2.99	274	0.018	1.53	2.04	170
2022	Prasugrel 5 mg	0.011	1.029	0.15	14	0.002	0.115	0.18	13
2023		0.010	0.929	0.14	13	0.002	0.120	0.19	14
2024		0.010	0.926	0.14	13	0.002	0.122	0.17	14
2022	Rivaroxaban 2.5 mg	0.175	30.03	2.40	411	0.027	3.05	3.08	349
2023		0.207	36.37	2.81	493	0.033	3.87	3.70	440
2024		0.237	42.64	3.21	577	0.039	4.82	4.37	538
2022	Ticagrelor 60 mg	0.023	3.56	0.32	49	0.004	0.535	0.43	61
2023		0.022	3.23	0.30	44	0.004	0.561	0.44	64
2024		0.020	2.88	0.27	39	0.004	0.566	0.43	63
2022	Ticagrelor 90mg	0.247	29.84	3.38	408	0.040	4.465	4.54	511
2023		0.236	28.61	3.21	388	0.038	4.354	4.32	494
2024		0.227	27.50	3.07	372	0.038	4.316	4.22	482

mn: million; SHI: statutory health insurance.

To evaluate country-level differences in drug utilisation, we calculated the relative difference in tablet volumes per 1000 persons in Switzerland compared with Germany. Aspirin 100 mg was used 119% more frequently in Switzerland than in Germany (19,571 vs 8929 tablets per 1000 persons) in 2024. Conversely, prasugrel 10 mg was used 38% less frequently. Ticagrelor delivery rates were higher in Switzerland: the 90 mg formulation was 30% higher and the 60 mg formulation 63% higher. The absolute use of ticagrelor 60 mg remained very low in both countries. Differences in drug utilisation across all included substances are depicted in figure 2.

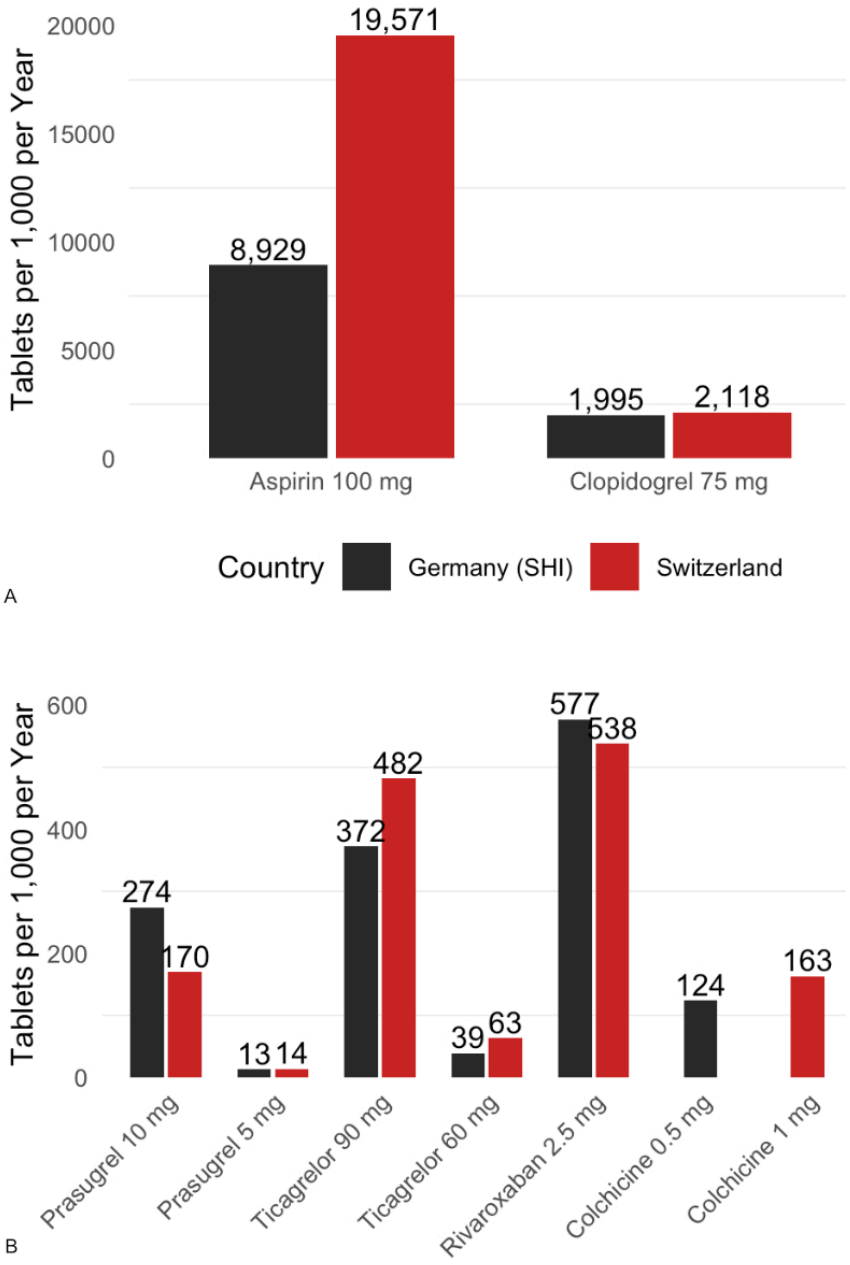


Figure 2: Comparison of dispensing volumes for the included medications in Germany and Switzerland in 2024, expressed as tablets per 1000 persons per year. (A) Aspirin 100 mg and clopidogrel 75 mg. (B) Prasugrel 10 mg, prasugrel 5 mg, ticagrelor 90 mg, ticagrelor 60 mg, rivaroxaban 2.5 mg, colchicine 0.5 mg (Germany) and colchicine 1 mg (Switzerland). Due to substantial differences in dispensing volumes, the two panels are displayed separately.

The relative changes in dispensed/sold tablet volumes per 1000 persons in Switzerland and Germany between 2022 and 2024 are illustrated in figure 3. In Germany, a slight decline from 2022 to 2024 in dispensed volumes was observed for most antiplatelet agents, including aspirin (–5.3%), clopidogrel (–4.4%), prasugrel 5 mg (–11.3%), ticagrelor 60 mg (–20%) and ticagrelor 90 mg (–8.9%). A comparable pattern was seen in Switzerland, with minor reductions in utilisation for aspirin (–2.0%), clopidogrel (–4.3%) and ticagrelor 90 mg (–5.8%). In contrast, utilisation of prasugrel 10 mg and 5 mg, as well as ticagrelor 60 mg, remained stable or slightly increased in Switzerland (3.0%, 4.6% and 3.1%, respectively), although absolute volumes remained very low. The only antithrombotic agent showing a substantial increase in both countries was rivaroxaban 2.5 mg, with a relative rise of 40.4% in Germany and 54.4% in Switzerland between 2022 and 2024. While the

dispensing volume of colchicine 0.5 mg in Germany remained largely stable between 2022 and 2024 (showing only a modest increase of 8.1%), the use of colchicine 1 mg in Switzerland rose by 92.9% over the same period (from 85 to 163 tablets per 1000 persons per year).

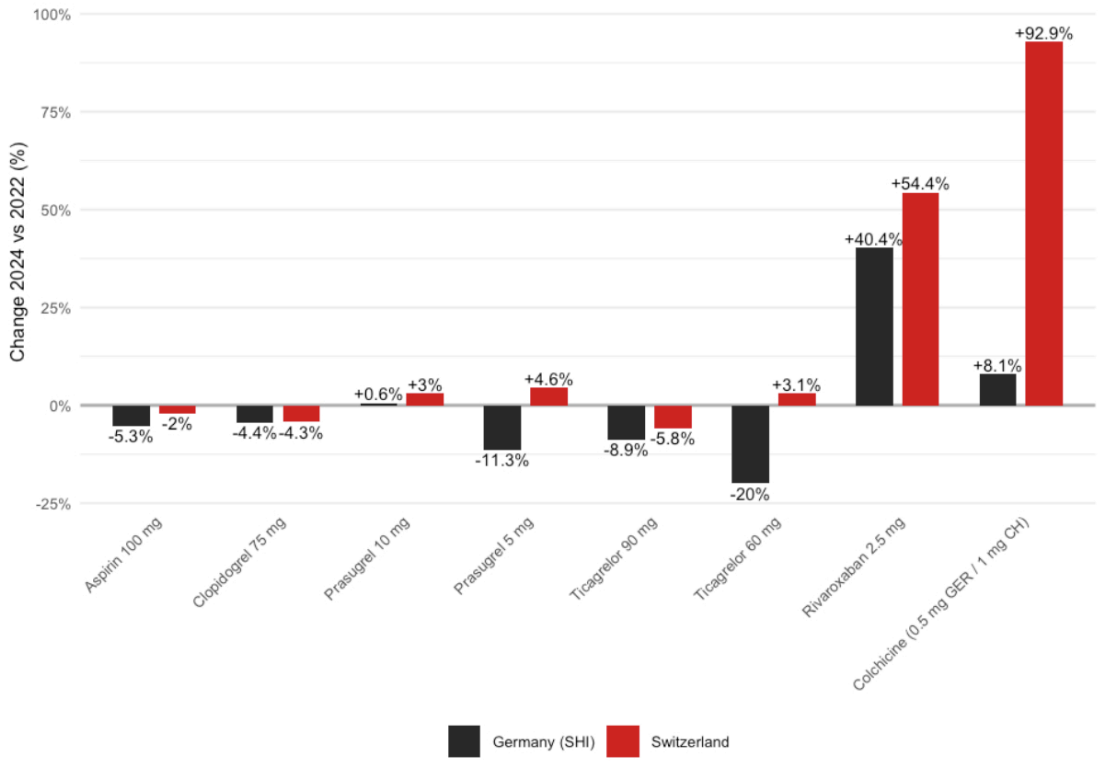


Figure 3: Relative changes in dispensed/sold tablets from 2022 to 2024 in Germany and Switzerland. The percentage change in annual dispensing per 1000 statutory health insurance beneficiaries (Germany, black bars) or per 1000 inhabitants (Switzerland, red bars) is shown for each included substance. Negative values indicate a decline in dispensing (downward bars), while positive values represent an increase (upward bars).

The average number of tablets per pack was consistently higher in Germany compared to Switzerland for nearly all substances, with the exception of ticagrelor 60 mg in 2024 (supplementary table 1).

To provide an internal population-level reference for interpreting dispensing volumes, we related the tablets per 1000 persons per year to the corresponding aspirin dispensing rate in 2024 for each country:

Germany (2024 reference: aspirin 8929 tablets/1000/year): Clopidogrel corresponded to 22.4% of aspirin dispensing, prasugrel 10 mg to 3.1% and prasugrel 5 mg to 0.15%, colchicine reached 1.4%, rivaroxaban 2.5 mg corresponded to 6.5% of aspirin dispensing (3.2% dosing-adjusted), ticagrelor 60 mg accounted for 0.44% (0.22% adjusted) and ticagrelor 90 mg for 4.2% (2.1% adjusted). When prasugrel, ticagrelor, rivaroxaban 2.5 mg and colchicine were considered together, their combined dispensing volume corresponded to 15.7% of aspirin dispensing in crude tablet counts and 10.1% after adjustment for twice-daily dosing of ticagrelor and rivaroxaban 2.5 mg.

Switzerland (2024 reference: aspirin 19,571 tablets/1000/year): Clopidogrel corresponded to 10.8% of aspirin dispensing, prasugrel 10 mg to 0.87% and prasugrel 5 mg to 0.07%, colchicine reached 0.83%, rivaroxaban 2.5 mg corresponded to 2.75% (1.38% adjusted), ticagrelor 60 mg accounted for 0.32% (0.16% adjusted) and ticagrelor 90 mg for 2.46% (1.23% adjusted). When prasugrel, ticagrelor, rivaroxaban 2.5 mg and colchicine were considered together, their combined dispensing volume corresponded to 7.3% of aspirin dispensing in crude tablet counts and 4.5% after adjustment for twice-daily dosing of ticagrelor and rivaroxaban 2.5 mg. Across both countries, the

combined dosing-adjusted dispensing volume of intensified long-term antithrombotic and anti-inflammatory therapies was close to or below the illustrative 10% benchmark, reaching 10.1% in Germany and 4.5% in Switzerland. These findings could indicate that population-level uptake may be limited, particularly in Switzerland, while acknowledging that patient-level eligibility and contraindications cannot be determined from the available data.

Discussion

Population-level uptake of intensified secondary prevention therapies

A total of 18.3% of post-myocardial infarction patients experienced a recurrent cardiovascular event within the first year after discharge in a registry study, and 20% of initially stable patients had such events over the following three years [22]. These data highlight the persistent vulnerability of this population and the need for intensified, long-term secondary prevention strategies in selected patients. Despite evidence from clinical trials and repeated recommendations in guidelines [2-4, 6, 8-12, 23], the observed dispensing patterns may indicate that the population-level uptake of long-term secondary prevention therapies could be lower than expected in both Switzerland and Germany. This pattern appears broadly consistent with our previous findings in Germany [13]. In 2024, the volume of aspirin in Switzerland reached ~19,600 tablets per 1000 persons per year. In contrast, dispensing volumes of other guideline-recommended agents such as rivaroxaban 2.5 mg, ticagrelor 60 mg, prasugrel 5 mg and colchicine 0.5 mg corresponded to only a very small fraction of aspirin use, each remaining below roughly 3% of aspirin dispensing. When interpreting the calculated numbers of tablets per 1000 persons per year, it should be considered that aspirin, clopidogrel, colchicine (for chronic coronary syndrome) and prasugrel are administered once daily, whereas rivaroxaban and ticagrelor are given twice daily. Thus, for a direct comparison across substances, the values for rivaroxaban and ticagrelor would need to be divided by two, which would further reduce their relative proportion compared with aspirin. In 2022, 20.2% of the Swiss population reported having ever been diagnosed with a cardiovascular disease [17]. Real-world analyses indicate that a considerable proportion of patients with coronary artery disease or, more broadly, atherosclerotic cardiovascular disease would qualify for long-term antithrombotic therapy. Approximately 37–45% of contemporary patients met the COMPASS trial eligibility criteria in large Canadian and Italian cohorts [18, 19]. Similarly, in the post-myocardial infarction setting, two major observational studies from the US and South Korea demonstrated that 41–78% of patients fulfilled the PEGASUS-TIMI 54 criteria [20, 21]. Against this backdrop of high disease prevalence and broad eligibility for intensified long-term antithrombotic therapy, epidemiological considerations suggest that a substantial proportion of patients with ASCVD or prior myocardial infarction could theoretically qualify for such strategies. These observational data indicate that roughly one-third or more of patients may meet eligibility criteria for trials such as COMPASS or PEGASUS. Based on these considerations, one might anticipate that population-level dispensing volumes of intensified long-term therapies would reach a meaningful fraction of aspirin use. Herein, we therefore considered an illustrative benchmark of approximately 10% of aspirin dispensing as a conservative reference for the combined expected uptake of intensified long-term antithrombotic and anti-inflammatory therapies. In the present analysis, the combined dosing-adjusted dispensing volume of prasugrel, ticagrelor, rivaroxaban 2.5 mg and colchicine reached 10.1% of aspirin dispensing in Germany and 4.5% in Switzerland. While the German estimate was close to this conservative threshold, the Swiss estimate remained clearly below it. Taken together, these observations may suggest limited population-level uptake of intensified secondary prevention strategies, particularly in Switzerland, although patient-level eligibility and contraindications cannot be determined from the available data.

Guideline recommendations in relation to observed drug utilisation patterns

The 2019 and 2024 ESC Guidelines for the management of chronic coronary syndrome recommend the addition of a second antithrombotic agent to aspirin for extended long-term secondary prevention in selected high ischaemic risk patients without high bleeding risk (class IIa recommendation, level of evidence A), e.g. in patients with recurrent ischaemic events and/or (recurrent) in-stent restenosis, extensive or complex stenting with long total stent length, multiple concomitant ischaemic risk factors or prior intervention in bypass grafts, particularly venous bypass graft stenting [11, 23]. Despite these endorsements, their reaffirmation in 2024 and the considerable number of patients in Switzerland potentially meeting high ischaemic risk criteria, our findings may suggest

that the population-level uptake of extended antithrombotic strategies could be lower than expected. Consistent with patterns previously observed in Germany [13], dispensing volumes of these agents in Switzerland in 2024 remained low relative to aspirin use across substance groups, even one year after the updated guideline release, which could be interpreted as reflecting limited implementation of extended preventive strategies. Even for clopidogrel 75 mg, which was more frequently used, its use likely reflects early post-percutaneous coronary intervention or peripheral angioplasty management rather than prolonged secondary prevention [4], although this cannot be confirmed from our data alone.

Potential barriers to intensified long-term antithrombotic therapy

Several factors may contribute to the underuse of prolonged antithrombotic therapy, including concerns about bleeding, off-label use (e.g. for prasugrel 5 mg), resulting potential cost reclaims, financial barriers and limited physician awareness of both the efficacy and guideline recommendations. Another potential explanation is the perception that older patients may derive only marginal benefit from extended therapy despite their substantially elevated baseline risk. Health-economic analyses indicate that rivaroxaban in combination with aspirin is a cost-effective strategy in the US setting [24], whereas ticagrelor 60 mg plus aspirin shows intermediate value overall but becomes economically attractive when prescribed to high-risk subgroups [25]. These results emphasise that a risk-tailored application of intensified antithrombotic therapies is supported not only by clinical evidence but also by economic considerations.

Dataset characteristics and implications for cross-country comparison

The observed difference in aspirin use between Switzerland and Germany warrants careful interpretation. The reasons for this discrepancy remain speculative, and no direct evidence is available to support the following assumptions. One methodological consideration relates to the nature of the datasets. The Swiss data reflect sell-in volumes, i.e. the quantity of medication delivered from wholesalers to community pharmacies, hospital pharmacies and physician practices. While not identical to patient-level dispensing, sell-in volumes are considered a reasonable proxy for real-world use, as healthcare providers generally order quantities aligned with actual demand. In contrast, the German DAPI data are based on outpatient prescription claims submitted to SHI funds and represent anonymised, reimbursed prescriptions from over 95% of community pharmacies. These data are extrapolated to reflect 100% of SHI-insured individuals. However, they do not capture prescriptions issued to privately insured individuals, self-pay patients, medications dispensed via mail-order pharmacies or in-hospital drug use. This difference in data sources likely explains the lower aspirin 100 mg volumes observed in Germany. Regional differences were observed in the use of $P2Y_{12}$ inhibitors. While prasugrel 10 mg was more frequently dispensed in Germany (+38% vs Switzerland in 2024), both ticagrelor 90 mg and 60 mg were more commonly used in Switzerland (+30% and +63%, respectively). These variations likely reflect local prescribing preferences rather than guideline recommendations [12].

Regulatory and formulation differences influencing colchicine use

During the observation period from January 2022 to December 2024, only the 1 mg tablet formulation was available in Switzerland, whereas only the 0.5 mg formulation was marketed in Germany. When colchicine is prescribed for secondary prevention in patients with chronic coronary syndrome or a history of acute coronary syndrome, the recommended dose is 0.5 mg once daily [9, 10]. The 1 mg tablets are scored and officially approved as divisible [26], which possibly enables appropriate dosing in cardiovascular indications. Although colchicine is an inexpensive agent with a favourable efficacy profile at low dose, its use in the context of ASCVD remains marginal. In contrast to the US, where the FDA has approved low-dose colchicine for the prevention of recurrent cardiovascular events [27], it is not currently approved by the European Medicines Agency for this indication [28]. Thus, prescriptions in this context do represent off-label use in Germany and Switzerland. Further reasons for the limited uptake in Europe include low awareness, concerns about potential drug–drug interactions, liability considerations and tolerability issues.

Possible explanations for increasing rivaroxaban use

Among all low-dose antithrombotic therapies examined, rivaroxaban 2.5 mg was the most frequently dispensed agent beyond aspirin and clopidogrel in both countries. It was also the only substance with a marked increase in dispensing volumes in both countries between 2022 and 2024.

Several factors may contribute to this trend. First, the expiration of market exclusivity and the subsequent introduction of generic formulations in 2024 led to lower costs and broader accessibility in both Switzerland and Germany [29, 30]. Second, the broader approved and evidence-based indications for rivaroxaban 2.5 mg may have expanded its potential patient population. Unlike ticagrelor 60 mg or prasugrel 5 mg, which are primarily studied and recommended for long-term secondary prevention following acute coronary syndrome [2, 6], rivaroxaban 2.5 mg has demonstrated efficacy not only in patients with chronic coronary syndrome, but also in those with peripheral artery disease (PAD) [3]. This broader therapeutic scope could explain its comparatively higher and increasing use. The demographic shift with an ageing population and the projected rise in the prevalence of cardiovascular disease could further contribute to the growing pool of patients [31].

Temporal trends in antiplatelet dispensing

In both countries, a small but consistent decline in the dispensing volumes of several antiplatelet agents was observed between 2022 and 2024. This trend is unexpected, particularly given the ageing population and the anticipated increase in the absolute number of patients with an indication. Potential explanations remain speculative and include market-related factors, including periodic drug shortages, changes in reimbursement policies, fluctuations in co-payment regulations and the limited 3-year observation period.

Clinical implications of the findings

Aspirin remains the dominant antiplatelet therapy in both countries. However, contemporary evidence increasingly supports individualised antithrombotic strategies rather than uniform aspirin-based approaches. For example, $P2Y_{12}$ inhibitor monotherapy – including clopidogrel, ticagrelor or prasugrel in selected settings – has emerged as an alternative to aspirin monotherapy after completion of DAPT [6, 32-35]. Recent US guidelines recommend transition to ticagrelor monotherapy ≥1 month after PCI in acute coronary syndrome patients who have tolerated DAPT with ticagrelor [36]. If such strategies were widely implemented, a higher proportion of $P2Y_{12}$ inhibitor dispensing relative to aspirin might be expected. The PARTHENOPE randomised trial showed that a personalised DAPT strategy reduced net adverse clinical events compared with standard 12-month DAPT, with the strongest signal in patients with high DAPT score, supporting prolonged therapy in patients with high ischaemic risk [37]. In addition, although current evidence supports prasugrel over ticagrelor in selected acute coronary syndrome patients, particularly those aged <75 years without prior stroke or transient ischaemic attack, this does not appear to be reflected in Swiss prescribing patterns, where ticagrelor was dispensed more frequently than prasugrel [38, 39]. Thus, the present data suggest that current practice in both countries may still be strongly anchored to aspirin, while more individualised antithrombotic strategies appear to be used infrequently at the population level. Intensified long-term antithrombotic therapy is not appropriate for all patients and must always be balanced against bleeding risk, contraindications, frailty and drug-drug interactions.

Strengths and limitations

Strengths of this study include the use of national-level data from two countries, using the same standardised metric, number of tablets per 1000 inhabitants (Switzerland) or per 1000 SHI-insured persons (Germany) per year, allowing for direct cross-country comparison. The 3-year observation period encompasses two consecutive ESC guideline updates (2019 and 2024 chronic coronary syndrome guidelines), enabling the assessment of temporal trends around changes in recommendations. To our knowledge, this is the first direct comparison of use patterns for low-dose antithrombotic and anti-inflammatory therapies between two countries, one EU member state and one non-EU country with different healthcare systems.

Limitations include the absence of patient-level clinical data, comorbidities or indications, which prevents direct linkage between prescriptions and cardiovascular events or patient characteristics. Consequently, it was not possible to distinguish between short-term and long-term use. German DAPI data reflect only outpatient prescriptions reimbursed by SHI and exclude private prescriptions, hospital-dispensed medications and sales to self-paying patients, potentially underestimating total drug use. Swiss sell-in data represent purchases by hospitals, pharmacies and physicians, which are expected to closely mirror patient dispensing, as medications are generally ordered according to demand and not stockpiled to expiry. The comparison between the German SHI-insured population and the Swiss general population is a limitation but is justified given that

the German dataset covers 87% of residents. The commonly used pharmacoepidemiological metric of defined daily doses per 1000 inhabitants per day could not be calculated for the Swiss sell-in dataset due to the absence of reliable dispensing and dosing information; therefore, drug utilisation was standardised as tablets per 1000 persons per year to ensure cross-country comparability. A further consideration relates to the illustrative benchmark used to contextualise dispensing volumes of intensified long-term therapies relative to aspirin. This benchmark was derived from epidemiological evidence indicating that a substantial proportion of patients (>35%) with coronary or atherosclerotic cardiovascular disease (all of these should be treated with aspirin) may qualify for intensified antithrombotic strategies, while acknowledging that a proportion of patients will be ineligible due to bleeding risk or comorbidities. We therefore applied a deliberately conservative reference threshold of approximately 10% of aspirin dispensing to reflect a plausible lower-bound estimate of combined expected uptake in routine care. This threshold was intended to account for the fact that not all potentially eligible patients are suitable for intensified therapy because of bleeding risk, frailty, drug–drug interactions, comorbidities or other contraindications, and that a proportion of aspirin use may reflect primary prevention or other indications rather than established atherosclerotic cardiovascular disease. Although this threshold is necessarily approximate and cannot be validated without patient-level data, the combined dosing-adjusted dispensing volume of the evaluated therapies was close to this range in Germany but remained clearly below it in Switzerland. These differences should be interpreted cautiously, as they may in part reflect differences in the underlying data sources. Consequently, our findings should be interpreted as suggesting, rather than proving, potentially limited population-level uptake of low-dose antithrombotic and anti-inflammatory therapies. Furthermore, the deliberately conservative threshold was intended to account for contemporary bleeding-risk-guided strategies, including shorter DAPT or antiplatelet monotherapy in selected high-bleeding-risk patients, while also acknowledging that a substantial proportion of patients remain at high ischaemic risk and may benefit from prolonged or intensified secondary prevention.

Conclusion

The observed dispensing patterns suggest that the population-level uptake of low-dose antithrombotic and anti-inflammatory therapies may be lower than expected when interpreted relative to aspirin as a reference for long-term cardiovascular prevention, with uptake close to the conservative benchmark in Germany but particularly low in Switzerland. These findings could indicate opportunities to further support individualised risk-based preventive strategies in routine clinical practice. Continued efforts to improve awareness of long-term prevention options and to address practical barriers to their use may help optimise care for patients at elevated cardiovascular risk.

Data sharing statement

The data underlying this article from Germany cannot be shared publicly due to restricted access to the DAPI database and were provided for the purpose of the current analysis. These data are not publicly available due to data protection regulations but may be shared upon reasonable request to MS. Data from Switzerland may be shared upon reasonable request to the corresponding author, subject to institutional approval. The analyses were conducted using RStudio (Posit PBC, Boston, MA, USA) and standard statistical packages. Analytical scripts are not publicly available.

Notes

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References

1. Bhatt DL, Eagle KA, Ohman EM, Hirsch AT, Goto S, Mahoney EM, et al. Comparative Determinants of 4-Year Cardiovascular Event Rates in Stable Outpatients at Risk of or With Atherothrombosis. JAMA. 2010 Sep 22;304(12):1350-1357. doi:10.1001/jama.2010.1322
2. Bonaca MP, Bhatt DL, Cohen M, Steg PG, Storey RF, Jensen EC, et al. Long-Term Use of Ticagrelor in Patients with Prior Myocardial Infarction. New England Journal of Medicine. 2015 May 7;372(19):1791-1800. doi:10.1056/NEJMoa1500857
3. Eikelboom JW, Connolly SJ, Bosch J, Dagenais GR, Hart RG, Shestakovska O, et al. Rivaroxaban with or without Aspirin in Stable Cardiovascular Disease. New England Journal of Medicine. 2017 Oct 5;377(14):1319-1330. doi:10.1056/NEJMoa1709118
4. Mauri L, Kereiakes DJ, Yeh RW, Driscoll-Shempp P, Cutlip DE, Steg PG, et al. Twelve or 30 Months of Dual Antiplatelet Therapy after Drug-Eluting Stents. New England Journal of Medicine. 2014 Dec 4;371(23):2155-2166. doi:10.1056/NEJMoa1409312
5. Kim HS, Kang J, Hwang D, Han JK, Yang HM, Kang HJ, et al. Prasugrel-based de-escalation of dual antiplatelet therapy after percutaneous coronary intervention in patients with acute coronary syndrome (HOST-REDUCE-POLYTECH-ACS): an open-label, multicentre, non-inferiority randomised trial. The Lancet. 2020 Oct;396(10257):1079-1089. doi:10.1016/S0140-6736(20)31791-8
6. Jang Y, Park SD, Lee JP, Choi SH, Kong MG, Won YS, et al. One-month dual antiplatelet therapy followed by prasugrel monotherapy at a reduced dose: the 4D-ACS randomised trial. EuroIntervention. 2025 Jul;21(14):e796-e809. doi:10.4244/EIJ-D-25-00331
7. Hansson GK. Inflammation, Atherosclerosis, and Coronary Artery Disease. New England Journal of Medicine. 2005 Apr 21;352(16):1685-1695. doi:10.1056/NEJMra043430
8. Buckley LF, Chebrolu B, Al Zaria M, Blankstein R, Libby P, Weber BN. Potential Impact of Colchicine on Atherosclerotic Cardiovascular Disease in the United States. JACC: Advances. 2025 Mar;4(3):101622. doi:10.1016/j.jacadv.2025.101622
9. Tardif JC, Kouz S, Waters DD, Bertrand OF, Diaz R, Maggioni AP, et al. Efficacy and Safety of Low-Dose Colchicine after Myocardial Infarction. New England Journal of Medicine. 2019 Dec 26;381(26):2497-2505. doi:10.1056/NEJMoa1912388
10. Nidorf SM, Fiolet ATL, Mosterd A, Eikelboom JW, Schut A, Opstal TSJ, et al. Colchicine in Patients with Chronic Coronary Disease. New England Journal of Medicine. 2020 Nov 5;383(19):1838-1847. doi:10.1056/NEJMoa2021372
11. Vrints C, Andreotti F, Koskinas KC, Rossello X, Adamo M, Ainslie J, et al. 2024 ESC Guidelines for the management of chronic coronary syndromes. European Heart Journal. 2024 Sep 29;45(36):3415-3537. doi:10.1093/eurheartj/ehae177
12. Byrne RA, Rossello X, Coughlan JJ, Barbato E, Berry C, Chieffo A, et al. 2023 ESC Guidelines for the management of acute coronary syndromes. European Heart Journal. 2023 Oct 12;44(38):3720-3826. doi:10.1093/eurheartj/ehad191
13. Kunz M, Daudí AE, Kieble M, Laufs U, Götzinger F, Boeddinghaus J, et al. Temporal trends in the prescription of low-dose antithrombotic and anti-inflammatory therapies in Germany (2022–2024). Clinical Research in Cardiology. 2026 Aug;115(8):1351-1361. doi:10.1007/s00392-025-02761-x
14. Compendium. Fachinformation COLCTAB Tabl 1 mg [Internet]. Available from: https://compendium.ch/product/1481648-colctab-tabl-1-mg
15. Bundesamt für Statistik. Ständige Wohnbevölkerung nach Postleitzahl, Staatsangehörigkeitskategorie, Geschlecht, Altersklasse und Zivilstand, 2010-2023. [Internet]. 2019. doi:10.32614/cran.package.bfs Available from: https://www.bfs.admin.ch/asset/de/32229177
16. Federal Ministry of Health. Federal Ministry of Health [Internet]. Available from: https://www.bundesgesundheitsministerium.de/themen/krankenversicherung/zahlen-und-fakten-zur-krankenversicherung/mitglieder-und-versicherte
17. Schweizer Monitoring-System Sucht und nichtübertragbare Krankheiten. Herz-Kreislauf-Erkrankungen: Prävalenz (Alter: 15+) [Internet]. Available from: https://ind.obsan.admin.ch/indicator/monam/herz-kreislauf-erkrankungen-praevalenz-alter-15
18. Welsh RC, Gouda P, Dover D, Bainey KR, McAlister FA, Kaul P. Applicability and impact of the COMPASS trial in a Canadian population of patients with atherosclerotic disease. Atherosclerosis. 2024 Jun;393:117486. doi:10.1016/j.atherosclerosis.2024.117486
19. De Luca L, Formigli D, Meessen J, Uguccioni M, Cosentino N, Paolillo C, et al. COMPASS criteria applied to a contemporary cohort of unselected patients with stable coronary artery diseases: insights from the START registry. European Heart Journal - Quality of Care and Clinical Outcomes. 2021 Sep 16;7(5):513-520. doi:10.1093/ehjqcco/qcaa054
20. Bradley SM, Hess GP, Stewart P, Armstrong EJ, Farmer SA, Wasfy JH, et al. Implications of the PEGASUS-TIMI 54 trial for US clinical practice. Open Heart. 2017 Apr;4(1):e000580. doi:10.1136/openhrt-2016-000580
21. Lee KY, Hwang BH, Choo EH, Lim S, Kim CJ, Kim JJ, et al. Clinical benefit of long-term use of dual antiplatelet therapy for acute myocardial infarction patients with the PEGASUS-TIMI 54 criteria. Frontiers in Cardiovascular Medicine. 2022 Nov 17;9:1017533. doi:10.3389/fcvm.2022.1017533
22. Jernberg T, Hasvold P, Henriksson M, Hjelm H, Thuresson M, Janzon M. Cardiovascular risk in post-myocardial infarction patients: nationwide real world data demonstrate the importance of a long-term perspective. European Heart Journal. 2015 May 14;36(19):1163-1170. doi:10.1093/eurheartj/ehu505
23. Knuuti J, Wijns W, Saraste A, Capodanno D, Barbato E, Funck-Brentano C, et al. 2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes. European Heart Journal. 2020 Jan 14;41(3):407-477. doi:10.1093/eurheartj/ehz425
24. Lamy A, Eikelboom J, Tong W, Yuan F, Bangdiwala SI, Bosch J, et al. The Cost-Effectiveness of Rivaroxaban Plus Aspirin Compared with Aspirin Alone in the COMPASS Trial: A US Perspective. American Journal of Cardiovascular Drugs. 2024 Jan;24(1):117-127. doi:10.1007/s40256-023-00620-6
25. Magnuson EA, Li H, Wang K, Vilain K, Shafiq A, Bonaca MP, et al. Cost-Effectiveness of Long-Term Ticagrelor in Patients With Prior Myocardial Infarction. Journal of the American College of Cardiology. 2017 Aug;70(5):527-538. doi:10.1016/j.jacc.2017.05.063
26. Streuli Pharma AG. COLCTAB Tabl 1 mg Streuli Pharma AG Compendium [Internet]. Available from: https://compendium.ch/product/1481648-colctab-tabl-1-mg/mpro
27. U.S. Food and Drug Administration FDA. 2023 OND Annual Report - Breaking Barriers to Advance Public Health. 2024 Apr.
28. Lunzer R, Delle-Karth G, Zeitlinger M, Prager M, Pracher LM. Colchicin – Phönix aus der Asche. Wiener klinische Wochenschrift. 2025 Feb;137(S1):1-33. doi:10.1007/s00508-024-02490-7
29. Deutsche Apotheker Zeitung. Erstmals Xarelto-Generika im Handel [Internet]. 2024. Available from: https://www.deutsche-apotheker-zeitung.de/news/artikel/2024/04/18/erstmals-xarelto-generika-im-handel

30. Bundespatentgericht. Urteil vom 17. Januar 2025 [Internet]. Available from: https://www.bundespatentgericht.ch/fileadmin/entscheide/O2023_007-Urteil_2025-01-17.pdf

31. Chong B, Jayabaskaran J, Jauhari SM, Chan SP, Goh R, Kueh MTW, et al. Global burden of cardiovascular diseases: projections from 2025 to 2050. European Journal of Preventive Cardiology. 2025 Aug 25;32(11):1001-1015. doi:10.1093/eurjpc/zwae281

32. Giacoppo D, Gragnano F, Watanabe H, Kimura T, Kang J, Park KW, et al. P2Y 12 inhibitor or aspirin after percutaneous coronary intervention: individual patient data meta-analysis of randomised clinical trials. BMJ. 2025 Jun 4;389:e082561. doi:10.1136/bmj-2024-082561

33. Watanabe H, Morimoto T, Natsuaki M, Yamamoto K, Obayashi Y, Nishikawa R, et al. Clopidogrel Versus Aspirin Monotherapy Beyond 1 Year After PCI: The Final 5-Year Results of the STOPDAPT-2 ACS and STOPDAPT-2 Total Cohort. Circulation: Cardiovascular Interventions. 2026 Jun;19(6):e016280. doi:10.1161/CIRCINTERVENTIONS.125.016280

34. Koo BK, Kang J, Park KW, Rhee TM, Yang HM, Won KB, et al. Aspirin versus clopidogrel for chronic maintenance monotherapy after percutaneous coronary intervention (HOST-EXAM): an investigator-initiated, prospective, randomised, open-label, multicentre trial. The Lancet. 2021 Jun;397(10293):2487-2496. doi:10.1016/S0140-6736(21)01063-1

35. Ge Z, Kan J, Gao X, Raza A, Zhang JJ, Mohydin BS, et al. Ticagrelor alone versus ticagrelor plus aspirin from month 1 to month 12 after percutaneous coronary intervention in patients with acute coronary syndromes (ULTIMATE-DAPT): a randomised, placebo-controlled, double-blind clinical trial. The Lancet. 2024 May;403(10439):1866-1878. doi:10.1016/S0140-6736(24)00473-2

36. Rao SV, O'Donoghue ML, Ruel M, Rab T, Tamis-Holland JE, Alexander JH, et al. 2025 ACC/AHA/ACEP/NAEMSP/SCAI Guideline for the Management of Patients With Acute Coronary Syndromes: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2025 Apr;151(13):e771-e862. doi:10.1161/CIR.0000000000001309

37. Piccolo R, Calabrò P, Carrara G, Simonetti F, Varricchio A, Attisano T, et al. Personalized or Standard Duration of Dual Antiplatelet Therapy After Percutaneous Coronary Intervention. JACC. 2025 Dec;86(23):2352-2367. doi:10.1016/j.jacc.2025.08.040

38. Bangalore S, Sinha SK, Singh R, Parida AK, Mody R, Abhaichand R, et al. Ticagrelor vs Prasugrel in Patients With Diabetes and Multivessel Coronary Artery Disease: The TUXEDO-2 Randomized Clinical Trial. JAMA Cardiology. 2026 Apr 1;11(4):369-377. doi:10.1001/jamacardio.2025.5057

39. Schüpke S, Neumann FJ, Menichelli M, Mayer K, Bernlochner I, Wöhrle J, et al. Ticagrelor or Prasugrel in Patients with Acute Coronary Syndromes. New England Journal of Medicine. 2019 Oct 17;381(16):1524-1534. doi:10.1056/NEJMoa1908973

Appendix A

Table S1: Average number of tablets per package in the two countries.

		Average number of tablets per package	
Year	**Substance**	**Germany**	**Switzerland**
2022	Aspirin 100 mg	98.7	96.1
2023		98.6	96.0
2024		98.5	96.0
2022	Clopidogrel 75 mg	93.7	74.4
2023		93.2	74.5
2024		92.7	73.7
2022	Colchicine 0.5 mg	30.0	
2023		30.0	
2024		30.0	
2022	Colchicine 1 mg		10.0
2023			10.0
2024			10.3
2022	Prasugrel 10 mg	91.9	78.8
2023		91.6	82.5
2024		91.4	83.4
2022	Prasugrel 5 mg	91.2	72.6
2023		91.1	73.0
2024		91.2	78.2
2022	Rivaroxaban 2.5 mg	171.3	113.0
2023		175.6	118.7
2024		179.8	123.1
2022	Ticagrelor 60 mg	152.3	143.1
2023		147.7	143.5
2024		143.8	146.3
2022	Ticagrelor 90 mg	120.7	112.5
2023		121.0	114.3
2024		121.3	114.0