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Prescription Rates for Antiplatelet Therapy (APT) in Coronary Artery Disease (CAD) – What Benchmark are We Aiming at in Continuing Medical Education (CME)?

Bernd Hagen[a] and Reinhard Griebenow[b]

[a]Department of Evaluation and Quality Assurance, Central Institute for Statutory Health Care in Germany, Cologne/Berlin, Germany; [b]Praxis Rheingalerie, Cologne, Academic Teaching Practice, University of Cologne, Cologne, Germany

ABSTRACT

Physicians always aim to improve their patients' health. CME should be designed not only to provide knowledge transfer, but also to influence clinical decision-making and to close performance gaps. In aretrospective study we analysed prescription rates for APT in 254,932 CAD patients (male: 64.4%), treated in atotal of 3,405 practices in 2019 in aDMP in the region of North Rhine, Germany. Analyses were run for the whole study population stratified by sex as well as for subgroups of patients suffering from myocardial infarction/acute coronary syndrome, or who have been treated with percutaneous coronary intervention or bypass surgery. Patients mean age was 72.7 ± 11.2 years (mean ± 1SD), mean duration of DMP participation was 7.2 ± 4.7 years, and mean cumulative number of DMP visits was 27 ± 17. APT prescription rates were 85.0% in male and 78.8% in female CAD patients. In subgroups of male CAD patients APT prescription rates were between 89.7% and 92.8%, in the same subgroups of female CAD patients the corresponding rates were between 87.8% and 92.0%. Rates for amissing APT prescription per practice were between .0044% and .0062% for male and female CAD patients, respectively. Rates for amissing APT prescription per practice and DMP visit were .0002% for both sexes. These results suggest that a DMP can achieve high attainment rates for APT in CAD. To further improve attainment rates, consideration of absolute numbers of eligible patients per practice or physician is probably more appropriate than expression of performance as percentage values. This is especially true if attainment rates show substantial variations between subgroups, if subgroups show substantial variation in size, if attainment rates are already in the magnitude of 80% or higher, and if there are disparities in the evidence base underlying treatment recommendations related to subgroups.

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Introduction

Physicians always aim to improve their patients' health and consequently also improve community health. CME should always be designed to support this goal and thus not only provide knowledge transfer, but also influence clinical decision-making and fill performance gaps. This concept has been described as Moore's pyramid [1].

However, in clinical practice, achieving changes in community health may not only depend on physician performance, but also on e.g. access of patients to health care, evidence based and acceptance of treatment recommendations, and availability of treatment. Thus, the relative weight of CME to achieve improvements in community health needs to be determined.

This retrospective study has analysed what CME would have to address to improve physician performance in patients with a widespread disease [2], inscribed into a DMP, which offers free access to all patients, and treated with APT, a well-established and universally available treatment option.

Methods

Background and design of DMPs in Germany has been described elsewhere [3].

In brief, the DMP CAD contains the following elements, which are mandatory:

- Recommendations for diagnosis and treatment of CAD
- Definition of benchmarks ("quality goal") to be achieved (e.g. prescription rate for APT of ≥ 80%)
- Standardised electronic documentation of every patient visit

CONTACT Bernd Hagen bhagen@zi.de Central Institute for Statutory Health Care in Germany, Sedanstr. 10-16, 50668 Cologne, Germany

- At least one mandatory visit in each quarter of the year.
- Feedback reports to be issued every 6 months to the treating physician, which present core patient characteristics and treatment results for all patients enrolled by the individual physician as well as for all patients in the region of North Rhine.

We have analysed the prescription rates for APT in all patients enrolled in the DMP CAD in North Rhine on Dec. 31st, 2019, from the database of the Central Research Institute for Statutory Healthcare in Germany, which hosts all follow up data of DMP patients in the region of North Rhine.

In the DMP patients are grouped according to the following definitions:

(1) Myocardial infarction: MI/acute coronary syndrome at any time, n = 107,028, 42% of all patients
(2) Percutaneous coronary intervention (PCI): PCI at any time, n = 61,009, 23.9%
(3) Bypass operation: Coronary artery bypass operation at any time, n = 21,709, 8.5%
(4) Others: All patients not falling in groups 1.–3., n = 113,847, 44.7%

Groups 1.-3. are not mutually exclusive.

Numbers of patients without APT have also been related to:

(1) the number of practices in the North Rhine region treating DMP CAD patients, n = 3,083–3,405
(2) the number of DMP visits over the whole period of patients' DMP participation, n = 22–39 (min-max)

Data analysis has been performed by use of IBM SPSS 19.0 statistics software.

Results

On Dec. 31st, 2019, 254,932 patients had been enrolled in the DMP CAD North Rhine, equalling an estimated coverage rate of about 72% of all patients with CAD in the North Rhine region (calculated from 2), further demographic data are shown in Table 1.

Median number of DMP CAD patients per practice was 59 (interquartile range, IQR, 29–100), 39 (IQR 20–66) for male and 20 (IQR 9–35) for female patients. Mean age of all patients was 72.7 ± 11.2 yrs., mean duration of DMP participation was 7.2 ± 4.7 yrs., and mean cumulative number of DMP visits over the whole duration of DMP participation was 26.9 ± 17.3. Percentage of male patients was 64.4%, 88.8% of all CAD patients suffered from arterial hypertension, and 47.7% from diabetes mellitus, respectively.

Mean age, mean duration of DMP participation, and mean number of DMP visits differed by patients' subgroup. Compared to all other subgroups mean age was higher in patients with bypass surgery. In all three subgroups, percentage of male patients was larger compared to "others", as well as participation was longer and there were more DMP visits.

A total of 3,405 practices have enrolled patients in the DMP, number of practices per subgroup are shown in Table 2.

Excluding patients with contraindications and/or indications for oral anticoagulation yielded 225,977 CAD patients eligible for APT.

Prescription rates for the entire group as well as for subgroups are shown in Table 2, further stratified for sex, number of practices, and number of patient contacts in the DMP ("DMP visit").

85.0% of all male CAD patients were treated with APT, the corresponding percentage of female patients was 78.8%. Compared to "others" APT prescription rates were higher for male (89.7–92.8%) as well as for female CAD patients (87.8–92.0%) in all other three subgroups. APT was missing in 15.0% of male and 21.2% of female CAD patients, with a substantially higher percentage of missing APT in the "others" group compared to all other three subgroups (male: 7.2–10.3%, female: 8.0–12.2%).

Table 1. Baseline demographic data.

	All patients			Myocardial infarction			PCI			Bypass surgery			Others		
	Mean or n	± 1 SD or %		Mean or n	± 1 SD or %		Mean or n	± 1 SD or %		Mean or n	± 1 SD or %		Mean or n	± 1 SD or %	
Age (yrs)	72.7	±	11.2	72.3	±	11.4	72.4	±	11.1	75.8	±	9.7	72.7	±	11.2
Male sex	164,197		64.4	73,954		69.1	43,006		70.5	16,968		78.2	66,511		58.4
DMP (yrs)	7.2	±	4.7	8.3	±	4.4	8.3	±	5.5	10.6	±	4.8	5.7	±	4.2
N of DMP visits	26.9	±	17.3	31.0	±	16.6	31.0	±	20.5	39.2	±	18.3	21.7	±	15.5
Arterial hypertension	226,492		88.8	97,164		90.8	55,649		91.2	20,404		94.0	98,082		86.2
Diabetes mellitus	121,502		47.7	52,127		48.7	28,485		46.7	11,511		53.0	53,656		47.1

Table 2. Prescription and non-prescription of antiplatelet medication by subgroup, sex, and frequency of treatment.

	All patients		Myocardial infarction		PCI		Bypass surgery		Other	
	n	%	n	%	n	%	n	%	n	%
APT (+), male	123,555	85.0	59,285	90.4	34,943	92.8	12,942	89.7	45,567	77.0
APT (+), female	63,549	78.8	25,820	87.8	14,503	92.0	3,642	88.1	29,605	70.0
APT (–), male	21,757	15.0	6,307	9.6	2,716	7.2	1,492	10.3	13,623	23.0
APT (–), female	17,116	21.2	3,584	12.2	1,256	8.0	494	11.9	12,660	30.0
APT (–) per practice, male	6.39	0.0044	1.88	0.0029	0.84	0.0022	0.48	0.0033	4.08	0.0069
APT (–) per practice, female	5.03	0.0062	1.07	0.0036	0.39	0.0025	0.16	0.0039	3.80	0.0090
APT (–) per practice and DMP visit, m	0.237	0.0002	0.061	0.0001	0.027	0.0001	0.012	0.0001	0.186	0.0003
APT (–) per practice and DMP visit, f	0.186	0.0002	0.034	0.0001	0.012	0.0001	0.004	0.0001	0.173	0.0004

Number of practices: all patients n = 3,405, myocardial infarction n = 3,361, PCI n = 3,251, bypass surgery n = 3,083, other n = 3,335

If related to the number of practices, APT was missing in .0044% of male and .0062% of female CAD patients per practice (.0022–.0039% for subgroups), and if related to the number of practices and number of DMP visits, APT was missing in .0002% of male as well as female CAD patients (.0001% for subgroups).

Discussion

Following an index event (e.g. myocardial infarction) with hospital admission, prescription rates for APT, as part of a secondary preventive strategy, are usually high [4–10], but do not reach 100%. Age, female sex, race, polypharmacy due to comorbidities, and coding problems (among others) are variables which have been shown to have a negative impact on prescription rates at hospital discharge [11–17].

All the aforementioned variables also negatively influence long-term adherence, which has further been shown to decline due to poor health literacy, cognitive or psychic impairment, and medication cost issues (among others) [18–21]. Long-term adherence to APT has been reported to decline substantially over time [17,22,23], but more favourable results have also been reported [5,6,10,12,24–28].

Though we have no data regarding patient adherence, overall prescription rates for APT nevertheless document that participating physicians show a persistently high motivation for secondary prevention in this group of patients with a long-term history of CAD.

Absolute numbers of patients in the range of 17,000 to 22,000 (depending on sex) not being prescribed APT may nevertheless raise concern.

However, further analysis of subgroups shows that attainment rates for APT in subgroups exhibit substantial variation: thus, APT has been prescribed in about 92% of patients who have undergone a PCI and in nearly 90% of all patients who have suffered from myocardial infarction or undergone a coronary bypass operation, respectively.

It is only in the "others" group that between 23 and 30% (depending on sex) of the patients do not get APT. However, inclusion into the DMP does not require validation of the diagnosis by additional anatomical and/or functional tests, but could be based on clinical symptoms only. Thus, this group may well contain patients who by definition fall under "primary prevention", for which the prognostically favourable effect of APT is still less clear than in secondary prevention [29,30]. Evidence for similarly mixed patient groups is scarce and clinical trials have also not been able to unequivocally show a positive effect of APT in these patients [31,32].

Thus, our study demonstrates that use of overall attainment rates to guide needs assessment, definition of learning objectives, and ultimately benchmarks in CME is less appropriate, if

- prescription rates show substantial variations between subgroups,
- attainment rates are already in the order of magnitude of 80% or higher, and
- there are disparities in the evidence base underlying treatment recommendations related to subgroups.

Furthermore, if taking into consideration that CME should provide physicians with information as closely related to their particular working environment as possible to facilitate implementation, benchmarks to be propagated by CME become even more challenging:

- While percent values signal undertreatment of women (78.8% vs. 85% in male patients), this looks different from the perspective of the individual physician: absolute numbers break down to 6.4 male vs. 5 female patients without APT per practice.
- According to the Federal Association of Statutory Health Insurance Physicians in Germany (www.kbv.de/html/zahlen.php), in 2019, approximately 553 m cases have been treated in 101,932 practices, equalling an average number of 1,356

patient cases per practice. Assuming a 50-%-distribution between sexes (i.e. 678 cases each), it turns out that to further raise prescription rates for APT (towards 100%) in the "PCI" group it would need to identify 1 male patient in every practice and 1 female patient in every 3rd practice, respectively, or to put it in other words, 1 male patient in 678 male patients per quarter, and 1 female patient in 2,034 female patients per quarter. Likewise, to further raise prescription rates for APT in the "myocardial infarction" group it would need to roughly identify 1 female patient in every practice (1/678) and 2 male patients per practice (1/339), respectively. But to achieve the same result in the much smaller "bypass operation" group, it would need to identify 1 male patient in every 2nd practice (1/1,356) and 1 female patient in every 6th practice (1/4,068), respectively.

These figures demonstrate that

- use of just percentage values as performance measure may be misleading, especially when subgroups show substantial variation in size,
- differences, which may appear significant, if looking into larger patient cohorts (e.g. on the regional or national level), may turn out to be marginal in relation to how often these patients can be found in the patient cohort treated by an individual family physician. Whether CME may play a role in improving identification of these few patients needs to be determined. However, data from a scenario with a large need for change (i.e. the US opioid crisis) show that CME has been rated as being of minor importance to drive change [33]. On the other hand, theoretically useful interventions, which are related to the status of the individual patient, such as the use of clinical decision aids and/or alerts in electronic health records or on patients' mobile phones so far have shown variable and partly disappointing results [34–40].

Limitations:

Our study has several limitations:

a. Since our study population represents only about 72% of all patients with CAD in the region of North Rhine this might have had a confounding effect as well as potential differences in inclusion rates in North Rhine subregions [41].
b. Number of APT naïve patients per total quarterly number of patients per practice refers to nationwide numbers of practices of all specialities and may not reflect the numbers in the practices participating in the DMP CAD North Rhine.
c. For calculation of number of quarterly patients per practice we have assumed a 50:50 distribution of physician-patient contacts between sexes, without any adjustment for age, and comorbidities, since more detailed data are not publicly available. We though believe that our data give a realistic estimate of the order of magnitude of the issue.
d. Furthermore, these results may have been influenced by documentation disparities, which have been demonstrated to occur in a significant number of patients in similar studies [9,42–49].
e. We have no data to estimate to which extent complications emerging in the course of treatment might have influenced the results of this study, though e.g. bleeding complications might have occurred in a non-negligible proportion of patients [50–52].

We though speculate that the latter two (c/d) might have had an influence on the results, since otherwise an average number of 27 DMP visits representing the number of missed opportunities to prescribe APT would be hardly plausible.

In conclusion, our study demonstrates that

- a multifaceted intervention, like a DMP, can achieve high attainment rates for APT in CAD
- to describe the benchmark for CME to further improve attainment rates, consideration of absolute numbers of eligible patients per physician is probably more appropriate than expression of performance as percentage values in particular if
  - attainment rates show substantial variations between subgroups,
  - subgroups show substantial variation in size,
  - attainment rates are already in the magnitude of 80% or higher, and
  - there are disparities in the evidence base underlying treatment recommendations related to subgroups.

These results also indicate that defining the need for change (i.e. outcome of needs assessment) not only along percentage values, but as number of eligible patients per physician and/or practice may yield a more personalised and hence more motivating approach for participants in CME.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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