Use of recommended drug therapies before percutaneous coronary intervention

WIC Fall Meeting 2019

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Background

- in addition to lifestyle-altering measures, drug therapy is a central recommendation of current guidelines for prevention in patients with coronary heart disease

- secondary drug prevention after hospitalization or after myocardial infarction / acute coronary syndrome:
  - Deviations in the implementation of guideline recommendations in the routine care of CHD patients in Germany

- studies in the US and Canada have shown that drug therapy before PCI is poorly implemented

- first examination of the use of drug therapy before PCI in Germany
Background

- Systematization of guideline recommendations based on routine data.
- Analysis of the implementation and the factors influencing implementation of recommended drug therapy before PCI.

- Low prescription prevalence can be attributed to two main factors:
  - Lack of implementation of treatment recommendations.
  - High rates of treatment discontinuation / lack of adherence.

- In addition to individual patient characteristics, factors of physician-patient interaction and care structure may influence the use of drug therapy.
Data basis KARDIO-study

- cooperation with the University of Marburg (consortium leadership), the IHF Ludwigshafen Foundation, the University Hospital Hamburg-Eppendorf and the statutory health insurances AOK, TK and BARMER

- routine data of the participating statutory health insurance companies with a total of 42.5 million insured persons

- the aim of the project is to improve the long-term indication quality of cardiac catheterization and thus to increase the quality of care for the patients

- funded by the innovation committee of the G-BA (01VSF16048)
Patient population (I)

- cohort of nationwide billing data of the AOK, Barmer and Techniker Krankenkasse for the years 2014 to 2016

- patients who underwent PCI (EBM: 34291, OPS: 8-836) in hospital or outpatient in 2016
- 18 years and older
- insured for at least 360 days or died after / at the time of PCI
- patients who switched insurance between 2014 and 2016 were excluded

- main analysis: Known CHD treated for stable CHD / CP
- sensitivity analysis I: Known CHD treated for stable CHD / CP and instable AP
- sensitivity analysis II: no confirmed CHD treated for stable CHD / CP
Patient population (II)

N=147,272 patients with PCI

- N=76,632 Patients with secured CHD diagnosis:
  - Missing or conflicting information: n=51
  - N=76,581
    - Excluded treatment reason: n=46,515
      - N=30,066 PCI for stable CHD or CP
        - N=23,197
          - PCI or CABG in year prior: n=6,869
            - Main analysis - known CHD
              - N=22,551
    - N=40,511 PCI for stable CHD or CP incl. instable AP (ICD-10: I20.0, I20.1)
      - N=31,747
        - MI in year prior: n=646
          - Sensitivity analysis I incl. (I20.0, I20.1)
            - N=30,861
      - N=8,764
        - MI in year prior: n=886
          - Sensitivity analysis II - without known CHD
            - N=17,721

- Patients without secured CHD diagnosis: n=70,640
  - Missing or conflicting information: n=299
  - N=70,341
    - Excluded treatment reason: n=52,578
Guideline recommendations

combined endpoints

recommended medication (RM)

patient was assigned to the user group if at least one prescription was filled within 12 months prior to PCI

- lipid lowering drugs (statins, fibrates, anion exchangers or cholesterol absorption inhibitors)

and

- symptom-oriented therapy (beta blocker, calcium channel blocker, ivabradine, ranolazine or organic nitrate)

symptom-oriented therapy:

patient was assigned to the user group if at least two drugs or a combination of the symptom-oriented therapy was prescribed within 12 months prior to PCI

adapted representation after NVL 2014 /2016 und ESC CAD
Prescription prevalence

**recommended therapy**
(at least one lipid-lowering agent and one symptom-oriented therapy)

- 68.61% meet the criterion
- 25.40% of patients receive one therapy
- 5.99% patients received none

**symptom-oriented therapy**
- 43.56% of patients receive two drugs
- 43.48% of patients receive one drug
- 12.96% of patients receive none
Multilevel model and influencing factors

<table>
<thead>
<tr>
<th>Individual level</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>0.99</td>
<td>(0.98 - 0.99)</td>
<td>&lt;0.001</td>
<td>1.01</td>
<td>(1.01 - 1.02)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>female</td>
<td>1.06</td>
<td>(0.99 - 1.14)</td>
<td>0.084</td>
<td>1.37</td>
<td>(1.29 - 1.46)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>DMP CHD</td>
<td>1.58</td>
<td>(1.49 - 1.68)</td>
<td>&lt;0.001</td>
<td>1.23</td>
<td>(1.17 - 1.30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>myocardial infarction</td>
<td>1.70</td>
<td>(1.59 - 1.81)</td>
<td>&lt;0.001</td>
<td>1.13</td>
<td>(1.07 - 1.20)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>previous PCI / CABG</td>
<td>1.23</td>
<td>(1.10 - 1.35)</td>
<td>&lt;0.001</td>
<td>1.00</td>
<td>(0.92 - 1.10)</td>
<td>n.s.</td>
</tr>
<tr>
<td>cardiac insufficiency</td>
<td>1.08</td>
<td>(1.01 - 1.15)</td>
<td>0.002</td>
<td>1.13</td>
<td>(1.07 - 1.20)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>hypertension</td>
<td>1.66</td>
<td>(1.48 - 1.86)</td>
<td>&lt;0.001</td>
<td>2.80</td>
<td>(2.44 - 3.21)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>disorders of lipid metabolism</td>
<td>2.46</td>
<td>(2.29 - 2.64)</td>
<td>&lt;0.001</td>
<td>1.15</td>
<td>(1.07 - 1.23)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>diabetes mellitus</td>
<td>1.34</td>
<td>(1.26 - 1.43)</td>
<td>&lt;0.001</td>
<td>1.38</td>
<td>(1.31 - 1.46)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PAD</td>
<td>1.22</td>
<td>(1.12 - 1.33)</td>
<td>&lt;0.001</td>
<td>1.22</td>
<td>(1.17 - 1.32)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>dementia</td>
<td>0.75</td>
<td>(0.66 - 0.86)</td>
<td>&lt;0.001</td>
<td>0.89</td>
<td>(0.78 - 1.01)</td>
<td>n.s.</td>
</tr>
<tr>
<td>depression</td>
<td>0.81</td>
<td>(0.76 - 0.88)</td>
<td>&lt;0.001</td>
<td>0.97</td>
<td>(0.90 - 1.03)</td>
<td>n.s.</td>
</tr>
<tr>
<td>GP or general internist</td>
<td>1.16</td>
<td>(1.07 - 1.27)</td>
<td>&lt;0.001</td>
<td>1.16</td>
<td>(1.08 - 1.26)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>cardiologist</td>
<td>1.47</td>
<td>(1.37 - 1.59)</td>
<td>&lt;0.001</td>
<td>1.18</td>
<td>(1.11 - 1.27)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

a: mean centered
n.s.: not significant

<table>
<thead>
<tr>
<th>District level</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacies per 100,000 inhabitants</td>
<td>1.00</td>
<td>(1.00 - 1.01)</td>
<td>n.s.</td>
<td>1.01</td>
<td>(1.00 - 1.02)</td>
<td>n.s.</td>
</tr>
<tr>
<td>GPs per 100,000 inhabitants</td>
<td>1.00</td>
<td>(1.00 - 1.00)</td>
<td>n.s.</td>
<td>1.00</td>
<td>(1.00 - 1.00)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Internists per 100,000 inhabitants</td>
<td>1.00</td>
<td>(1.00 - 1.01)</td>
<td>n.s.</td>
<td>1.00</td>
<td>(1.00 - 1.01)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Number of cases per GP</td>
<td>1.00</td>
<td>(1.00 - 1.00)</td>
<td>n.s.</td>
<td>1.00</td>
<td>(1.00 - 1.00)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Number of cases per internist</td>
<td>1.00</td>
<td>(1.00 - 1.00)</td>
<td>n.s.</td>
<td>1.00</td>
<td>(1.00 - 1.00)</td>
<td>n.s.</td>
</tr>
<tr>
<td>East Germany</td>
<td>1.01</td>
<td>(0.91 - 1.11)</td>
<td>n.s.</td>
<td>1.19</td>
<td>(1.09 - 1.30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>constant</td>
<td>0.28</td>
<td>(0.18 - 0.42)</td>
<td>n.s.</td>
<td>0.12</td>
<td>(0.08 - 0.18)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Variance of districts</td>
<td>0.04</td>
<td>(0.02 - 0.06)</td>
<td>-</td>
<td>0.03</td>
<td>(0.02 - 0.05)</td>
<td>-</td>
</tr>
</tbody>
</table>

n.s.: not significant
Conclusion

- over 80 percent of patients receive one of the symptom-oriented therapies

- less than half receive two classes of drug

- 68 % receive a lipid-lowering agent and symptom-oriented therapy

- patients who receive the recommended drug therapy prior to PCI have a more pronounced cardiovascular history and more diagnosed comorbidities

- higher utilization and participation DMP CHD associated with higher odds

- the prescription prevalence at the regional level shows a heterogeneous picture that can not be explained solely by the individual factors of the patients

- for the symptom-oriented therapy the comparison of the East and West German districts showed a positive association with an odds ratio of 1.19 (1.09 - 1.30)
Discussion

advantages and limitations of the use of routine data

- detailed analyses of prescription profiles are possible based on medication data by linking it with claims data from other sectors and service areas

- routine data allow a nationwide, small-scale analysis of the care process

- OTC-drugs and drugs that are administered in the hospital, samples and prescriptions at the expense of private health insurance are not recorded

- a prescription is only recorded if the patient redeems the prescription

- routine data do not allow conclusions about the actual patient adherence

- special case: ASA is an OTC; Can be prescribed at the expense of the SHI (June 2013), if a CHD, backed by symptoms and complementary non-invasive or invasive diagnostics is present
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Thank you for your attention