Improving medical decision making: Stroke prevention in atrial fibrillation
Arts, D.L.

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Chapter 3

Reasons for intentional guideline non-adherence: a systematic review

D.L. Arts, A.G. Voncken, S.K. Medlock, A. Abu-Hanna, H.C.P.M. van Weert
ABSTRACT

Background
Reasons for intentional non-adherence to guidelines are largely unknown. The objective of this systematic review was to gain insight into and categorize reasons for intentional non-adherence and their validity. Non-adherence might be a conscious choice by either the clinician or the patient, and is not influenced by external factors (e.g. lack of knowledge or resources). We use the term intentional non-adherence to describe this class of reasons for not following guideline recommendations.

Methods
Two independent reviewers examined MEDLINE citations for studies that investigated reasons for guideline non-adherence. The obtained articles were assessed for relevance and quality. Our search yielded 2912 articles, of which 16 matched our inclusion criteria and quality requirements. We planned to determine an overall ranking of categories of non-adherence.

Results
Seven studies investigated clinical reasons and performed adjudication, while nine studies did not perform adjudication. Non-adherence varied between 8.2% and 65.3%. Meta-analysis proved unfeasible due to heterogeneity of study methodologies. The percentage of reasons deemed valid by adjudication ranged from 6.6% to 93.6%. Guideline non-adherence was predominantly valid; contra-indications and patient preference were most often reported as reasons for intentional non-adherence.

Conclusion
We found a wide range of rates of non-adherence to clinical guidelines. This non-adherence is often supported by valid reasons, mainly related to contra-indications and patient preference. Therefore, we submit that many guideline deviations are intentional and these deviations do not necessarily impact quality of care.
Chapter 3

INTRODUCTION

In recent years, the scientific community has shown an increased interest in clinical practice guidelines, and practitioners' adherence to such guidelines. Guidelines can reduce inappropriate variation in medical practice, thereby improving quality of care [1, 2] and reducing costs [3]. Guidelines are increasingly used for quality management and health care policy. Another use of guidelines is in remuneration of physicians by healthcare insurers, where reaching a certain level of guideline adherence qualifies for additional remuneration. However, adherence to guidelines varies greatly: several studies report adherence rates of 10% to 80% [4, 5]. Most research into reasons for non-adherence has been performed in the behavioral field. Cabana et al. [6] describe multiple reasons for non-adherence in their systematic review (e.g., Lack of Awareness, Lack of Outcome Expectancy and Guidelines Factors) and divided these into three different categories: Knowledge, Attitudes, and Behavior. Other studies found that guideline adherence is related to characteristics of the clinician, guideline, system, and implementation [7, 8]. Many attempts [7, 9, 10] have been made to improve these circumstances linked to guideline non-adherence, but even with support from leaders in the medical field, availability on demand, clinical decision support systems (CDSS), and financial rewards, non-adherence remains substantial [9, 10]. Some of this residual non-adherence is attributable to a conscious decision by the clinician or patient to not follow the guideline. In this study we investigate these reasons for non-adherence. We use the term intentional non-adherence to describe this class of reasons for not following guideline recommendations. Unintentional non-adherence can occur due to external factors (such as lack of knowledge about the guideline's recommendations) or error on the part of the clinician or patient (such as forgetting to prescribe or take a medication). In this paper we will not investigate this type of non-adherence.

To study intentional reasons for non-adherence we consider documentation of an explicit reason for not following the guideline to be evidence that the decision was intentional. These documented reasons are the focus of this review. In this study we aim to categorize and quantify reasons for intentional non-adherence and report on their appropriateness (as defined by peers), if applicable. We expect our results to contribute not only to future guideline development, but also to aid in assessing the validity of modern-day quality indicators. Finally, clinical decision support systems (CDSS) require that guidelines explicitly mention exceptions, in order to be able to adequately apply a digital guideline to every patient. Our study could make guideline developers aware of different types of exceptions, and thus enable them to more effectively document them, developing more differentiated guidelines and better CDSS.
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METHODS

We reviewed the existing literature with the objective of assessing reasons for intentional non-adherence to clinical practice guidelines.

Search strategy and study selection

We searched MEDLINE using the following query: (guideline adherence [MeSH Major Topic] OR practice guidelines as topic [MeSH Major Topic]) AND (reason OR reasons OR perception OR perceptions OR attitude OR attitudes OR view OR views OR barrier OR barriers OR facilitator OR facilitators). We applied the limits: “Humans”, “English”, and “has abstract” and searched until October 1, 2014. Two independent reviewers (AV, DA) individually assessed the resulting titles and abstracts and selected papers that fit the inclusion and exclusion criteria described below. In cases where the reviewers disagreed, a third reviewer (HW) was consulted. Selected full-text articles were assessed for relevance. References and “related articles” of the selected articles were explored for potential inclusion.

Inclusion criteria were:

• Reasons for intentional non-adherence to clinical guidelines were described.

Exclusion criteria were:

• Reasons for non-adherence were not collected within three months.
• Study did not assess actual clinical performance (i.e., vignette studies).
• A clear reference to the studied guideline was not provided.
• Data-collection was not explicitly described.
• Study was of insufficient methodological quality (according to the methodological criteria described below).

Articles concerning non-adherence to quality indicators, decision rules, clinical decision reminders, or triage decisions were eligible if these were a derivative of a guideline. There was no restriction regarding specialty or case-mix.

Exclusion of articles based on methodology

Two reviewers (AV, DA) assessed the methodological quality of the selected articles using the “Dutch Cochrane checklists for assessing Cohort studies” [11]. This tool allows the user to make an assessment of methodological quality; it assesses several key methodological aspects of a study, including, “population definition”, “risk of selection bias” and “follow-up duration”. Both reviewers judged the articles to be of either sufficient (all criteria of the checklist were met) or insufficient (one or more criteria of the checklist were not met) methodological quality. These assessments were compared and disagreements were resolved during a consensus meeting. Articles deemed to be of insufficient methodological quality by both reviewers were excluded.
Data extraction and category creation
We collected the following characteristics of the included studies: study design, year, site, setting, country, target disorder, information technology used (if any), intervention, type of guideline and its distribution, rates of non-adherence, and reasons for non-adherence. To rank categories of reasons for non-adherence for each study, both reviewers noted categories of reasons for non-adherence and their reported importance (rank) in a structured form. Results were compared and merged into one result set. Different but often overlapping categories were used in the included studies to classify reasons for non-adherence. To be able to compare reported reasons, we created categories by way of induction, i.e., "the process by which themes and categories emerge from the data through the researcher’s careful examination and constant comparison." [12]. Since most articles did not report proportions of reasons for non-adherence, we performed classification by ranking relative occurrence of a reason in an article by two reviewers (DA, AV). Finally, we collected percentages of valid reasons for articles with adjudication (judgment of validity by peers). The PRISMA statement was used as a guideline for this systematic review [13].

Statistical analysis
We used an independent samples Kruskis-Wallis test to test for association between adherence rates and study/guideline characteristics: setting, type of intervention, application of adjudication, and patient selection by use of exclusion criteria. To test for association with the use of exclusion criteria we categorized studies into three groups: with none, some, or extensive exclusion criteria. The "some" group was defined as one to five exclusion criteria, the "extensive" group as more than five.

RESULTS
Out of the 2912 titles and abstracts screened, we selected 147 full-text articles based on title and abstract (Figure 1). Of these 147 full articles, 119 did not meet our inclusion criteria, leaving 28 articles. Reference checking did not provide any additional articles. Of the remaining 28 articles, twelve articles were excluded because the methodology was inadequate. Sixteen studies were retained for analysis; seven studies[14-20] applied adjudication and nine studies[21-29] did not. The included articles were heterogeneous in almost every aspect: setting, site, country (health care system), and target disorder (table 1), as well as method of reporting; categories of reasons for non-adherence were defined differently and frequencies of reasons were often not explicitly listed. None of the included articles explicitly described using a form of information technology. Due to this heterogeneity, meta-analysis was not feasible. All studies had a cohort design:
nine retrospective chart analyses, six prospective chart analyses, and one mixed retrospective and prospective chart analysis (Table 1).

The induction process resulted in five categories for intentional non-adherence: “patient decision”, contra-indications”, “patient demographics”, “physician decision”, and “other” (table 2). Further granularization was not possible due to the lack of detail in the categories described in the studies. The ranks of each category per article are shown in table 3. The category “contra-indications” was mentioned most, followed by “patient decision,” “other,” “patient demographics,” and finally “physician decision.” See box 1 for hypothetical examples of the induced categories.
### Table 1. Overview of studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Adj</th>
<th>Year</th>
<th>Study design</th>
<th>Setting</th>
<th>Site</th>
<th>Country</th>
<th>Target disorder</th>
<th>Exclusion criteria</th>
<th>Intervention</th>
<th>Guideline or otherwise</th>
<th>Guideline distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owen [18]</td>
<td>Yes</td>
<td>2002</td>
<td>Retrospective cohort</td>
<td>Secondary care</td>
<td>Psychiatry inpatient ward</td>
<td>USA</td>
<td>Schizophrenia</td>
<td>Some</td>
<td>Antipsychotic drugs</td>
<td>Clinical performance measure based on guidelines</td>
<td>National</td>
</tr>
<tr>
<td>Inwin [16]</td>
<td>Yes</td>
<td>2003</td>
<td>Prospective Cohort</td>
<td>Secondary care</td>
<td>Cardiology department</td>
<td>Canada</td>
<td>Bradycardia</td>
<td>None</td>
<td>Pacemaker Implantation</td>
<td>Guideline</td>
<td>National</td>
</tr>
<tr>
<td>Ardery [14]</td>
<td>Yes</td>
<td>2007</td>
<td>Retrospective cohort</td>
<td>Primary care</td>
<td>General Practice</td>
<td>USA</td>
<td>Hypertension</td>
<td>Multiple comorbid illnesses</td>
<td>Treatment according to guidelines (therapeutic and diagnostic)</td>
<td>Guideline</td>
<td>National</td>
</tr>
<tr>
<td>Persell [19]</td>
<td>Yes</td>
<td>2010</td>
<td>Prospective cohort</td>
<td>Secondary care</td>
<td>Internal medicine outpatient clinic</td>
<td>USA</td>
<td>Coronary artery disease</td>
<td>None</td>
<td>Primary and secondary prevention</td>
<td>Quality measures</td>
<td>NS</td>
</tr>
<tr>
<td>Kmetik [17]</td>
<td>Yes</td>
<td>2011</td>
<td>Retrospective cohort</td>
<td>Secondary care</td>
<td>General internal medicine and cardiology outpatient clinic</td>
<td>USA</td>
<td>Coronary artery disease</td>
<td>None</td>
<td>Drug therapy</td>
<td>Quality measures</td>
<td>NS</td>
</tr>
<tr>
<td>Farias [15]</td>
<td>Yes</td>
<td>2012</td>
<td>Prospective cohort</td>
<td>Secondary care</td>
<td>Pediatric cardiology outpatient clinic</td>
<td>USA</td>
<td>Three pediatric cardiac disorders</td>
<td>None</td>
<td>Outpatient follow-up and assessment</td>
<td>Standardized Clinical Assessment and Management Plan</td>
<td>NS</td>
</tr>
<tr>
<td>Evans [24]</td>
<td>No</td>
<td>1996</td>
<td>Prospective cohort</td>
<td>Tertiary care</td>
<td>All inpatient wards</td>
<td>USA</td>
<td>Infections</td>
<td>None</td>
<td>Vancomycin treatment</td>
<td>Guideline</td>
<td>National</td>
</tr>
</tbody>
</table>
### Table 1. Overview of studies (continued)

<table>
<thead>
<tr>
<th>Author</th>
<th>Adj</th>
<th>Year</th>
<th>Study design</th>
<th>Setting</th>
<th>Site</th>
<th>Country</th>
<th>Target disorder</th>
<th>Exclusion criteria</th>
<th>Intervention</th>
<th>Guideline or otherwise</th>
<th>Guideline distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marras [27]</td>
<td>No</td>
<td>1998</td>
<td>Prospective and retrospective</td>
<td>Tertiary Care</td>
<td>All inpatient wards</td>
<td>Canada</td>
<td>Community Acquired Pneumonia</td>
<td>Multiple comorbid illnesses</td>
<td>Treatment with antibiotic according to guideline</td>
<td>Guideline</td>
<td>National</td>
</tr>
<tr>
<td>Halm [26]</td>
<td>No</td>
<td>2000</td>
<td>Retrospective chart review and physician survey at admittance</td>
<td>Emergency Department</td>
<td>Emergency Department</td>
<td>USA</td>
<td>Community Acquired Pneumonia</td>
<td>Non-candidates for outpatient treatment</td>
<td>Decision of admittance according to a decision rule (Pneumonia Severity Index)</td>
<td>Guideline</td>
<td>Local/ Internal</td>
</tr>
<tr>
<td>Balasubramanian [22]</td>
<td>No</td>
<td>2003</td>
<td>Prospective cohort</td>
<td>Secondary care</td>
<td>Oncology department</td>
<td>UK</td>
<td>Breast cancer</td>
<td>Some</td>
<td>Treatment with (neo-) adjuvant chemo- and radiotherapy</td>
<td>Guideline</td>
<td>Regional</td>
</tr>
<tr>
<td>Oliveira [28]</td>
<td>No</td>
<td>2004</td>
<td>Retrospective cohort</td>
<td>Secondary care</td>
<td>Oncology (inpatient and outpatient)</td>
<td>USA</td>
<td>Colorectal cancer</td>
<td>Not in HMO for 1yr</td>
<td>Referral to oncologist and subsequent treatment with chemotherapy</td>
<td>Guideline</td>
<td>National</td>
</tr>
<tr>
<td>Aujesky [21]</td>
<td>No</td>
<td>2009</td>
<td>Prospective cohort</td>
<td>Secondary care</td>
<td>Oncology (inpatient and outpatient)</td>
<td>USA</td>
<td>Community Acquired Pneumonia</td>
<td>Multiple comorbid illnesses</td>
<td>Choice of treatment site using the Pneumonia Severity Index</td>
<td>Guideline</td>
<td>Local/regional</td>
</tr>
<tr>
<td>Cornali [23]</td>
<td>No</td>
<td>2009</td>
<td>Retrospective cohort</td>
<td>Secondary care</td>
<td>Post-acute geriatric setting (inpatient)</td>
<td>Italy</td>
<td>Diabetes</td>
<td>None</td>
<td>Treatment according to guidelines (therapeutic and diagnostic)</td>
<td>Guideline</td>
<td>Internal</td>
</tr>
<tr>
<td>Freed [25]</td>
<td>No</td>
<td>2010</td>
<td>Retrospective cohort</td>
<td>Tertiary care</td>
<td>Cardiology (inpatient and outpatient)</td>
<td>USA</td>
<td>Aortic valve stenosis</td>
<td>None</td>
<td>Aortic valve replacement</td>
<td>Guideline</td>
<td>National</td>
</tr>
<tr>
<td>Stensvold [29]</td>
<td>No</td>
<td>2011</td>
<td>Retrospective cohort</td>
<td>Secondary care</td>
<td>Oncology &amp; urology (inpatient and outpatient)</td>
<td>Norway</td>
<td>Prostate cancer</td>
<td>Multiple</td>
<td>Surgery and/or radiotherapy</td>
<td>Guideline</td>
<td>In House</td>
</tr>
</tbody>
</table>
Reasons for intentional guideline non-adherence: a systematic review

**Table 2. Induction of the categories of reasons for non-adherence**

<table>
<thead>
<tr>
<th>Induced category</th>
<th>Source categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient decision</td>
<td>Family decision</td>
</tr>
<tr>
<td></td>
<td>Infrequent clinic visits</td>
</tr>
<tr>
<td></td>
<td>Low compliance</td>
</tr>
<tr>
<td></td>
<td>Refusal of treatment</td>
</tr>
<tr>
<td>Demographics</td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
</tr>
<tr>
<td></td>
<td>Ethnicity</td>
</tr>
<tr>
<td></td>
<td>Limited level of physical activity</td>
</tr>
<tr>
<td>Physician decision</td>
<td>Physician decision (unspecified)</td>
</tr>
<tr>
<td>Contra-indications</td>
<td>Abnormal findings (laboratory / physical)</td>
</tr>
<tr>
<td></td>
<td>High operative risk</td>
</tr>
<tr>
<td></td>
<td>Limited life expectancy</td>
</tr>
<tr>
<td></td>
<td>Intolerance for recommended treatment</td>
</tr>
<tr>
<td></td>
<td>‘Did not fit the guideline’ (as reported in manuscript)</td>
</tr>
<tr>
<td></td>
<td>Extensive comorbidities</td>
</tr>
<tr>
<td>Other</td>
<td>Insurance constraints</td>
</tr>
<tr>
<td></td>
<td>Other (as reported in manuscript)</td>
</tr>
</tbody>
</table>

**Table 3. Non-adherence, proportion of appropriate reasons and ranked categories for non-adherence per study.**

<table>
<thead>
<tr>
<th>Author</th>
<th>Non-adherence</th>
<th>Appropriate</th>
<th>Ranking categories***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owen [18]</td>
<td>39.4%</td>
<td>80%</td>
<td>1) Contra-indications, Other</td>
</tr>
<tr>
<td>Irwin [16]</td>
<td>50.6%</td>
<td>Large proportion*</td>
<td>1) Contra-indications 2) Demographics 3) Physician decision</td>
</tr>
<tr>
<td>Ardery [14]</td>
<td>31.6%</td>
<td>7%</td>
<td>1) Contra-indications 2) Patient decision 3) Other</td>
</tr>
<tr>
<td>Persell [19]</td>
<td>22.2%</td>
<td>94%</td>
<td>Ranking was not possible.</td>
</tr>
<tr>
<td>Kmetik [17]</td>
<td>24.3%</td>
<td>93%</td>
<td>1) Contra-indications</td>
</tr>
<tr>
<td>Farias [15]</td>
<td>8.2%</td>
<td>50%</td>
<td>1) Other 2) Physician decision 3) Contra-indications</td>
</tr>
<tr>
<td>Uijl [20]</td>
<td>18.6%</td>
<td>26%</td>
<td>1) Contra-indications 2) Patient decision</td>
</tr>
<tr>
<td>Evans [24]</td>
<td>65.3%</td>
<td>NA</td>
<td>1) Physician decision, Other</td>
</tr>
<tr>
<td>Marras [27]</td>
<td>19.5%</td>
<td>NA</td>
<td>1) Contra-indications 2) Other</td>
</tr>
<tr>
<td>Halm [26]</td>
<td>56.4%</td>
<td>NA</td>
<td>1) Patient decision 2) Contra-indications 3) Physician decision</td>
</tr>
<tr>
<td>Balasubra-manian [22]</td>
<td>18%</td>
<td>NA</td>
<td>1) Other 2) Contra-indications, Demographics</td>
</tr>
<tr>
<td>Oliveria [28]</td>
<td>30%</td>
<td>NA</td>
<td>1) Physician decision 2) Contra-indications 3) Patient decision, Other</td>
</tr>
<tr>
<td>Aujesky [21]</td>
<td>20.3%</td>
<td>NA</td>
<td>1) Contra-indications 2) Patient decision 3) Physician decision</td>
</tr>
<tr>
<td>Cornali [23]</td>
<td>17.7%</td>
<td>NA</td>
<td>1) Contra-indications 2) Demographics 3) Patient decision</td>
</tr>
<tr>
<td>Freed [25]</td>
<td>42%</td>
<td>NA</td>
<td>1) Contra-indications 2) Physician decision 3) Patient decision, Demographics 4) Other</td>
</tr>
<tr>
<td>Stensvold [29]</td>
<td>16.7%</td>
<td>NA</td>
<td>1) Demographics 2) Contra-indications, Patient decision</td>
</tr>
</tbody>
</table>

*Appropriateness was evaluated, but no explicit percentage was mentioned.

***Categories were ranked by occurrence. If a category was not mentioned, it was not ranked. Categories with equal numbers of occurrences were ranked together.
Box 1. Examples of induced categories.

A 72-year-old male visits the clinician because of newly detected atrial fibrillation. He is known to have diabetes and hypertension; both conditions are well regulated by medication. According to the Dutch guideline for atrial fibrillation this patient should receive warfarin. The patient explicitly asks for the new oral anticoagulants (NOACs), as he is in Spain during the winter months. He does not want to have his INR monitored there, nor does he want to manage it himself. The reason for prescribing NOACs would be classified as patient decision. If this patient has a high risk of falling, due to for instance polyneuropathy and vertigo, the reason not to prescribe any anticoagulants would have been classified as a contra-indication. Refraining from any anticoagulant treatment because of old age would have been classified as a demographic reason and not prescribing anticoagulants because of a terminal illness would be classified as physicians’ decision.

Non-adherence varied between 8.2% and 65.3%. Validity of reasons for adjudicated studies varied between 6.6% and 93.6%. Of studies with adjudication, all but Ardery [14] and Uijl [20] judged the majority of reasons for non-adherence as valid (Table 2).

DISCUSSION

The objective of this study was to categorize and quantify reported reasons for intentional non-adherence and their validity. We found a wide range of non-adherence rates. When reasons for guideline non-adherence were adjudicated, they were mostly judged as valid. The main categories of reasons for non-adherence were “contra-indications” and “patient decision.”

Strengths

To our knowledge, this is the first review that assesses reasons for intentional guideline non-adherence. We reduced selection bias by reviewing every title, abstract, and article with two independent reviewers. Checking relevant references and “related articles” in MEDLINE did not result in any new articles, confirming the sensitivity of our search strategy. Due to limited resources, our search was limited to MEDLINE which could have resulted in the omission of relevant papers.

Limitations

An important limitation of this study is lack of matching methodologies used the included articles. Due to the heterogeneity of the reviewed articles, comparing reasons for non-adherence was difficult, and some overlap in our defined categories could exist. Many articles did not specify what contra-indications were already mentioned in the guideline, so we assumed that when “contra-indications” were given as a reason for non-adherence,
these were not mentioned in the guideline. Furthermore, the process of induction is, by
definition, a possible source of bias, as the interpretation of categories can be subjective.

**Limitations of included papers**

Despite matching our inclusion criteria and passing our methodological checklist, there
are several limitations to the included studies that stand out. First and foremost, with one
exception none of the studies attempted to use a standardized approach for evaluating
guideline non-adherence. Furthermore, many studies were retrospective chart analyses,
and while studies with risk for severe recall bias were excluded, this design still leaves
room for bias, as opposed to the prospective study design.

The significant heterogeneity of the studies included in this paper is the most likely cause
of the wide range of non-adherence rates we found. Studies varied in setting, population,
and design. Other studies on this topic confirm these findings [30, 31]. Differences in
study design, particularly retrospective vs. prospective, are reported as important factors
for the large spread in adherence rates, but we did not find this association. Additionally,
no associations were observed for setting, guideline characteristics, and target disease.
We expected guidelines with extensive exclusion criteria to be associated with higher
adherence rates, but our statistical analysis could not confirm this. It should be noted
that the limited number of studies included in the analysis would have required large
differences to amount to a statistically significant association.

**Reasons for non-adherence**

Most studies on reasons for non-adherence either come from the behavioral field or were
written in opinion articles and narrative reviews. In the behavioral field, a meta-synthesis
of qualitative research by Cabana [6] describes categories such as “inapplicability to the
patient”, “inability to reconcile patient preferences with guideline recommendations”
and “lack of outcome expectancy”. This corresponds with our categories of “contra-
indications”, “patient decision” and “physician decision”. However, the category “patient
demographics” is not mentioned in Cabana’s framework, and could be classified as an
additional reason in the category Attitudes. Lugtenberg et al. [32] found that “lack of
agreement with guideline recommendations” was the most prominent barrier in applying
guidelines in general practice, a barrier that also corresponds with “physician decision ”.
A second important barrier they found was “applicability to the patient”, which relates to
out categories “contra-indications” and “patient demographics”. Gurses describes, “ex-
ception ambiguity,” defined as “the ambiguity on whether benefits of applying a particular
guideline to a specific patient outweigh the potential risks and patient discomfort.”[33].
This corresponds with our categories “contra-indications” and “physician decision”. The
large proportion of the category “patient decision” raises the question of whether there
should be more patient involvement in guideline development, as patients have shown an increased preference to be involved in their own care process [34].

**Validity of reasons**

For all but two of the studies [14, 20] with adjudication, the majority of reasons were adjudicated as valid. The large proportion of reasons that were adjudicated as valid was expected, since intentional guideline non-adherence, by definition, indicates that a physician has considered the guideline in the context of the patient, and found a reason to deviate from the advice. This underscores the value and validity of professional clinical judgment when applying guidelines in daily practice. Thus, ideal guideline adherence might not be 100% adherence, but may be much lower, 69% to 98% in the included studies.

The high frequency of valid reasons indicates that guidelines can be improved. A study on applicability of clinical practice guidelines on elderly patients with comorbidities showed that only one-third of the guidelines adequately discussed issues related to patients with comorbidities[35, 36]. This also corresponds with Gurses’ “Exception ambiguity” and Cabana’s “Applicability to Patient” [33, 6] and with our “Contra-indications” and “Demographics” categories. It should be noted that situations where a guideline simply isn’t applicable to a patient, although the patient in question matches the described target population of the guideline, deviating from the guideline might be the only right thing to do. A possible solution for this issue could be to list every possible exception for a guideline. Another, more viable solution is application of clinical decision support systems, as those can hide all but the relevant exceptions for the current patient. Further research should be done to investigate the feasibility of these concepts.

**Recommendations for future researchers and guideline developers**

Meta-analysis proved unfeasible due to heterogeneity of study methodologies. We therefore propose that future researchers take a more structured approach to evaluating guideline adherence. Farias [15] described Standardized Clinical Assessment and Management Plan (SCAMP) as a quality-improvement initiative that guides clinical decision-making to standardize the assessment and management of patients with a specific disorder. This system collects data on clinical deviations (DEVs) and reasons provided by caregivers. Evaluation of these reasons leads to improvement of the SCAMP, thus creating a dynamic guideline. Moreover, this results in a structured dataset with guideline deviations that can easily be analyzed. This method could be part of a guideline evaluation framework that has predefined categories of reasons for non-adherence, and formal methods for adjudication of these reasons. Such a framework could greatly increase comparativeness of studies on guideline non-adherence and thus result in generalizable concepts for guideline improvement.
Implications for decision support systems
The structural documentation of exceptions can also improve decision support systems, making these more capable to provide recommendations for patients with multiple comorbidities. Currently, conflicts often arise between overlapping guidelines, which cannot be resolved by a computer. Using methods to formalize guidelines, and more specifically intentions of guidelines, could prove invaluable for the future of decision support [37]. Our study underwrites the need for flexible guidelines and decision support systems as described by Latoszek-Berendsen et. al., that allow a physician to “take a road that may not be completely according to the guideline, but within its spirit” [37, 38]. As we have shown that physicians have many justifiable reasons for straying from a guideline recommendation. Lastly, we highly recommend future decision support systems implement functionality that allows for user friendly, though mandatory reporting on reasons for guideline deviations by physician users.

Conclusion
In this study we found wide ranges of non-adherence rates to clinical guidelines. This non-adherence is often intentional and supported by valid reasons, mainly related to contra-indications and patient preference. Therefore, we submit that many guideline deviations are intentional and justifiable, and these deviations do not necessarily impact quality of care.
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Chapter 3


