Health status as a function of intentional and unintentional non-adherence among costly chronic conditions in the EU

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“Drugs don’t work in patients who don’t take them.”

- C. Everett Koop
Background

• Among those taking medication for chronic conditions in developed nations, the World Health Organization estimates adherence rates are only 50%\(^1\)

• Haynes et al. estimated that improving adherence rates would have a greater improvement on health than any treatment itself\(^2\)
  + 10% increase in adherence may result in reductions of HbA1c of 0.16%\(^3\)
  + HIV compliance interventions have resulted in an estimated $250,000 of lifetime savings in direct medical costs per patient\(^4\)

Background

- Recently, research has suggested that the reasons for non-adherence (intentional vs. unintentional) may dictate different interventional strategies\(^5\)

- However, few studies have examined the relationships between these different types of non-adherence and health outcomes across multiple chronic conditions

Objective

- This study investigates the humanistic and economic burden of intentional (INA) or unintentional (UNA) non-adherence among eleven costly chronic conditions in 5EU.
Methods

• Data from the 5EU 2010 National Health and Wellness Survey
  + Cross-sectional Internet-based survey of adults across Europe
  + NHWS uses a stratified random sample design to invite members of large Internet panels who are representative of each of the following countries: France, Germany, UK, Italy, and Spain (5EU)

• Of all members of 5EU 2010 NHWS (N = 57,805), included in the current study were 19,279 respondents who reported taking prescription medication for any of these conditions:
  + Asthma, pain, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), diabetes, hypertension, depression, bipolar disorder, peripheral vascular disease (PVD), transient ischemic attack (TIA), and stroke
Measures

• **Demographics**
  - Age, marital status (partnered, separated, vs. single), gender (male vs. female), education (university education vs. less), income (below the country median, above the country median, or decline to answer), employed (yes vs. no)

• **Health profile**
  - BMI (underweight, overweight, obese, or missing, vs. normal weight), Charlson comorbidity index (CCI)

• **Morisky Medication Adherence Scale**
  - Intentional non-adherence (INA):
    - “When you feel better do you sometimes stop taking your medicine?”
    - “Sometimes if you feel worse when you take the medicine, do you stop taking it?”
  - Unintentional non-adherence (UNA):
    - “Do you ever forget to take your medicine?”
    - “Are you careless at times about taking your medicine?”
  - Scores range from 0=adherent (reference) to 1=moderate and 2=high non-adherence.
Outcome measures

• Health utilities
  + SF-6D health utility scores were derived from the SF-12v2 items
  + Scores vary from 0 (death) to 1 (perfect health)

• Work productivity
  + Absenteeism, presenteeism, overall work impairment, and activity impairment were included from the Work Productivity and Activity Impairment questionnaire

• Healthcare resource utilization
  + Number of ER visits and hospitalizations in the past six months
Results

- Among those taking medication for asthma (n=3,147), pain (n=6,605), CHF (n=248), COPD (n=584), diabetes (n=3,062), hypertension (n=8,821), depression (n=3,714), bipolar disorder (n=240), PVD (n=106), TIA (n=287), or stroke (n=356), 49.7% were male, mean age was 52.9 years (SD=15.0).

- 32.3% and 30.8% exhibited some INA and UNA, respectively ($r_{INA/UNA}=0.34, \ p<0.001$).
Percentage of UNA/INA behaviors

- **Diabetes**
- **Stroke**
- **CHF**
- **Hypertension**
- **TIA**
- **PVD**
- **COPD**
- **Bipolar**
- **Depression**
- **Asthma**
- **Pain**

UNA/INA Behaviors:
- 2 Behaviors
- 1 Behavior
Pearson correlations between INA, UNA and health outcomes

Overall work impairment
Presenteeism
Absenteeism
# Physician visits
# Hospitalizations
# ER visits
Activity impairment
Health utilities

PCS
MCS

UNA
INA

*p<.05
Multivariable Analysis

- Generalized linear models (GLMs)
  + GLMs predicted health utilities for INA or UNA, controlling for sociodemographic characteristics and comorbidities.
  + Negative binomial GLMs predicted work productivity and activity impairment outcomes, controlling for covariates and accounting for overdispersion.
  + Negative binomial GLMs predicted healthcare resource use outcomes, controlling for covariates and accounting for overdispersion.
Adjusted health utility means by levels of INA/UNA

<table>
<thead>
<tr>
<th>UNA</th>
<th>INA</th>
<th>0 Behaviors</th>
<th>1 Behavior</th>
<th>2 Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.67</td>
<td>0.68</td>
<td>0.66*</td>
<td>0.65*</td>
<td>0.64*</td>
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</tbody>
</table>
Adjusted health utility means by levels of INA/UNA for each condition
Adjusted health utility means by levels of INA/UNA for each condition
Adjusted health utility means by levels of INA/UNA for each condition

- **Pain**
  - 0 UNA: 0.60
  - 1 UNA: 0.61
  - 2 UNA: 0.61*
  - 0 INA: 0.59
  - 1 INA: 0.62
  - 2 INA: 0.62*

- **Depression**
  - 0 UNA: 0.58
  - 1 UNA: 0.58
  - 2 UNA: 0.58
  - 0 INA: 0.57
  - 1 INA: 0.57

- **Bipolar**
  - 0 UNA: 0.60
  - 1 UNA: 0.59
  - 2 UNA: 0.60
  - 0 INA: 0.58
  - 1 INA: 0.60
  - 2 INA: 0.60

- **PVD**
  - 0 UNA: 0.61
  - 1 UNA: 0.63
  - 2 UNA: 0.72*
  - 0 INA: 0.63
  - 1 INA: 0.62
  - 2 INA: 0.62

- **Stroke**
  - 0 UNA: 0.64
  - 1 UNA: 0.65
  - 2 UNA: 0.64
  - 0 INA: 0.61
  - 1 INA: 0.62

Legend:
- □ 0 Behaviors
- □ 1 Behavior
- □ 2 Behaviors
Pearson correlations between INA, UNA and health outcomes

<table>
<thead>
<tr>
<th>Health outcome</th>
<th>Pearson Correlation</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Overall work impairment</td>
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<tr>
<td>Presenteeism</td>
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<tr>
<td>Absenteeism</td>
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<tr>
<td># Physician visits</td>
<td></td>
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<tr>
<td># Hospitalizations</td>
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<tr>
<td># ER visits</td>
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<tr>
<td>Activity impairment</td>
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<tr>
<td>Health utilities</td>
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<tr>
<td>PCS</td>
<td></td>
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<tr>
<td>MCS</td>
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</tbody>
</table>

* p<.05
Adjusted health outcome means by levels of INA and UNA

- **MCS**
  - UNA
  - INA

- **PCS**
  - UNA
  - INA

- **# ER visits**
  - UNA
  - INA

- **# Hospitalizations**
  - UNA
  - INA

- **Absenteeism**
  - UNA
  - INA

- **Presenteeism**
  - UNA
  - INA

- **Overall work impairment**
  - UNA
  - INA

- **Activity impairment**
  - UNA
  - INA

*Significance levels marked with asterisks.*

(Data from KANTAR HEALTH)
Conclusions

• These results suggest that both types of non-adherence (both INA and UNA) are pervasive, though their respective frequency varies by condition.

• INA may have a stronger negative impact on health outcomes than UNA, which can help guide adherence-improving intervention strategies.

• Contrary to UNA, when one behavior was often not significantly different than zero behaviors, even one INA behavior was consistently associated with worse outcomes.
Conclusions

- The usage of devices and techniques that help maintain adherence against forgetfulness and carelessness may have less of an impact on health outcomes than overall improved patient education and treatments with superior side effect profiles\(^6\) or lower complexity\(^7\) (which may help against intentionally stopping medication use).

- The results also highlight disease areas in which specific interventions may yield better outcomes. If intentional non-adherence is more of an issue within certain disease areas (e.g., asymptomatic conditions\(^8\)) than others, for example, educational efforts may be concentrated there.

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