

# Quality of Life and Depression as Determinants of Treatment Adherence in Hypertension

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# Outline

- Background
- Objective
- Study design
- Data analysis
- Results
- Conclusions



# Background

- Hypertension affects almost one third of the adults in the US.
- Being hypertensive increases the chance of developing heart attacks, strokes, heart failure and kidney failure.
- The chance of developing these diseases decreases significantly if hypertension is detected, treated, and controlled.



# Background

- Only 53% of known hypertensives receiving pharmacologic treatment have their blood pressure controlled.
- 50% of patients with refractory hypertension are in fact non-adherent
- Almost half of all patients become non-adherent during the first year of antihypertensive treatment.



# Background

- Antihypertensive drugs can have significant positive and negative impact on health related quality of life (QOL) and depression symptoms severity (DSS).
- In turn, both QOL and DSS may influence treatment adherence.
- There are no prospective data on the roles of QOL and DSS on treatment adherence.



# Objective

- To evaluate whether baseline levels and changes in health-related quality of life (QOL) and depression symptoms severity (DSS) are predictive of treatment adherence in newly treated hypertensive patients.
- Long-term goal: to identify predictors of treatment adherence useful to screen for high risk patients and to design effective adherence-enhancing interventions.



# Study Design

- Longitudinal cohort study among newly identified patients with essential hypertension who required drug therapy.
- QOL and DSS (exposure) and treatment adherence (outcome) were evaluated at baseline and at 3, 6, 9, and 12 months after they entered into the study.

# Population

- Sample size: 214 newly-diagnosed hypertensive; 42% women; 88% White.
- Eligibility criteria:
  - 20-69 years old.
  - Not taking mood-modifying drugs
  - Starting pharmacologic treatment for the first time or re-starting after a discontinuation  $\geq 2$  months
- Cohort recruited and followed at the UW-Department of Family Medicine and WREN Clinics.

# Exposure Measurements

## ■ QOL:

- The Health Utilities Index.
- A short version of the Physical Symptoms Distress Index (PSDI).
- The Sexual Symptoms Distress Index (SSDI)
- The Psychological General Well-Being Index (PGWB).
- The Sleep Dysfunction Scale (SDS).

## ■ DSS:

- The Beck Depression Inventory-II (BDI-II).

# Outcome Measurements

- Treatment adherence:
  - Pill count → Primary outcome
    - Non-complier: <80% of prescribed pills
  - Blood pressure level → Secondary outcome
    - Trained study personnel measured the participant's blood pressure three times in each visit, with a 2-minute wait between measurements, using an automated device.

# Recruitment

- WREN Clinics:
  - Patients were identified and referred by their physicians or by clinic nurses
- UW-DFM Clinics:
  - Patients were identified through the DFM Clinical Data Warehouse (CDW)
  - Invited for screening evaluation by mail/phone

# Follow-Up

- Participants were evaluated at baseline and at 3, 6, 9, and 12 months after they entered to the study
- Follow-up ended:
  - Participant stopped taking his/her medication
  - Drop out
  - Completion of the follow-up period (4th follow-up visit).

# Data Analysis

- Risk of non-adherence:
  - Incidence rates of non-adherence were calculated for each quarter.
  - Cumulative risk was calculated using the incidence rates ( $\text{risk} = 1 - \exp(-\text{rate} \times \text{time})$ )
- Independent effects of the exposures:
  - Poisson regression with clustering at the individual level to account for the use of repeated observations.

# Results

- Baseline data from 214 subjects → 178 had at least one follow-up visit.
- Male 58.4% (95%CI: 51.1, 65.7)
- Average age: 49.9 (95%CI: 48.4, 51.4)  
Range: 23-69 years

- Follow-up

| □ Baseline | F1  | F2  | F3  | F4 | Total FU |
|------------|-----|-----|-----|----|----------|
| 214        | 175 | 133 | 109 | 91 | 508      |

- Average F-U time: 271.2 days (range 68-425 days)

# Characteristics of the population

| Characteristics              | %    | 95% CI     |
|------------------------------|------|------------|
| Married                      | 74.6 | 68.1, 81.1 |
| White                        | 88.1 | 84.1, 93.5 |
| High school or less          | 25.3 | 18.8, 31.7 |
| Full time employee           | 70.8 | 64.0, 77.5 |
| Income $\geq$ \$50,000/y     | 65.7 | 58.7, 72.8 |
| HMO/Other private            | 78.1 | 72.0, 84.2 |
| Copay for drugs              | 88.7 | 83.9, 93.5 |
| House tenancy (own/mortgage) | 78.7 | 71.9, 84.4 |
| Current smoking              | 14.0 | 8.9, 19.2  |

# Results: Well-being

## ■ Self-reported health status:

- Excellent/Very good 52.8%
- Good 38.2%
- Fair/Poor 9.0%

## ■ Psychological General Well-Being Index (PGWB) :

- Average: 81.8 (95%CI: 79.7, 83.9)

# Results: Depression

- Beck Depression Inventory-II (BDI-II):
  - Minimal (<14) 89.7%
  - Mild (14-19) 5.3%
  - Moderate (20-28) 3.2%
  - Severe (29-63) 1.8%
  
  - Average: 4.9 (95%CI: 3.9, 6.0)
- Depression: 10.3% (95%CI: 6.3, 14.3)

## Average compliance and 12-month cumulative risk of non-adherence to antihypertensive medication by age and gender\*

| Variable   | Compliance (%) | 95% CI <sup>+</sup> | Risk (%) | 95% CI <sup>+</sup> |
|------------|----------------|---------------------|----------|---------------------|
| Age Group: |                |                     |          |                     |
| 23-29      | 90.2           | (86.7, 93.7)        | 60.7     | (36.6, 84.9)        |
| 30-39      | 88.9           | (79.3, 98.4)        | 65.9     | (48.6, 83.2)        |
| 40-49      | 94.2           | (89.8, 98.7)        | 44.5     | (31.2, 57.8)        |
| 50-59      | 92.9           | (89.4, 96.5)        | 49.8     | (38.8, 60.7)        |
| 60-69      | 94.0           | (87.3, 100.8)       | 56.6     | (42.2, 71.0)        |
| Gender:    |                |                     |          |                     |
| Women      | 90.2           | (87.1, 93.4)        | 57.2     | (47.9, 66.4)        |
| Men        | 95.0           | (91.7, 98.2)        | 49.5     | (40.7, 58.3)        |
| All        | 93.0           | (90.7, 95.3)        | 52.6     | (46.1, 59.1)        |

\*Compliance is defined as the proportion of pills taken out of all prescribed. Non-adherence is defined as taken less than 80% of the prescribed amount of pills.

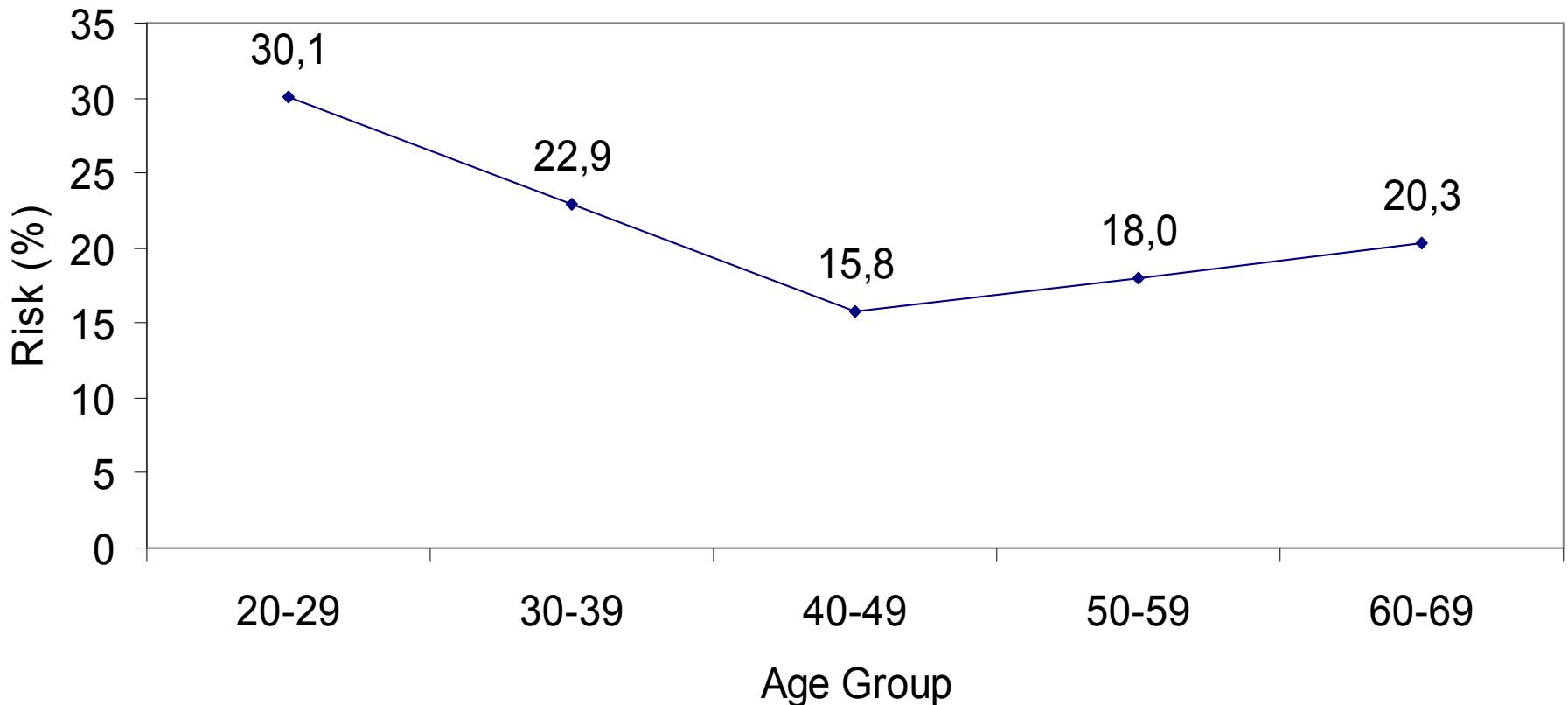
<sup>+</sup>95% Confidence Interval

## Multivariate adjusted effects (rate ratios) of depression symptoms and quality of life indicators on the incidence of non-adherence to antihypertensive medication

| Variable                               | Rate Ratio  | 95%Confidence Interval | P-Value      |
|--|-------------|------------------------|--------------|
| <b>BDI-II Score<math>\geq</math>14</b> | <b>2.26</b> | <b>(1.35, 3.80)</b>    | <b>0.002</b> |
| Age in 5-years units                   | 0.37        | (0.22, 0.62)           | <0.001       |
| Age in 5-years squared                 | 1.05        | (1.02, 1.09)           | <0.001       |
| Male gender                            | 0.87        | (0.61, 1.20)           | 0.456        |
| Visit                                  | 0.82        | (0.69, 0.97)           | 0.020        |
| Number of BP medications               | 1.44        | (1.18, 1.76)           | <0.001       |
| Currently unemployed                   | 1.83        | (1.08, 3.10)           | 0.025        |
| <b>General Well-being (GWB)</b>        |             |                        |              |
| Severe distress                        | 1.00        |                        |              |
| Distress                               | 0.99        | (0.54, 1.83)           | 0.985        |
| Positive well-being                    | 0.96        | (0.47, 1.96)           | 0.916        |
| <b>Anxiety score&lt;median</b>         | <b>1.77</b> | <b>(1.18, 2.65)</b>    | <b>0.005</b> |

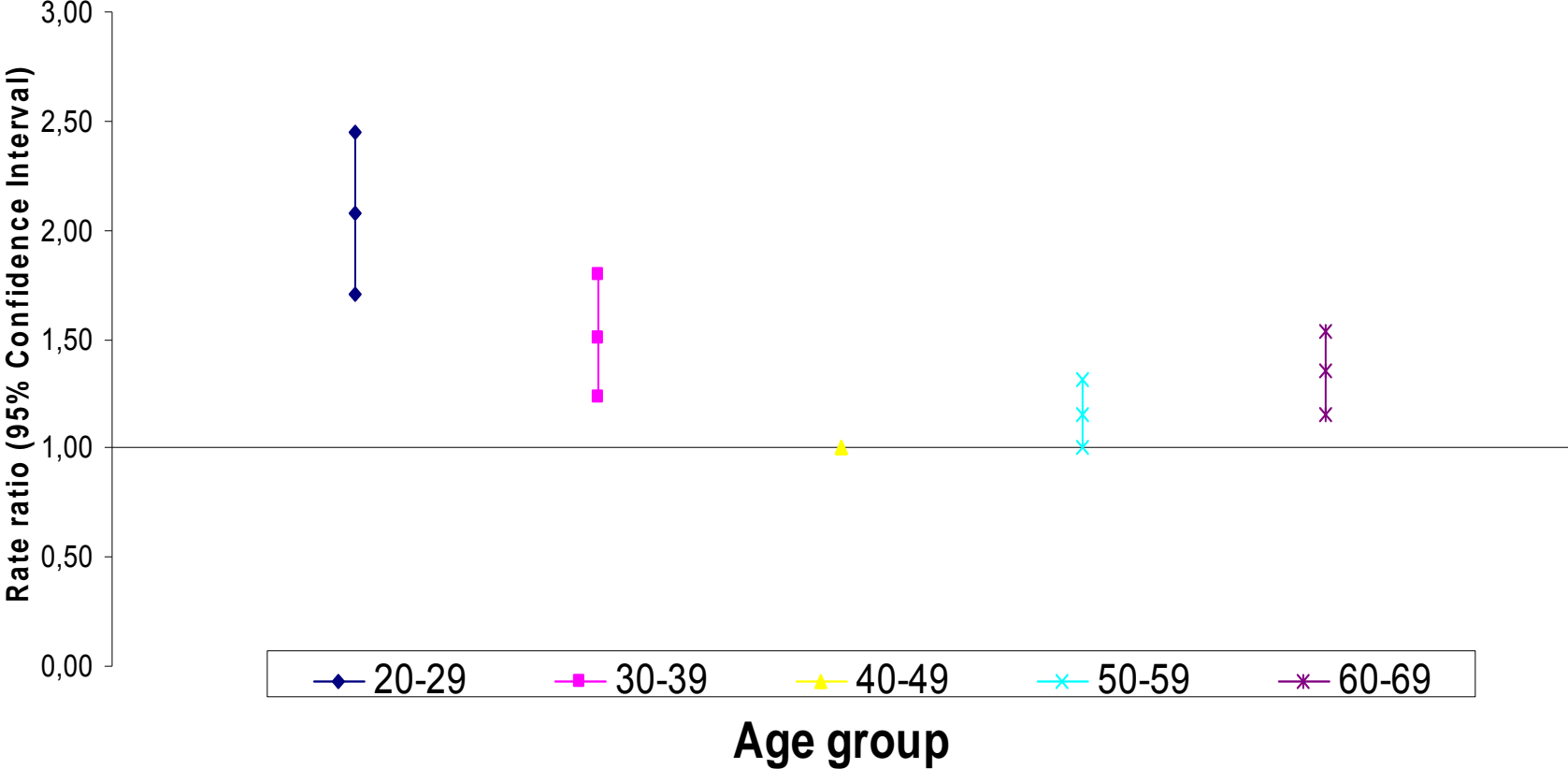
\*Within individual effects were similar to the marginal effects.

## Three-months risk of non-adherence derived from the multivariate model



The risk of non-adherence decreases significantly from age 20 to age 50, and then increased until age 69.

# Multivariate adjusted effect (rate ratios) of age on the incidence of non-adherence to antihypertensive medication



# Multivariate adjusted effects (rate ratios) of depression symptoms and quality of life indicators on compliance with antihypertensive medication

| Variable                               | Difference in compliance* | 95% Confidence Interval | P-Value      |
|--|---------------------------|-------------------------|--------------|
| <b>BDI-II Score<math>\geq</math>14</b> | <b>-9.51</b>              | <b>(-16.44, -2.59)</b>  | <b>0.007</b> |
| Age in 10-years units                  | 1.41                      | (-0.51, 3.32)           | 0.150        |
| Male gender                            | 4.95                      | (0.49, 9.41)            | 0.030        |
| Visit number                           | 2.00                      | (0.30, 3.69)            | 0.021        |
| Number of BP medications               | -4.56                     | (-6.93, -2.20)          | <0.001       |
| Married                                | -7.67                     | (-13.51, -1.84)         | 0.010        |
| Currently unemployed                   | -5.32                     | (-15.22, 4.57)          | 0.290        |
| <b>Anxiety score&lt;median</b>         | <b>-5.49</b>              | <b>(-9.54, -1.43)</b>   | <b>0.008</b> |
| Doctor visits last year                |                           |                         |              |
| 1-2                                    | 0.00                      |                         |              |
| 3-4                                    | 5.92                      | (0.08, 11.75)           | 0.047        |
| $\geq$ 5                               | 9.34                      | (2.91, 15.76)           | 0.005        |
| Constant                               | 84.12                     | (72.44, 95.80)          | <0.001       |

# Conclusions (1)

- The risk of non-adherence (53% in 12 months) was similar to that reported in other cohort studies.
- The risk of becoming non-adherent to antihypertensive medication is 2.5 times higher in patients with at least mild depression ( $BDI \geq 14$ ) and about 70% higher in those with high anxiety (GWB score for anxiety below the median).

# Conclusions (2)

- The risk of non-adherence also increases significantly in patients who are unemployed.
- As reported in previous studies, non-adherence increased with the number of antihypertensive medications (and number of pills) prescribed.
- The risk of non-adherence was similar by gender, but was significantly higher in young and older individuals, as compared to those 40-50 years old.
- General well-being, sexual symptoms distress, and sleep dysfunction were not associated with treatment adherence.



# Conclusions (3)

- This findings should be useful for identifying patients at high risk of non-adherence in the clinical setting, as well as for the design of compliance improving interventions.



# Questions?



THANK YOU