Understanding Temporal Patterns in Hypertensive Drug Therapy

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๏ Worsened conditions
๏ Adverse outcomes
๏ Increased risk of death
Hospitalization costs due to medication non-adherence are estimated as high as $13 billion annually.

Medication Possession Ratio (MPR)

\[ \frac{\sum \text{days supplied}}{\text{length of observation period}} \]
Medication Possession Ratio (MPR)

\[ \frac{\sum \text{days supplied}}{\text{length of observation period}} \]

Diagram showing timeline with study start and study end points.
Medication Possession Ratio (MPR)

\[
\frac{\sum \text{days supplied}}{\text{length of observation period}} = 100\%
\]
Medication Possession Ratio (MPR)

\[ \frac{\sum \text{days supplied}}{\text{length of observation period}} = 83\% \]
Medication Possession Ratio (MPR)

\[ \frac{\sum \text{days supplied}}{\text{length of observation period}} = 75\% \]
Hypertensive Drug Therapy

- **ACE** - Angiotension-Converting Enzyme-Inhibitors
- **ARB** - Angiotension II Receptor Blockers
- **CCB** - Calcium Channel Blockers
- **Beta** - Beta Blockers
- **Diur** - Diuretics
Hypertensive Drug Therapy
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Can we use visualization tools to more accurately understand adherence patterns in hypertensive drug therapy?
Research Questions

- Can we identify good vs. bad patterns?
- Can we understand patient behavior?
Data

- Commercial prescription claims
- 900,000 individuals (16 million claims)
- 5 Drug Classes
  - ACE Angiotension-Converting Enzyme-Inhibitors
  - ARB Angiotension II Receptor Blockers
  - CCB Calcium Channel Blockers
  - Beta Beta Blockers
  - Diur Diuretics
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging

Start of record

time
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging

Start of record 2 years time
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging
Data Simplification

- Partitioning
- Temporal Windowing
- Interval Merging
How do allowable gap and overlap assumptions affect adherence analysis?
Sensitivity Analysis: Allowable Gap

0 days
7 days
15 days
30 days
Sensitivity Analysis: Allowable Gap
Sensitivity Analysis: Allowable Gap

0 days

7 days

15 days

30 days
Sensitivity Analysis: Allowable Gap

0 days

7 days

15 days

30 days
Sensitivity Analysis: Allowable Overlap

0 days

7 days

15 days

30 days
Sensitivity Analysis: Allowable Overlap

0 days
7 days
15 days
30 days
Sensitivity Analysis: Allowable Overlap
Sensitivity Analysis: Allowable Overlap
Single Drugs
Single Drugs
2 Drugs
2 Drugs
2 Drugs

false overlap
2 Drugs
2 Drugs
All 5 Drugs

2,200 patients
All 5 Drugs

2,200 patients
All 5 Drugs

2,200 patients
All 5 Drugs

2,200 patients
All 5 Drugs

2,200 patients
All 5 Drugs

2,200 patients
All 5 Drugs

2,200 patients
Starting on Diuretic

150,000 patients
Starting on Diuretic

150,000 patients
Starting on Diuretic

150,000 patients
Summary

- Visualization facilitated rapid understanding of complex patient behavior
- Interactions allow systematic analysis of episode modeling
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