

Medication Adherence Patterns and Targeted Interventions



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Introduction

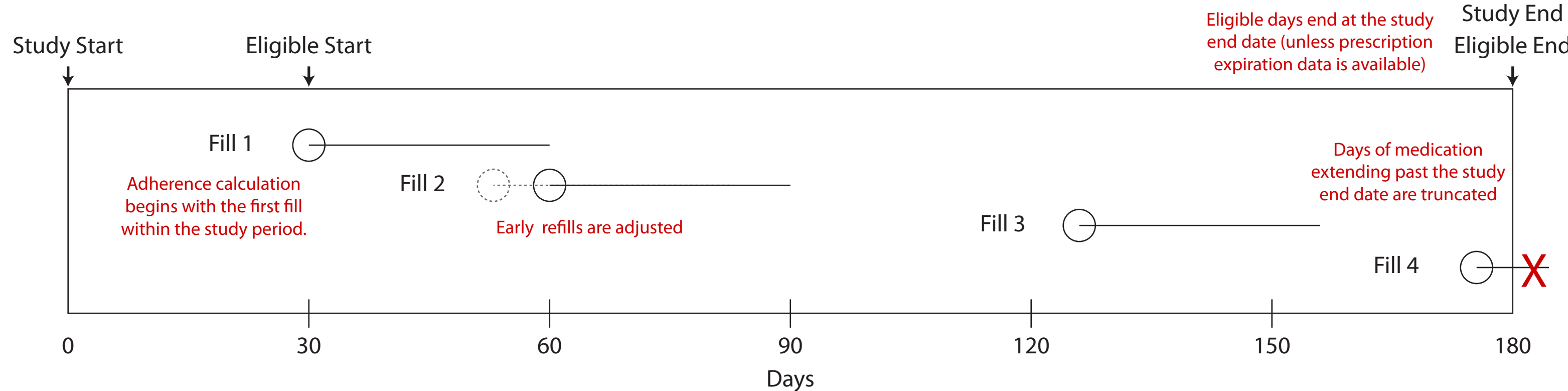
Medication adherence is an important factor for controlling medical utilization and cost, as well as improving outcomes and quality of life. Studies about consequences of non-adherence vary widely in methods, drug classes, populations, and outcomes. How much adherence matters, and how much is enough, varies by patient, condition and drug. Furthermore, while often overlooked in research, adherence pattern is relevant. For example, taking a daily medication every other day is not clinically equivalent to stopping medication for 3 months. Similar to research on adherence consequences, results reporting the effectiveness of interventions show widely varying results. There are many different causes of medication non-adherence, including personal choices, access issues, and barriers to medication management. Unsurprisingly, the effectiveness of interventions depends on the root cause. Patient needs and quality of life must be central to the conversation in order to incentivize adherence.

This project is focused on measuring and describing patient medication adherence patterns and ultimately applying the data to inform clinical decisions, design intervention strategies, and improve patient outcomes. Our approach is structured in incremental stages, each designed to produce both immediately applicable results and support for future stages. We are currently finalizing Stage 3, and earlier stages continue to be refined.

Stage 1: Measure and Define Adherence Patterns

Goals:

1. Calculate medication adherence scores appropriate for a rolling time frame in a clinical setting
2. Design a graphic for a quick, intuitive look at adherence "big picture", encompassing both medication-specific adherence and patient-level patterns.
3. Define patient-level labels that describe intervention-relevant adherence patterns in a few simple words.



PDC Scores

To measure medication adherence, we used the Percentage of Days Covered (PDC) measure applied to pharmacy insurance claims. PDC is calculated as the proportion of days in a time interval that are covered, where a covered day indicates that the medication was available to the patient on that day. Good PDC methods adjust pharmacy fill data to account for early refills and prescriptions extending past the study end date.

$$PDC = \frac{\text{Days Covered}}{\text{Eligible Days}} = \frac{95}{150} = 0.63$$

Patient Adherence Graphics

- all prescribed, long-term medications
- adherence score, fill pattern, and days covered for each prescription
- overall pattern of adherence across all prescriptions

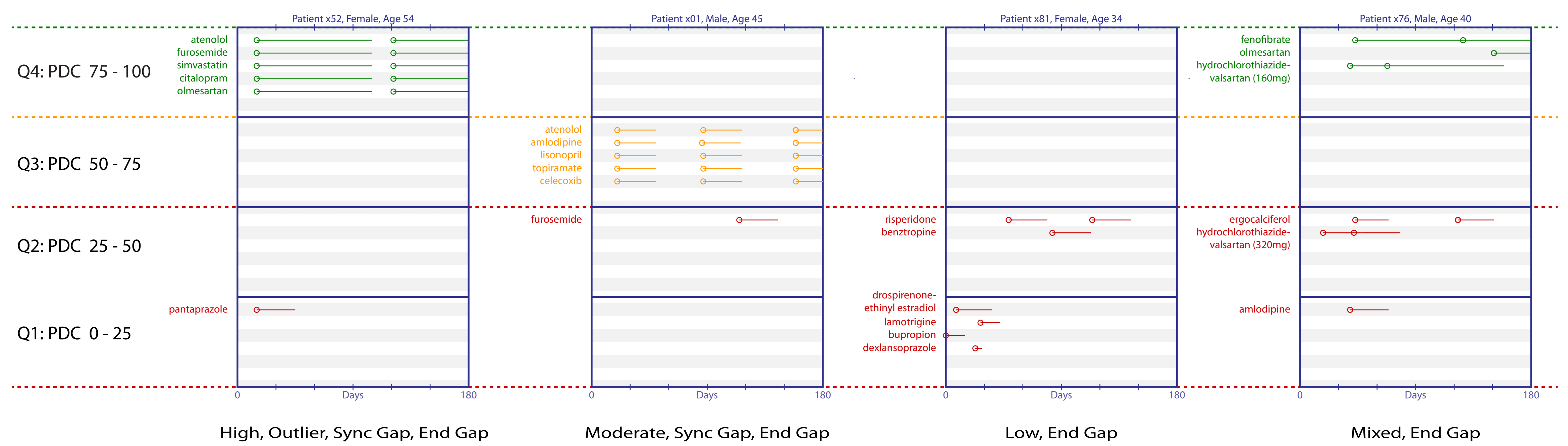
Adherence Pattern Labels

Base Labels (all patient have 1 base label)

- High: 75% of prescriptions in Q4
- Moderate: 75% of prescriptions in Q3
- Low: 75% or prescriptions in Q1 and Q2
- Mixed: all other patients

Add-On Labels (patients may have 1+ add-on labels)

- Outlier: 1+ drugs with PDC 2+ quartiles from base
- Sync Gap: 3+ drugs with synchronized gaps
- End Gap: no coverage within 30 days of end date
- Overpossession: >120% possession ratio



Stage 2: Adherence Statistics and Relationships to Patient Outcomes

Goals:

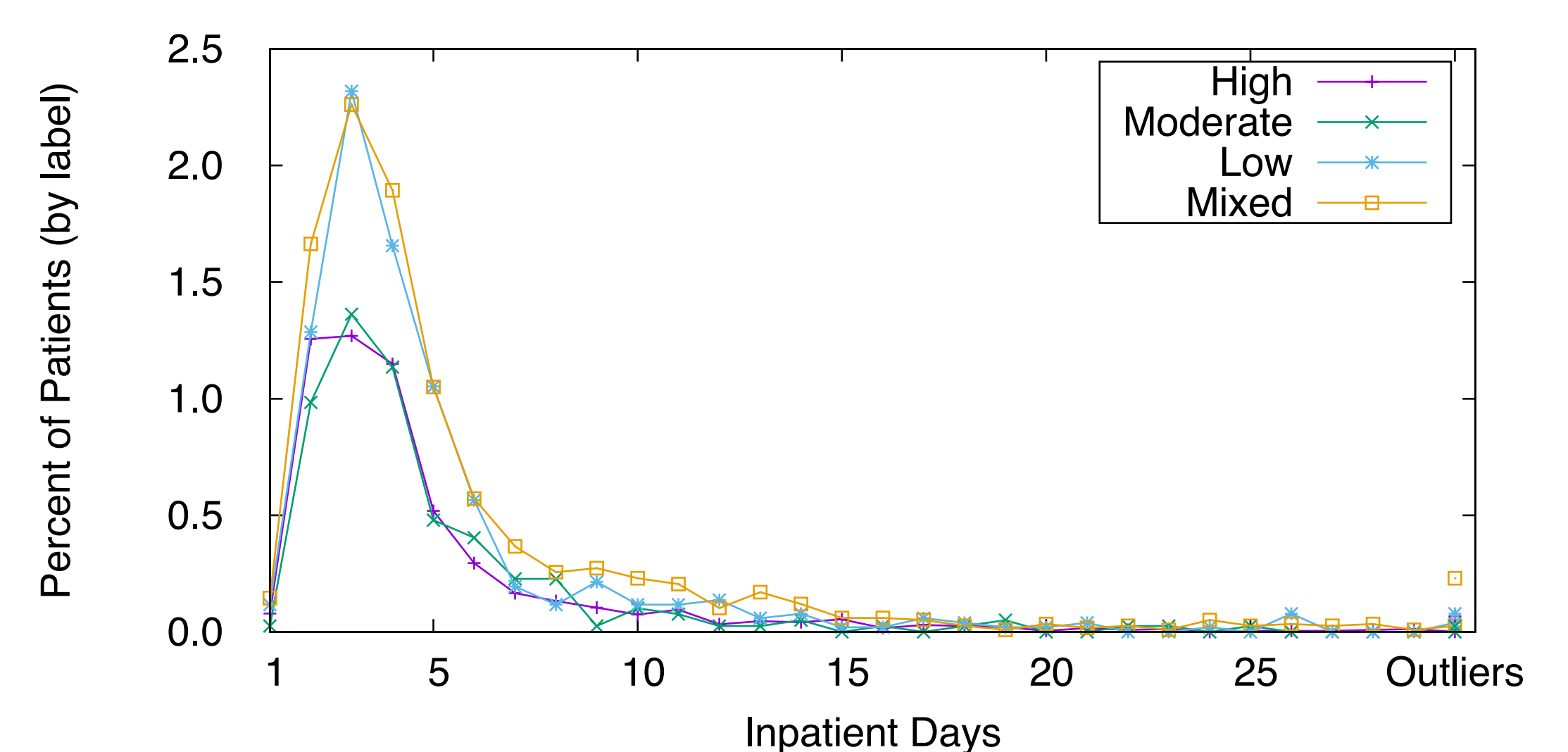
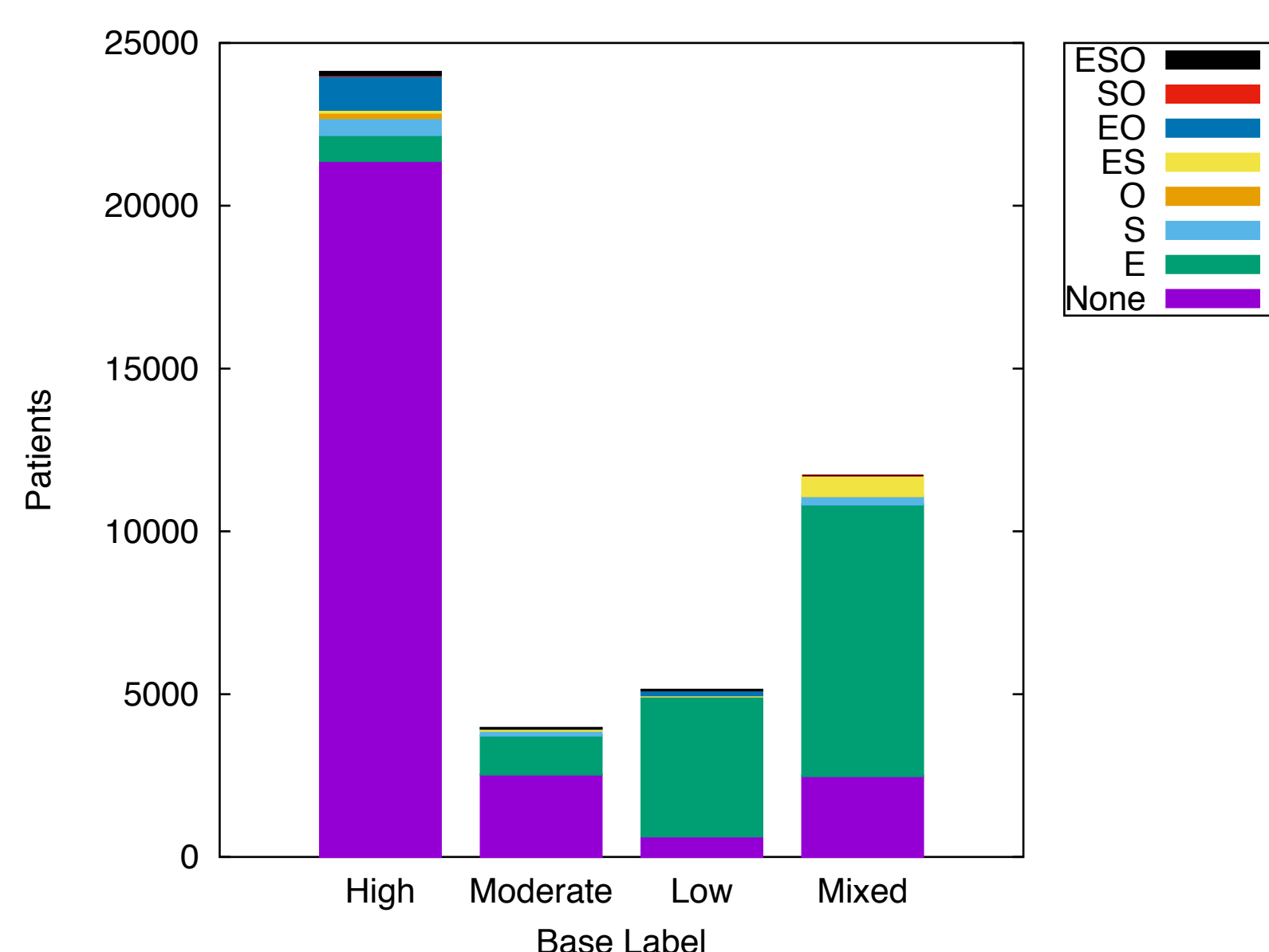
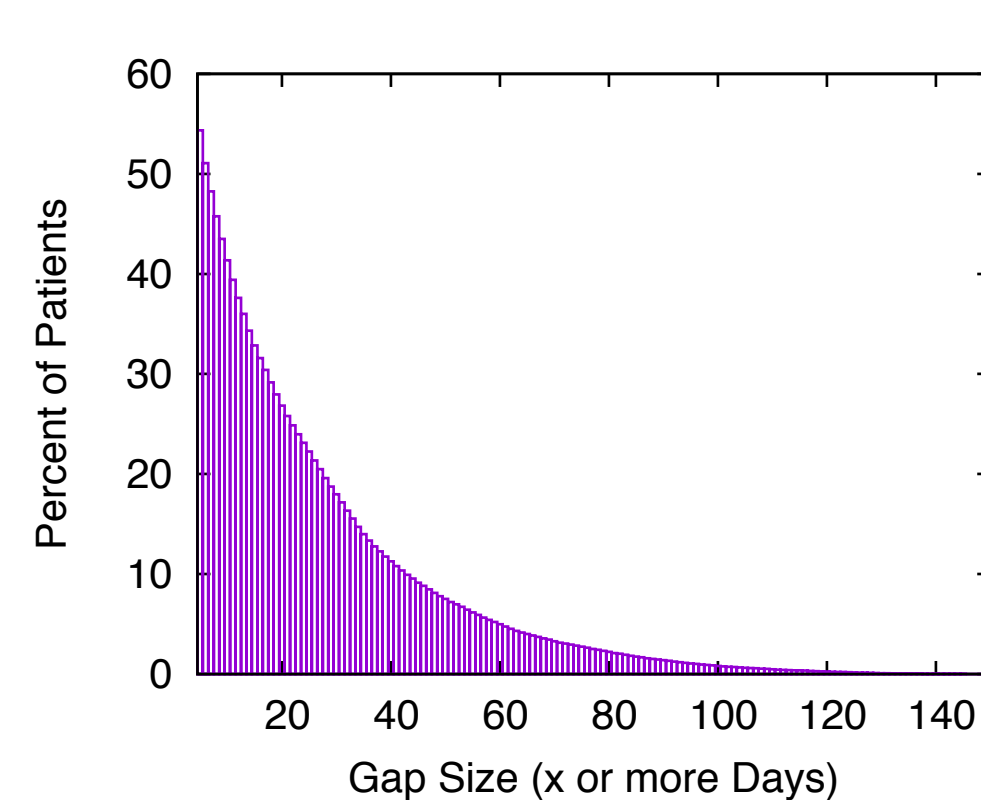
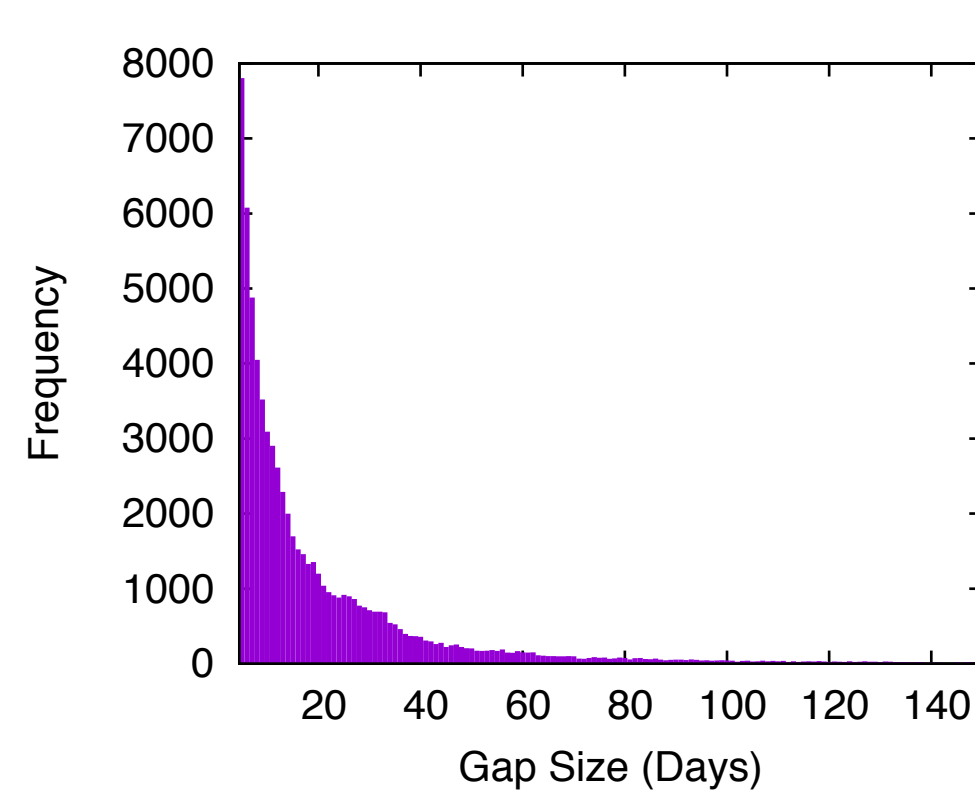
1. Determine the distributions of prescription patterns and adherence behaviors in an Advocate population
2. Demonstrate meaningful relationships between adherence labels and health outcomes (proof-of-concept analysis)

Data

Medication adherence scores and labels were computed for the Advocate population of commercially insured patients (n=49,306) with at least one maintenance drug fill in the 180 day period from July 5, 2011 to December 31, 2011 (the last 180 days in 2011). This span covered 736,276 fills across 123,998 prescriptions. Drugs were not grouped by class or category. Outcomes data was extracted from claims with dates of service during the study period and the subsequent 180 day period, from January 1, 2012 to June 28, 2012. The included outcomes were number of inpatient admissions, number of ED visits, and total cost of care.

Prescription Statistics

- 75.9% of patients (60.2% of prescriptions) had at least one gap of 5+ days
- 54.3% of patients (36.7% of prescriptions) had temporary gaps
- 49.0% of patients (31.5% of prescriptions) had end gaps (non-persistence)



Label Distributions

	Total	Outlier	Overpossession	End Gap	Sync Gap
High	26,373 (53.5)	1,449 (5.5)	951 (3.6)	2,185 (8.3)	765 (2.9)
Moderate	4,384 (8.9)	35 (0.8)	5 (0.1)	1,442 (32.9)	225 (5.1)
Low	5,706 (11.6)	187 (3.3)	0 (0.0)	5,009 (87.8)	58 (1.0)
Mixed	12,843 (26.0)	NA	251 (2.0)	9,851 (76.7)	984 (7.7)
Total	49,306 (100.0)	1,671 (3.4)	1,207 (2.4)	18,487 (37.5)	2,032 (4.1)

Outcomes Comparison

	High	Moderate	Low	Mixed
Count	24,110	3,964	5,132	11,720
Average PDC	0.93	0.63	0.29	0.64
Cost (PMPM)	858.14	740.68	1045.99	1454.61
Inpatient Days (PM)	0.2959	0.2762	0.4799	0.6538
ED Days (PM)	0.0018	0.0013	0.0033	0.0032

Stage 3: Connect Patterns with Patient and Clinician Needs

Goals:

1. Incorporate drug- and patient-specific information into adherence statistics on labels and outcomes
2. Conduct patient survey/study to record self-reported causes of observed medication gaps or non-persistence
3. Collect clinical feedback on developed tools and concepts (beta-testing)

Location:

3 coordinated outpatient clinics

Cohort/Users:

Beta-testing
All clinicians

Patient Needs/Baseline Pilot

Outpatient Pharmacists
Select Physicians

Patient ID: x01	Age: 45	Gender: Male <input type="checkbox"/> Female <input checked="" type="checkbox"/>	Primary reason for visit: <input type="checkbox"/> Acute condition <input checked="" type="checkbox"/> Chronic condition <input type="checkbox"/> Routine
Adherence Base Label: <input type="checkbox"/> High <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Low <input type="checkbox"/> Mixed		Additional Labels: <input type="checkbox"/> Temporary Gap <input checked="" type="checkbox"/> End Gap <input checked="" type="checkbox"/> Sync Gap <input type="checkbox"/> Outlier <input type="checkbox"/> Overpossession	
Atenolol, Topiramate, Lisinopril, Celecoxib		Adherence Gap Rationale: <input checked="" type="checkbox"/> Cost <input type="checkbox"/> Memory <input type="checkbox"/> Side Effect <input type="checkbox"/> Language/Literacy Barrier <input type="checkbox"/> Not Necessary <input type="checkbox"/> Physical Impairment <input type="checkbox"/> Stigma <input type="checkbox"/> Unable to Obtain	
Furosemide		Patient is stretching medication due to financial pressure	
Comments: Please describe advice, actions taken, or interventions offered to patient to address pharmacy needs. Referred to social work for financial support. Change some anti-hypertensives to night administration.		Patient reports feeling lightheaded after taking furosemide	

Summary

- While the majority of patients are highly adherent, nearly 76% of patients had at least one medication gap of 5 or more days. The (narrow) majority of gaps are temporary.
- A mixed pattern of adherence is nearly 3 times more likely than consistently moderate adherence.
- Moderate adherence (not mixed) is usually due to temporary gaps.
- Low and mixed patterns are most often attributable to non-persistence.
- At the population level, moderate adherence showed similar outcomes and lower cost than high adherence.
- Mixed adherence patterns resulted in similar outcomes to low adherence.

- A pilot of the medication adherence tool is ongoing in three coordinated outpatient clinics. Feedback from clinicians has been encouraging.

- "It's extremely beneficial for new patients or when you are taking care of a different physician's patients"
- "Very helpful. It was useful in helping patients figure out reason for non-adherence"
- "She was lying to me and I would have never known"

Stage 4: Design Evidence- and Value-Driven Pilots

Goals:

1. Design adherence intervention pilots tailored to needs of target populations
2. Early Pilot: targeted interventions for highly adherent patients with high-opportunity outliers

Acknowledgements

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