Parkinson's Foundation Hospital Care Benchmarking Toolkit: Executive Summary

The Parkinson's Foundation Hospital Care Benchmarking Toolkit ("Toolkit", created by the COSMOS-PD (Collaborative Observational Studies for Monitoring Outcomes and Safety in Parkinson's Disease) Collaborative is a shared benchmarking toolkit that helps hospital quality improvement (QI) teams see where their organization stands on inpatient safety for people with Parkinson's disease (PWP). The project draws on the Parkinson's Foundation Hospital Care Recommendations, which span medication safety, mobility, and dysphagia.[1] This initial release focuses on medication safety, defining metrics for medication timing and contraindicated medications, along with a directional, unadjusted length-of-stay and readmission comparison as a general outcomes signal. These metrics are calculable from data already in the electronic health record (EHR), reflect measures studied in the published literature, and are accessible through standard EHR reporting tools, offering a practical entry point for community-wide benchmarking. COSMOS-PD is a partnership among LSU Health Shreveport, the University of Rochester (NY), Northwestern Medicine, Epic Systems Corporation, and the Parkinson's Foundation (PF), with PF as sponsor and Northwestern Medicine serving as the data coordinating center (DCC).

Release 1 (beta) is designed for Epic SlicerDicer, a drag-and-drop, self-service analytics tool built into the Epic EHR that lets QI teams explore clinical data without specialized reporting or programming skills. It reflects four principles: start simple, stay Epic-facilitated for easy adoption, keep definitions locally adaptable, and remain community-driven for future iteration. Working through Release 1 will build staff familiarity with SlicerDicer and EHR self-service analytics more broadly, a skill set that carries over to other QI work beyond PD safety. Although specific implementation guidance is only available for Epic-using health systems, the underlying metric definitions are written to be interpretable by sites using any EHR.

Four primary metric domains are defined: length-of-stay and 30-day readmission differences between people with and without Parkinson's disease (Metric 1); custom levodopa ordering rate (Metric 2); levodopa administration-timing adherence within 15 and 30 minutes (Metric 3); and contraindicated dopamine-blocking agent use (Metric 4). Each provides a shared baseline measure for community aggregation, while remaining open to site-specific extension.

The full Release 1 (beta) of this toolkit will be posted to Epic UserWeb for Epic customers. This executive summary and metric definitions will also be made available by the Parkinson's Foundation to any interested QI team. Near-term, we plan to refine measures through community feedback and encourage integration into Epic's standard offerings to further facilitate ease of adoption.

This toolkit represents a common starting point for shared metrics for shared learning, not a comprehensive standard. Sites are encouraged to adapt locally, including extending its logic to settings such as Observation-status and Emergency Department encounters, which were excluded here due to the variation they would introduce into a shared benchmark. These extensions are a starting point for local QI iteration and, where useful, more formal validation. Feedback is welcome at hospitalcare@parkinson.org.

Reference: Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2026;13(1):29–43. doi:10.1002/mdc3.70247. PMID: 40736219.

Parkinson's Foundation Hospital Care Benchmarking Toolkit Metric Definitions

Table of Contents

1 Metric Overview

This document defines the Parkinson's Foundation Hospital Care Benchmarking Toolkit benchmarking metrics (Metrics 1–4) for site quality improvement teams and analytics support resources. Definitions are written to be implemented from any electronic health record or self-service analytics platform capable of encounter-, order-, and administration-level queries. Shared population, cohort, and reporting-convention definitions are defined below and referenced throughout the toolkit.

2 General Reporting & Suppression Conventions

2.1 Small-Cell Suppression Rule

Any reported cell with a count (N) between 1 and 10 is suppressed and reported as "NA," including every statistic derived from that cell (percentiles, rates, differences). A count of zero (N = 0) may be reported. This rule applies uniformly across every metric in the toolkit (Metrics 1–4).

Additional metric-specific complementary-suppression rules and considerations are stated within that metric's population or stratification section.

2.2 Metric Tier & Inheritance Rule

The Toolkit metrics are organized into three tiers: Primary (required), Secondary (expected), and Exploratory (optional, bandwidth-permitting).

Unless a definition explicitly states otherwise, every Secondary and Exploratory metric inherits the population definition, inclusion criteria, exclusion criteria, and reporting conventions of its parent metric. Each derived metric's definition therefore states only how it differs from its parent, such as the added stratifier, restricted scope, or modified numerator, rather than restating the full specification.

2.3 Data Extraction Timing

Self-service analytics tools can be affected by post-upgrade data repopulation. Sites using such tools should wait at least 1 month after any EHR upgrade and confirm that counts have stabilized before running metrics. This is generally not a concern for sites requesting data for these metrics from a formal analytics team.

Sites should also wait at least 3 months after the end of any reporting period before running extracts, to allow clinical documentation and coding, including DRG assignment, to reach completion and, for M1.2, to allow the 30-day readmission window to fully elapse for admissions occurring near the end of the period.

3 Core Case & Cohort Definitions

The definitions in this section are toolkit-wide: they are used, unchanged, by every metric domain (Metrics 1–4).
The age threshold and reporting timeframe window will vary by metric family. Those parameters are documented as distinct Cohort Parameter Sets below for use by metrics as indicated.

3.1 Parkinson's Disease (PD) Case Definition

A PWP (person with Parkinson's disease) is defined as a person with a Parkinson's disease diagnosis (defined as an ICD-10 G20.* diagnosis code recorded during the applicable reporting period – which may vary by Cohort), preceded by at least one additional G20.* diagnosis code within the prior 12 months. Requiring a second G20.* code in the preceding 12 months increases the specificity of the case definition, with some cost to sensitivity.

This requirement is also intended to reduce, though does not eliminate, the risk of attributing a hospitalization to the PWP cohort before Parkinson's disease had been diagnosed. Without a confirming prior code, a person first diagnosed with PD late in the reporting period could otherwise be classified as PWP for hospitalizations that occurred earlier in the same period. Those hospitalizations may have occurred before the PD diagnosis was made and should not be held to PD-specific hospital safety standards.

This algorithm is applied identically across all Toolkit metrics.
The age threshold and reporting timeframe window will vary by metric family. Those parameters are documented as distinct Cohort Parameter Sets below for use by metrics as indicated.

3.2 Eligible Acute-Care Inpatient Encounter Definition (Eligible Encounter)

This section defines which hospital stays qualify as an Eligible Acute-Care Inpatient Encounter (referred to as **Eligible Encounter** for the rest of this document.

This definition establishes the shared encounter population is the denominator basis for Metrics 1 and 4.

For Metrics 2 and 3, Eligible Encounter membership still determines which orders and administrations are in scope, but the encounter itself is not the denominator. See Unit of Analysis and Data Timing and each metric's specification for the exact denominator.

An eligible encounter is a completed, acute-care inpatient hospitalization, as distinguished from observation, emergency department, rehabilitation, hospice, or hospital-at-home stays.

Inclusion Criteria

An encounter is eligible when all of the following are true:

1. The encounter is a Hospital Encounter with at least one day of Inpatient Class, occurring at a site-specific facility.
    - Site-specific facilities are defined using each site's determined eligible Service Area(s) and Location(s).
2. The encounter is complete/closed (discharged).
3. The encounter start date falls within the applicable reporting period (see Cohort Parameter Sets).
    - Reporting period inclusion is scoped by encounter start date, not discharge date, consistent with the toolkit's existing pilot data collection methodology. Encounters spanning a reporting period boundary are included based on start date only.

Exclusion Criteria

An encounter is excluded if any of the following apply:

1. The encounter's final Patient Class does not represent Inpatient status.

- This will include categories such as Observation, Rehabilitation, Hospice, or home-based acute care (e.g., "Hospital at Home"). These categories listed here are illustrative and do not represent a comprehensive list.

2. The encounter never reaches Inpatient status (e.g., Emergency Department-only encounters).
3. Encounter status is cancelled, scheduled, or still-open (not yet discharged).

Implementation Guidance
Eligibility depends on two data points evaluated together: whether the encounter ever reached Inpatient status (Inclusion Criterion 1) and its final Patient Class (Exclusion Criterion 1). Encounters that transition into Inpatient status and remain there through discharge are eligible (e.g., Observation→Inpatient, Emergency Department→Inpatient); encounters reclassified out of Inpatient status before discharge are not (e.g., Inpatient→Observation).

Observation encounters are excluded because they typically represent shorter-duration, transitional care rather than the acute, higher-acuity inpatient care benchmarked in this toolkit.

Sites unable to fully isolate eligible acute-care inpatient hospitalizations through Location, Service Area, and Patient Class filtering alone (e.g., organizations with many locations/service areas, or limited structural differentiation) may apply a representativeness threshold of ≥80% eligible acute-care inpatient hospitalizations within the selected cohort. Any filtering adjustments must be documented in the site's session tracker reporting sheets to support transparency and cross-site comparability.

3.3 Cohort Parameter Sets

3.3.1 Process Cohort (Metrics 2–4)
Metrics 2–4 are process metrics and apply the PD Case definition and Eligible Encounter definition above using two additional parameters:

- Age threshold of ≥30 years
- The most recently completed calendar year

This parameter set is intended to maximize capture of persons with Parkinson's disease while maintaining a standardized population for benchmarking hospital safety process measures.

3.3.2 Outcomes Cohort (Metric 1)
Metric 1 includes outcome metrics and apply the PD Case definition and Eligible Encounter definition above using two different parameters:

- Age threshold of ≥50 years
- The two recently completed calendar years

During toolkit development, hospitalization events among persons aged 30–49 years were relatively uncommon across participating test sites, often resulting in small or suppressed analytic cohorts. The ≥50-year threshold and two-year reporting period were selected to increase the number of hospitalization events captured, improve cohort stability, reduce suppression, and support more reliable length-of-stay and readmission benchmarking analyses across sites.

4 Metric 1 Population Definitions

4.1 PWP Definition (Metric 1)

PWP (person with Parkinson's disease) is defined at the person level by meeting the Parkinson's Disease Case Definition. This definition is contrasted with the PwoP population in Metric 1, the toolkit's outcomes measure, which uses the two-year Outcomes Cohort. Metrics 2–4 are process measures using the one-year Process Cohort instead.

This population is linked to the Eligible Encounter Definition, with age-at-encounter and reporting-period filters applied at the encounter level per the Outcomes Cohort (age ≥50; two most recently completed calendar years).

4.2 PwoP Definition (Metric 1)

PwoP (person without Parkinson's disease) is the reference comparator population to PWP for Metric 1. PwoP represents a general acute-inpatient population without PD and will be substantially larger than PWP.

This PwoP population is not intended to serve as a matched control group for PWP. Instead, the PWP-PwoP comparison provides a cross-organization signal for Metric 1 rather than a definitive outcomes measure. Differences across sites may be influenced by variation in practice patterns, hospital size, case mix, and services provided. These definitions reflect a practical initial signal suitable for aggregation across sites. A formal, risk-adjusted comparison of LOS or readmission would ideally require a case-control study design, which is outside the practical scope of this toolkit.

A person is included in PwoP if they have no Parkinson's disease diagnosis (ICD-10 G20.*) recorded at any point in the 10 years preceding the last day of the most recently completed calendar year (the end of the Outcomes Cohort reporting period).

4.3 Suppression Conventions (M1-specific)

In addition to the Small-Cell Suppression Rule above, metric M1 has a higher risk of small-cell suppression and requires complementary suppression, because Metric 1 stratifies by DRG, legal sex, and age group. A suppressed cell can sometimes be reconstructed by subtracting the visible strata from a reported total. Metrics 2–4 use simpler, single-dimension stratifiers with less risk of cell reconstruction, so this addendum applies to Metric 1 only. Sites must suppress the smallest additional stratum necessary to prevent reconstruction of any suppressed cell, applied as follows.

Legal Sex stratification (Male, Female, Other, Total ≥50yo): Legal Sex (Male, Female) may include a third category, Other, which is not broken out as its own row but is included in the Total. Complementary suppression here has two triggers.

First, if either the Male or Female count is itself suppressed under the primary rule, the remaining visible Legal Sex count must also be suppressed, since it could otherwise be reconstructed by subtracting from the reported Total. For example, if Male N LOS = 8 (suppressed as NA) and Female N LOS = 45 with a Total of 53, reporting Female as 45 would allow Male to be back-calculated (53 − 45 = 8); Female must also be reported as NA.

Second, even when both Male and Female counts individually exceed 10, if the difference between the Total and the sum of Male and Female is less than 11, that difference is an implied Other count that would itself be disclosed through subtraction. In this case, sites must suppress the smaller of the Male or Female cells (and its associated row) so the implied Other count cannot be derived. For example, if Male N LOS = 30, Female N LOS = 20, and Total N LOS = 55, the implied Other count (55 − 30 − 20 = 5) is a suppressible small cell; Female, as the smaller of the two, must be reported as NA.

Age Group stratification (≥50–<65, ≥65–<80, ≥80, Total ≥50yo): if one age group's count is suppressed under the primary rule, sites must also suppress the second-smallest of the remaining two age groups, leaving only the single largest age group visible. This ensures at least two of the three age-group cells are unknown, which prevents reconstruction via subtraction from the Total even though the third cell alone exceeds 10.

These rules apply independently to the N LOS (count of eligible encounters with length-of-stay data) and N Readmit (count of eligible encounters associated with a later readmission) columns. Readmission counts are typically smaller than LOS counts within the same stratum and are therefore at greater risk of triggering suppression. If N LOS is 10 or fewer, the entire row is suppressed. If N Readmit is 10 or fewer but N LOS is 11 or greater, only the readmit columns are suppressed for that row.

Suppression risk increases with each additional DRG, since DRG-specific cell sizes are smaller than the overall M1 population. Where complementary suppression would require extensive cell-by-cell adjustment, sites may simply report an entire DRG row as NA rather than working through the minimal suppression set.

The data coordinating center is available to review a site's completed data submission sheet on an anonymous basis and advise on complementary suppression specific to that proposed data session tracker file.

5 Metric 1: Inpatient LOS & 30-Day Readmission

Metric 1 quantifies differences in inpatient length of stay and 30-day readmission between PWP and PwoP (Metric 1 Population Definitions, above) across all eligible inpatient admissions occurring during the two-year Outcomes Cohort reporting period. PwoP serves as the reference population for both primary metrics.

Metric	Abbreviation	Name	Description
M1.1	LOSDiff	LOS Difference	Median inpatient LOS among PWP minus median inpatient LOS among PwoP (days), all diagnoses
M1.2	ReadmitDiff	30-Day Readmission Difference	30-day readmission rate among PWP minus 30-day readmission rate among PwoP (percentage points), all diagnoses

5.1 M1.1 — LOS Difference (Primary metric specification)

Metric name	LOS Difference
Metric ID	M1.1
Abbreviation	LOSDiff
Measure Type	Continuous Variable (Difference of Medians)
Description	Median inpatient length of stay (LOS), in days, among PWP minus median inpatient LOS among PwoP, computed across all diagnoses (all-DRG) within the two-year Outcomes Cohort reporting period.
Denominator	Number of eligible discharged inpatient encounters within the two-year Outcomes Cohort reporting period, counted separately for PWP and PwoP (Metric 1 Population Definitions).
Numerator	Not applicable. M1.1 is a continuous-variable measure (difference of medians)
Measurement	Median inpatient LOS in days is computed separately for PWP and PwoP. Submitted values include N, 25th percentile (P25), median, and 75th percentile (P75) for each population. M1.1 = PWP median − PwoP median.

	Median, rather than mean, is used because inpatient LOS distributions are typically right-skewed by a small number of extended stays.
Exclusions	See Metric 1 Population Definitions and the Eligible Acute-Care Inpatient Encounter Definition (Core Case & Cohort Definitions) for population- and encounter-level exclusions. No additional exclusions apply to M1.1 specifically.
Implementation notes	Best computed via Epic self-service analytics per applicable SOP. Non-Epic sites should approximate using an equivalent inpatient-status-day count within the same encounter population.
Reporting	Reported as a single aggregate across the two-year Outcomes Cohort reporting period (not year-over-year). One result row is submitted for PWP and one for PwoP. Small-cell suppression applies per General Reporting & Suppression Conventions.
Interpretation notes	Positive value = PWP have longer inpatient stays than PwoP overall; negative value = shorter. LOS is the number of days the patient held inpatient-level status during the encounter, per the Eligible Encounter Definition.
Rationale	People with Parkinson's disease face elevated risk of longer, more complicated hospital stays, related to factors including medication-timing sensitivity, impaired mobility, and dysphagia-related complications (see references VC2025; PF2023). M1.1 measures this site-level difference to support quality-improvement prioritization and cross-site benchmarking. Site-level results reflect local patient volume and case mix; inferential interpretation of a single site's result in isolation is not recommended without verification.
Alignment & References	[PF2023] The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023. [VC2025] Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.

5.2 M1.2 — 30-Day Readmission Difference (Primary metric specification)

Metric name	30-Day Readmission Difference
Metric ID	M1.2
Abbreviation	ReadmitDiff
Measure Type	Proportion Difference (Rate Difference, Percentage Points)
Description	30-day readmission rate among PWP minus 30-day readmission rate among PwoP, expressed in percentage points, computed across all eligible diagnoses (all-DRG) within the two-year Outcomes Cohort reporting period.
Denominator	Number of eligible discharged inpatient encounters within the two-year Outcomes Cohort reporting period, counted separately for PWP and PwoP.
Numerator	Number of denominator encounters flagged as having a qualifying readmission under the CMS Hospital-Wide All-Cause Unplanned Readmission (HWR) Measure's readmission identification criteria. A qualifying readmission need not occur within the same reporting period as its index encounter.

Exclusions	See Metric 1 Population Definitions and the Eligible Acute-Care Inpatient Encounter Definition for population- and encounter-level exclusions. No additional exclusions apply to M1.2 specifically.
Implementation notes	Readmissions are identified using the CMS Hospital-Wide All-Cause Unplanned Readmission (HWR) Measure's identification criteria for the numerator; HWR's age-65+ population scope and risk-standardization methodology are not used, superseded by this toolkit's own Population Definitions. The metric is best computed using Epic self-service analytics according to the applicable SOP; non-Epic sites may approximate the metric using the criteria above.
Reporting	Reported as a single aggregate across the two-year Outcomes Cohort reporting period (not year-over-year). One result row is submitted for PWP and one for PwoP. Small-cell suppression applies per General Reporting & Suppression Conventions.
Interpretation notes	Positive value = PWP readmitted more often than PwoP overall; negative value = less often. This measure can only capture readmissions visible within the reporting site's own EHR/data warehouse; readmissions occurring at a different facility are not captured. This is a known limitation of single-site self-service analytics common to all participating sites.
Rationale	Hospitalized PWP face elevated risk of complications (medication-timing errors, immobility, dysphagia) that can contribute to early readmission (VC2025; PF2023). M1.2 quantifies this difference at the site level to support quality-improvement prioritization and cross-site benchmarking, using the same site-level interpretation caution described under M1.1.
Alignment & References	[PF2023] The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023. [VC2025] Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.

5.3 Stratification & Derived Metrics (Metric 1)

Secondary and Exploratory metrics for M1.1 and M1.2 follow the Metric Tier & Inheritance Rule (General Reporting & Suppression Conventions): each inherits the population, inclusion/exclusion, and reporting conventions of its parent primary metric and modifies only the stated dimension.

Metric Type	Description
Sex-stratified	Primary metric calculated separately by Legal Sex (Male & Female)
Age-stratified	Primary metric calculated separately for each age group
DRG-specific	Primary metric calculated within a specified DRG (see Appendix: DRG Reference Table)

Age-stratified levels:

Metric Type	Description
≥50yo and <65 yo	Represents younger-onset and early Medicare-eligible Parkinson's disease populations.
≥65yo and <80 yo	Represents the majority of inpatient admissions among people with Parkinson's disease and aligns with typical Medicare-age populations.

≥80 yo	Represents the oldest patient population, who may have distinct hospitalization patterns, readmission risk, and length of stay.

Persons aged <50 years are excluded from Metric 1 analyses, consistent with the Outcomes Cohort definition.

Exploratory metrics further stratify a DRG-specific Secondary metric by sex or by age group (not both simultaneously):

Metric Type	Description
DRG x Sex	DRG-specific metric stratified by sex
DRG x Age	DRG-specific metric stratified by age group

Metric hierarchy and naming convention (example output metrics):

Parent Metric	Tier	Stratification	Example Output Metrics
M1.1 LOS Difference	Primary	None	M1.1
M1.1 LOS Difference	Secondary	Sex	M1.1_sex
M1.1 LOS Difference	Secondary	Age	M1.1_age
M1.1 LOS Difference	Secondary	DRG	M1.1.871, M1.1.177, etc.
M1.1 LOS Difference	Exploratory	DRG × Sex	M1.1.871_sex, etc.
M1.1 LOS Difference	Exploratory	DRG × Age	M1.1.871_age, etc.
M1.2 Readmission Difference	Primary	None	M1.2
M1.2 Readmission Difference	Secondary	Sex	M1.2_sex
M1.2 Readmission Difference	Secondary	Age	M1.2_age
M1.2 Readmission Difference	Secondary	DRG	M1.2.871, M1.2.177, etc.
M1.2 Readmission Difference	Exploratory	DRG × Sex	M1.2.871_sex, etc.
M1.2 Readmission Difference	Exploratory	DRG × Age	M1.2.871_age, etc.

This yields 14 Secondary and 20 Exploratory codes across M1.1 and M1.2 combined (34 total). The complete enumerated code list is provided in the Appendix: Full Metric Dictionary; individual specification tables are not repeated here per metric code, consistent with the Inheritance Rule above.

6 Metrics 2–4 Population Definitions

6.1 PWP Definition (Metrics 2–4)

PWP is defined at the person level by meeting the Parkinson's Disease Case Definition. Metrics 2–4 are process measures, using the one-year Process Cohort. Metric 1 is the toolkit's outcomes measure which uses the two-year Outcomes Cohort instead.

This population is linked to the Eligible Encounter Definition, with age-at-encounter and reporting-period filters applied at the encounter level per the Process Cohort (age ≥30; most recently completed calendar year).

6.2 Unit of Analysis and Data Timing

The unit of analysis differs across Metrics 2–4 and is specified within each metric: M2 and M3 are measured at the individual medication order/administration level (see each metric's Denominator/Numerator); M4 is measured at the eligible-encounter level.

Eligible Encounters Definition constrains which orders and administrations are in scope for M2 and M3, since each must occur within an eligible encounter, but the encounter itself is not the counted unit for these metrics, unlike M1 and M4.

Data Extraction Timing (see General Reporting & Suppression Conventions) applies equally to Metrics 2–4.

7 Metric 2: Levodopa Custom Order Rate

Metric 2 quantifies the percent of scheduled, short-acting levodopa medication orders entered with custom or exact administration timing, rather than standard frequency-based ordering, among eligible PWP inpatient encounters within the Process Cohort reporting period (Metrics 2–4 Population Definitions, above).

7.1 M2 – Levodopa Custom Order Rate specification

Metric name	Levodopa Custom Order Rate
Metric ID	M2
Abbreviation	LDcustom
Measure Type	Proportion (Rate as percent)
Description	Percent of active, standing, immediate-release, short-acting levodopa orders entered with a custom or exact-timing frequency, among eligible PWP inpatient encounters within the Process Cohort reporting period.
Denominator	Number of active, standing, immediate-release, short-acting levodopa orders placed within eligible PWP inpatient encounters during the Process Cohort reporting period.
Numerator	Number of denominator orders entered with a custom or exact-timing frequency.
Measurement	Numerator ÷ Denominator × 100, expressed as a percentage.
Exclusions	See Metrics 2–4 Population Definitions and the Eligible Acute-Care Inpatient Encounter Definition for population- and encounter-level exclusions. Additionally excluded: rejected orders; PRN and one-time order frequencies; levodopa formulations with non-oral default route (extended/controlled-release, mixed IR/ER capsules, inhaled, intestinal infusion, subcutaneous). Oral tablets later given by tube remain included.
Implementation notes	Sites map local order-frequency values to the custom or exact-timing frequency category via a standardized grouper, consistent with other toolkit-wide grouper mappings (e.g., Patient Class, Eligible Encounter Definition). Best computed via Epic self-service analytics per applicable SOP; non-Epic sites should approximate using the criteria above.
Reporting	Reported as a single aggregate across the one-year Process Cohort reporting period. Small-cell suppression applies per General Reporting & Suppression Conventions.
Interpretation notes	Higher M2 = a greater share of eligible orders entered with a custom or exact-timing frequency rather than a standard frequency, indicating attention to specific dose timing at the point of ordering. This does not confirm the ordered time matches the patient's outpatient regimen, only that one was specified.
Rationale	Primary safety/process metric aligned with hospital care recommendations to order PD medications using custom timing that matches the outpatient regimen. Immediate-release, short-acting levodopa is the toolkit's index medication as the most commonly prescribed and most time-sensitive PD medication in hospital settings; restricting to one consistently defined medication class improves cross-site comparability.
Alignment & References	[PF2023] The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023. [VC2025] Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.

7.2 Stratification & Derived Metrics

Secondary metrics for M2 follow the Metric Tier & Inheritance Rule (General Reporting & Suppression Conventions): each restricts the M2 denominator to a specific admission pathway or administration route while inheriting M2's numerator logic, exclusions, and reporting conventions.

Metric	Abbreviation	Name	Denominator restriction	Rationale
M2_ed	LDcustom_ed	Levodopa Custom Order Rate – ED	Admission included an ED visit	ED-associated admissions often involve a medication reconciliation workflow from ED to inpatient.
M2_direct	LDcustom_direct	Levodopa Custom Order Rate – Direct	Admission did not include an ED visit	Direct admissions typically require a de novo hospitalist medication-ordering workflow.
M2_oral	LDcustom_oral	Levodopa Custom Order Rate – Oral	Route restricted to oral	Oral is the most common ordering route; isolates it from routes that may signal a different at-risk population.
M2_tube	LDcustom_tube	Levodopa Custom Order Rate – Tube	Route restricted to enteral tube (gastric/intestinal feeding tube)	Tube-based dosing has unique operational barriers (crushing policies, workflow delays); benchmarks a higher-complexity route.

7.3 Exploratory: Timing-Reconciliation Frequency Usage

Some EHRs include an order frequency specifically designed to reconcile exact administration timing between outpatient and inpatient orders, which may be particularly relevant for time-sensitive PD medications such as levodopa. Sites with this capability may optionally collect exploratory session data on the frequency's usage rate among eligible orders, to help assess use of this functionality across reporting sites. This is not a formal toolkit metric, and sites whose EHR does not support this capability are not expected to collect this exploratory data.

For Epic sites, this corresponds to Epic's native "Exact Times" order frequency, which supports automated outpatient-to-inpatient timing carryover for eligible orders.

8 Metric 3: Levodopa Timing Adherence

Metric 3 quantifies adherence to levodopa administration-timing targets among eligible PWP inpatient encounters within the Process Cohort reporting period (Metrics 2–4 Population Definitions, above).

Metric	Abbreviation	Name	Description
M3.1	LDlt15	Levodopa Administration ≤15min Rate	% of eligible levodopa administrations occurring within 15 minutes of scheduled administration time during the reporting period
M3.2	LDlt30	Levodopa Administration ≤30min Rate	% of eligible levodopa administrations occurring within 30 minutes of scheduled administration time during the reporting period

8.1 M3.1 / M3.2 — Levodopa Timing Adherence specification

Field	M3.1	M3.2
Metric name	Levodopa Administration ≤15min Rate	Levodopa Administration ≤30min Rate
Metric ID	M3.1	M3.2
Abbreviation	LDlt15	LDlt30
Measure Type	Proportion (Percent)	Same as M3.1.
Description	Percent of eligible immediate-release, short-acting levodopa administrations given within 15 minutes of the scheduled administration time, among eligible PWP inpatient encounters within the Process Cohort reporting period.	Percent of eligible immediate-release, short-acting levodopa administrations given within 30 minutes of the scheduled administration time, among eligible PWP inpatient encounters within the Process Cohort reporting period.
Denominator	Number of standing (non-PRN, non-one-time), immediate-release, short-acting levodopa administrations given within eligible PWP inpatient encounters during the Process Cohort reporting period.	Same as M3.1.
Numerator	Number of denominator administrations occurring within 15 minutes of scheduled administration time.	Number of denominator administrations occurring within 30 minutes of scheduled administration time.
Measurement	Numerator ÷ Denominator × 100, expressed as a percentage.	Same as M3.1.
Exclusions	See Metrics 2–4 Population Definitions and the Eligible Acute-Care Inpatient Encounter Definition for population- and encounter-level exclusions. Additionally excluded: administrations not documented as given (held, missed, cancelled, or other non-given status); PRN and one-time order frequencies; early administrations (given before scheduled time); levodopa formulations with non-oral default route (extended/controlled-release, mixed IR/ER capsules, inhaled, intestinal infusion, subcutaneous).	Same as M3.1.
Implementation Notes	Sites map local administration-action statuses and order-frequency values to standardized groupers (medication identity; given-status; PRN/one-time exclusion), consistent with other toolkit-wide grouper mappings. Best computed via Epic self-service analytics per applicable SOP; non-Epic sites should approximate using the criteria above.	Same as M3.1.
Reporting	Reported as a single aggregate across the one-year Process Cohort reporting period. One result row is submitted. Small-cell	Same as M3.1.

	suppression applies per General Reporting & Suppression Conventions.	
Interpretation notes	Higher M3.1/M3.2 = a greater share of eligible administrations given within the threshold window, reflecting closer real-time adherence to the scheduled administration time. M3.2's denominator equals M3.1's; its numerator is a superset of M3.1's numerator, since administrations within 15 minutes are also within 30 minutes.	Same as M3.1.
Rationale	Primary safety/process metric aligned with hospital care recommendations to administer PD medications close to the home regimen's timing. The 15-minute threshold (M3.1) reflects an ideal target; the 30-minute threshold (M3.2) is a practical, clinically meaningful alternative alongside it. Immediate-release, short-acting levodopa is the toolkit's index medication for the same reasons stated under Metric 2.	Same as M3.1.
Alignment & References	[PF2023] The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023. [VC2025] Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.	Same as M3.1.

8.2 Stratification & Derived Metrics

Secondary metrics exist only for M3.2. Each follows the Metric Tier & Inheritance Rule (General Reporting & Suppression Conventions): restricting the M3.2 denominator to a specific admission pathway or administration route while inheriting M3.2's numerator logic, exclusions, and reporting conventions.

Metric	Abbreviation	Name	Denominator restriction	Rationale
M3.2_ed	LDlt30_ed	Levodopa Administration ≤30min Rate – ED	Admission included an ED visit	ED-associated admissions frequently show first-dose delays and timing variability; helps identify workflow issues during ED evaluation and the ED-to-inpatient transition.
M3.2_direct	LDlt30_direct	Levodopa Administration ≤30min Rate – Direct	Admission did not include an ED visit	Comparison group for admissions not associated with the ED; helps assess whether ED involvement is associated

				with differences in administration timing.
M3.2_oral	LDlt30_oral	Levodopa Administration ≤30min Rate – Oral	Route restricted to oral	Oral dosing reflects the standard inpatient workflow; evaluates routine oral administration timing.
M3.2_tube	LDlt30_tube	Levodopa Administration ≤30min Rate – Tube	Route restricted to enteral tube (gastric/intestinal feeding tube)	Tube-based dosing has unique operational barriers (crushing policies, workflow delays); benchmarks a higher-complexity route.

9 Metric 4: DBA Contraindicated Medication Use

Metric 4 quantifies contraindicated dopamine-blocking agent (DBA) orders and administrations among eligible PWP inpatient encounters within the Process Cohort reporting period (Metrics 2–4 Population Definitions, above).

Metric	Abbreviation	Name	Description
M4.1	DBAordPct	DBA Order Rate	% of eligible PWP encounters with ≥1 actionable DBA order during the reporting period
M4.2	DBAadminPct	DBA Administration Rate	% of eligible PWP encounters with ≥1 DBA medication administration during the reporting period
M4.3	DBAordAdminPct	DBA Order-Administration Rate	% of eligible PWP encounters with ≥1 actionable DBA order that also had ≥1 DBA medication administered during the reporting period, calculated as two independently derived encounter-level counts*

9.1 M4.1 / M4.2 — DBA Order and Administration Rates (Primary)

Field	M4.1	M4.2
Metric name	DBA Order Rate	DBA Administration Rate
Metric ID	M4.1	M4.2
Abbreviation	DBAordPct	DBAadminPct
Measure Type	Proportion (Percent)	Same as M4.1.
Description	Percent of eligible PWP encounters with at least one actionable order for a contraindicated DBA, based on the standardized DBA medication list, during the Process Cohort reporting period.	Percent of eligible PWP encounters with at least one documented administration of a contraindicated DBA, based on the standardized DBA medication list, during the Process Cohort reporting period.

Denominator	Number of total eligible PWP inpatient encounters during the Process Cohort reporting period.	Same as M4.1.
Numerator	Number of denominator encounters with at least one actionable (non-rejected) order for a contraindicated DBA, per the Contraindicated DBA Medication List.	Number of denominator encounters with at least one documented administration (given) of a contraindicated DBA, per the Contraindicated DBA Medication List.
Measurement	Numerator ÷ Denominator × 100, expressed as a percentage.	Same as M4.1.
Exclusions	See Metrics 2–4 Population Definitions and the Eligible Acute-Care Inpatient Encounter Definition for population- and encounter-level exclusions. No additional exclusions apply.	Same as M4.1.
Implementation Notes	DBA medication identity is determined via a standardized medication-component grouper (Contraindicated DBA Medication List, below), applied consistently across the Orders and Medication Administrations data models. Best computed via Epic self-service analytics per applicable SOP; non-Epic sites should approximate using the criteria above.	Same as M4.1.
Reporting	Reported as a single aggregate across the one-year Process Cohort reporting period. One result row is submitted. Small-cell suppression applies per General Reporting & Suppression Conventions.	Same as M4.1.
Interpretation notes	Higher M4.1 = more frequent contraindicated DBA ordering intent; higher M4.2 = more frequent actual contraindicated DBA exposure. The order-having and administration-having encounter sets are not guaranteed to be identical; see M4.3 for a combined, encounter-level view of how often an order is followed by an administration.	Same as M4.1.
Rationale	Primary safety/process metric aligned with hospital care recommendations to eliminate potentially harmful medications, particularly DBAs, in hospitalized PWP. Ordering (M4.1) and administration (M4.2) are tracked as two independent process points, since contraindicated exposure can occur at either step.	Same as M4.1.
Alignment & References	[PF2023] The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023. [VC2025]	Same as M4.1.

	Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.	

9.2 M4.3 — DBA Order-Administration Rate specification

Metric name	DBA Order-Administration Rate
Metric ID	M4.3
Abbreviation	DBAordAdminPct
Measure Type	Proportion (Percent) — ratio of two independently derived encounter counts, not a true conditional rate (see Implementation Notes).
Description	Percent of DBA order-having encounters (M4.1 numerator) that also had at least one contraindicated DBA administration (M4.2 numerator), during the Process Cohort reporting period, calculated as two independently derived encounter-level counts.
Denominator	Number of eligible PWP encounters with at least one actionable order for a contraindicated DBA (M4.1 numerator; DBAactorders.encN).
Numerator	Number of eligible PWP encounters with at least one documented administration of a contraindicated DBA (M4.2 numerator; DBAadmins.encN), derived independently of the denominator's order-having encounter set.
Measurement	M4.3 = DBAadmins.encN ÷ DBAactorders.encN × 100, expressed as a percentage.
Exclusions	See Metrics 2–4 Population Definitions and the Eligible Acute-Care Inpatient Encounter Definition for population- and encounter-level exclusions. No additional exclusions apply.
Implementation Notes	DBA medication identity follows the Contraindicated DBA Medication List (below), which is applied consistently to both the Orders and Medication Administrations data models. Self-service analytics tools generally cannot link a specific order to a specific administration at the encounter-aggregate scale, so M4.3 is computed as a ratio of two independently derived encounter counts rather than a true joint/conditional count. An optional Exploratory session provides a closer linkage by successively filtering orders to encounters to administrations to encounters, as a validation check; in pilot testing this did not meaningfully change the result, so it remains optional rather than required. Best computed via Epic self-service analytics per applicable SOP; non-Epic sites should approximate using the criteria above.
Reporting	Reported as a single aggregate across the one-year Process Cohort reporting period. One result row is submitted. Small-cell suppression applies per General Reporting & Suppression Conventions.
Interpretation notes	M4.3 is an encounter-level proxy, not a verified order-to-dose linkage; the order-having and administration-having encounter sets are derived independently and are not guaranteed to fully overlap.
Rationale	Ordering (M4.1) and administration (M4.2) are tracked as two independent process failure points; M4.3 provides an encounter-level view of how often an order is followed by an administration, helping distinguish sites where ordering drives exposure from sites where administration practices diverge from what is ordered.
Alignment & References	[PF2023] The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023.

	[VC2025] Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.

9.3 Stratification & Derived Metrics

Secondary metrics exist under M4.1 (order frequency) and M4.2 (administration route) only; M4.3 has no Secondary metrics, consistent with it already being a derived compound metric.

Each Secondary metric departs from the Metric Tier & Inheritance Rule (General Reporting & Suppression Conventions) in one respect: its denominator is the parent metric's numerator (the order-having or administration-having encounter count), and its numerator restricts that same set by frequency or route. Exclusions and reporting conventions are otherwise inherited unchanged.

Metric	Abbreviation	Name	Denominator	Numerator	Rationale
M4.1_prn	DBAordPct_prn	DBA Order Rate – PRN	Encounters in the M4.1 numerator (encounters with ≥1 actionable DBA order)	Denominator encounters with ≥1 actionable order at PRN frequency	PRN orders may reflect infrequent or reflexively generated orders; helps identify ordering patterns and opportunities for targeted education.
M4.1_sched	DBAordPct_sched	DBA Order Rate – Scheduled	Same as M4.1_prn (the M4.1 numerator)	Denominator encounters with ≥1 actionable order at non-PRN (scheduled/standing) frequency	Non-PRN orders reflect a higher degree of intent to administer and are harder to clinically justify when standing.
M4.2_enteral	DBAadminPct_enteral	DBA Administration Rate – Enteral	Encounters in the M4.2 numerator (encounters with ≥1 DBA administration)	Denominator encounters with ≥1 administration via enteral route	Enteral is the predominant administration route for DBAs; stratifying separates GI-tract exposure from parenteral exposure.
M4.2_parenteral	DBAadminPct_parenteral	DBA Administration Rate – Parenteral	Same as M4.2_enteral (the M4.2 numerator)	Denominator encounters with ≥1 administration via parenteral route	Parenteral DBA administration may reflect higher-acuity use and carries higher acute parkinsonism risk.

9.4 Contraindicated DBA Medication List

Metrics 4.1 (DBA Order Rate), 4.2 (DBA Administration Rate), and 4.3 (DBA Order-Administration Rate) all identify contraindicated dopamine-blocking agent (DBA) exposure using the same standardized list of 16 generic medications. This list was established by iterative consensus among COSMOS-PD Collaborative participating site PIs and the Parkinson's Foundation, informed by a pilot Epic Cosmos data pull of DBA/neuroleptic medication use in hospitalized patients with PD. Quetiapine and clozapine are intentionally excluded as comparatively lower-risk, PD-preferred agents.

DBA Medications included for Metric 4:

Generic medication name	Common brand	Category
prochlorperazine	Compazine	antiemetic

haloperidol	Haldol	antipsychotic
olanzapine	Zyprexa	antipsychotic
metoclopramide	Reglan	antiemetic
promethazine	Phenergan	antiemetic
aripiprazole	Abilify	antipsychotic
risperidone	Risperdal	antipsychotic
ziprasidone	Geodon	antipsychotic
chlorpromazine	Thorazine	antipsychotic
lurasidone	Latuda	antipsychotic
paliperidone	Invega	antipsychotic
cariprazine	Vraylar	antipsychotic
fluphenazine	Prolixin	antipsychotic
brexpiprazole	Rexulti	antipsychotic
droperidol	Inapsine	antiemetic
perphenazine	Trilafon	antipsychotic

10 Appendices

10.1 DRG Reference Table

Metric 1's 5 DRGs were selected using a combined data-driven and clinically informed approach. Candidate DRG families and ICD-10 groupings were screened using both local site sessions and an exploratory ICD-10-based Epic Cosmos session based on common admission DRGs overall and for PWP. This list was then balanced against expert opinion to assemble a parsimonious set spanning a range of LOS severity and admission types.

The goal was to identify DRGs associated admissions that represented sufficiently high volume, non-neurologic acute medical/surgical conditions where Parkinson's disease would be incidental to the reason for admission. This would allow a PWP vs. PwoP comparison reflect general inpatient burden rather than PD itself being the admitting diagnosis.

Neurodegenerative-disorder DRGs were excluded because PD as a diagnosis would confound the PWP and PwoP distinction.
Sepsis with MCC (DRG 871) was retained as a prominent, long-LOS, commonly benchmarked DRG.
Major Joint Replacement of Lower Extremity (DRG 469/470) was chosen over fracture-specific DRGs for adequate cross-site sample size while remaining relevant to PD-related fall-fracture admissions.
Respiratory Infections and Inflammations (DRG 177/178) was added as a remaining medical DRG for preliminary LOS signal, volume, and face validity to PD-related aspiration/pneumonia risk.
The list was capped at five DRGs to keep site reporting burden manageable

DRG	DRG Name
All diagnoses	All eligible inpatient admissions
DRG 871	Septicemia or severe sepsis without mechanical ventilation >96 hours with MCC
DRG 177	Respiratory infections and inflammations with MCC
DRG 178	Respiratory infections and inflammations with CC
DRG 469	Major joint replacement of lower extremity with MCC
DRG 470	Major joint replacement of lower extremity without MCC

10.2 Full Metric Dictionary

All 54 rows from the current metrics dictionary:

Metric_Code	Metric_Abbrev	Metric_Name	Tier	Description	Interpretation
M1.1	LOSdiff	LOS Difference	Primary	Median inpatient LOS difference, PWP minus PwoP (days), all diagnoses (last 2 calendar years)	Positive value = PWP have longer inpatient stays than PwoP overall
M1.1_sex	LOSdiff_sex	LOS Difference - Sex	Secondary	M1.1 stratified by sex, all diagnoses	Assesses variation in LOS difference by sex
M1.1_age	LOSdiff_age	LOS Difference - Age	Secondary	M1.1 stratified by age group, all diagnoses	Assesses variation in LOS difference by age group
M1.1.871	LOSdiff_871	LOS Difference - DRG 871	Secondary	M1.1 within DRG 871 (Septicemia or severe sepsis without mechanical ventilation >96 hours with MCC)	LOS difference specific to DRG 871 (sepsis/severe sepsis) admissions
M1.1.177	LOSdiff_177	LOS Difference - DRG 177	Secondary	M1.1 within DRG 177 (Respiratory infections and inflammations with MCC)	LOS difference specific to DRG 177 (respiratory infection, MCC) admissions
M1.1.178	LOSdiff_178	LOS Difference - DRG 178	Secondary	M1.1 within DRG 178 (Respiratory infections and inflammations with CC)	LOS difference specific to DRG 178 (respiratory infection, CC) admissions
M1.1.469	LOSdiff_469	LOS Difference - DRG 469	Secondary	M1.1 within DRG 469 (Major joint replacement of lower extremity with MCC)	LOS difference specific to DRG 469 (joint replacement, MCC) admissions
M1.1.470	LOSdiff_470	LOS Difference - DRG 470	Secondary	M1.1 within DRG 470 (Major joint replacement of lower extremity without MCC)	LOS difference specific to DRG 470 (joint replacement, no MCC) admissions
M1.1.871_sex	LOSdiff_871_sex	LOS Difference - DRG 871 x Sex	Exploratory	M1.1 within DRG 871, stratified by sex	Bandwidth-permitting; small per-site cells likely

M1.1.177_sex	LOSdiff_177_sex	LOS Difference - DRG 177 x Sex	Exploratory	M1.1 within DRG 177, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.1.178_sex	LOSdiff_178_sex	LOS Difference - DRG 178 x Sex	Exploratory	M1.1 within DRG 178, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.1.469_sex	LOSdiff_469_sex	LOS Difference - DRG 469 x Sex	Exploratory	M1.1 within DRG 469, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.1.470_sex	LOSdiff_470_sex	LOS Difference - DRG 470 x Sex	Exploratory	M1.1 within DRG 470, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.1.871_age	LOSdiff_871_age	LOS Difference - DRG 871 x Age	Exploratory	M1.1 within DRG 871, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.1.177_age	LOSdiff_177_age	LOS Difference - DRG 177 x Age	Exploratory	M1.1 within DRG 177, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.1.178_age	LOSdiff_178_age	LOS Difference - DRG 178 x Age	Exploratory	M1.1 within DRG 178, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.1.469_age	LOSdiff_469_age	LOS Difference - DRG 469 x Age	Exploratory	M1.1 within DRG 469, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.1.470_age	LOSdiff_470_age	LOS Difference - DRG 470 x Age	Exploratory	M1.1 within DRG 470, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.2	ReadmitDiff	30-Day Readmission Difference	Primary	Absolute difference in 30-day readmission rate, PWP minus PwoP (percentage points), all diagnoses (last 2 calendar years)	Positive value = PWP readmitted more often than PwoP overall
M1.2_sex	ReadmitDiff_sex	30-Day Readmission	Secondary	M1.2 stratified by sex, all diagnoses	Assesses variation in readmission difference by sex

		Difference - Sex			
M1.2_age	ReadmitDiff_age	30-Day Readmission Difference - Age	Secondary	M1.2 stratified by age group, all diagnoses	Assesses variation in readmission difference by age group
M1.2.871	ReadmitDiff_871	30-Day Readmission Difference - DRG 871	Secondary	M1.2 within DRG 871 (Septicemia or severe sepsis without mechanical ventilation >96 hours with MCC)	Readmission difference specific to DRG 871 (sepsis/severe sepsis) admissions
M1.2.177	ReadmitDiff_177	30-Day Readmission Difference - DRG 177	Secondary	M1.2 within DRG 177 (Respiratory infections and inflammations with MCC)	Readmission difference specific to DRG 177 (respiratory infection, MCC) admissions
M1.2.178	ReadmitDiff_178	30-Day Readmission Difference - DRG 178	Secondary	M1.2 within DRG 178 (Respiratory infections and inflammations with CC)	Readmission difference specific to DRG 178 (respiratory infection, CC) admissions
M1.2.469	ReadmitDiff_469	30-Day Readmission Difference - DRG 469	Secondary	M1.2 within DRG 469 (Major joint replacement of lower extremity with MCC)	Readmission difference specific to DRG 469 (joint replacement, MCC) admissions
M1.2.470	ReadmitDiff_470	30-Day Readmission Difference - DRG 470	Secondary	M1.2 within DRG 470 (Major joint replacement of lower extremity without MCC)	Readmission difference specific to DRG 470 (joint replacement, no MCC) admissions
M1.2.871_sex	ReadmitDiff_871_sex	30-Day Readmission Difference - DRG 871 x Sex	Exploratory	M1.2 within DRG 871, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.2.177_sex	ReadmitDiff_177_sex	30-Day Readmission Difference - DRG 177 x Sex	Exploratory	M1.2 within DRG 177, stratified by sex	Bandwidth-permitting; small per-site cells likely

M1.2.178_sex	ReadmitDiff_178_sex	30-Day Readmission Difference - DRG 178 x Sex	Exploratory	M1.2 within DRG 178, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.2.469_sex	ReadmitDiff_469_sex	30-Day Readmission Difference - DRG 469 x Sex	Exploratory	M1.2 within DRG 469, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.2.470_sex	ReadmitDiff_470_sex	30-Day Readmission Difference - DRG 470 x Sex	Exploratory	M1.2 within DRG 470, stratified by sex	Bandwidth-permitting; small per-site cells likely
M1.2.871_age	ReadmitDiff_871_age	30-Day Readmission Difference - DRG 871 x Age	Exploratory	M1.2 within DRG 871, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.2.177_age	ReadmitDiff_177_age	30-Day Readmission Difference - DRG 177 x Age	Exploratory	M1.2 within DRG 177, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.2.178_age	ReadmitDiff_178_age	30-Day Readmission Difference - DRG 178 x Age	Exploratory	M1.2 within DRG 178, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.2.469_age	ReadmitDiff_469_age	30-Day Readmission Difference - DRG 469 x Age	Exploratory	M1.2 within DRG 469, stratified by age group	Bandwidth-permitting; small per-site cells likely
M1.2.470_age	ReadmitDiff_470_age	30-Day Readmission Difference	Exploratory	M1.2 within DRG 470, stratified by age group	Bandwidth-permitting; small per-site cells likely

		- DRG 470 x Age			
M2	LDcustom	Levodopa Custom Order Rate	Primary	% of scheduled short-acting levodopa orders entered with custom or exact administration times (last calendar year)	Assesses use of patient-specific levodopa scheduling rather than standard frequency-based ordering.
M2_ed	LDcustom_ed	Levodopa Custom Order Rate - ED Admissions	Secondary	M2 restricted to ED-associated admissions	Assesses patient-specific levodopa scheduling among ED-associated admissions; evaluates variation by admission pathway.
M2_direct	LDcustom_direct	Levodopa Custom Order Rate - Direct Admits	Secondary	M2 restricted to direct admissions	Assesses patient-specific levodopa scheduling among direct admissions; evaluates variation by admission pathway.
M2_oral	LDcustom_oral	Levodopa Custom Order Rate - Oral Route	Secondary	M2 restricted to oral-route orders	Assesses patient-specific levodopa scheduling among oral-route orders; evaluates variation by administration route
M2_tube	LDcustom_tube	Levodopa Custom Order Rate - Tube Route	Secondary	M2 restricted to enteral tube-related routes	Assesses patient-specific levodopa scheduling among enteral tube-route orders; evaluates variation by administration route
M3.1	LDlt15	Levodopa Administration ≤15min Rate	Primary	% of levodopa doses administered within 15 minutes of scheduled time (last calendar year)	Adherence to an ideal, levodopa administration timing target.
M3.2	LDlt30	Levodopa Administration ≤30min Rate	Primary	% of levodopa doses administered within 30 minutes of scheduled time (last calendar year)	Adherence to a practical, clinically meaningful levodopa timing target.
M3.2_ed	LDlt30_ed	Levodopa Administration ≤30min	Secondary	M3.2 restricted to ED-associated admissions	Assesses timing adherence among ED-associated admissions; evaluates variation by admission pathway

		Rate - ED Admissions			
M3.2_direct	LDlt30_direct	Levodopa Administration ≤30min Rate - Direct Admits	Secondary	M3.2 restricted to direct admissions	Assesses timing adherence among direct admissions; evaluates variation by admission pathway
M3.2_oral	LDlt30_oral	Levodopa Administration ≤30min Rate - Oral Route	Secondary	M3.2 restricted to oral-route administrations	Assesses timing adherence among oral-route administrations; evaluates variation by administration route
M3.2_tube	LDlt30_tube	Levodopa Administration ≤30min Rate - Tube Route	Secondary	M3.2 restricted to enteral tube-related administrations	Assesses timing adherence among enteral tube-route administrations; evaluates variation by administration route
M4.1	DBAordPct	DBA Order Rate	Primary	% of eligible PWP encounters with >=1 actionable DBA order (last calendar year)	Higher rate = more frequent contraindicated DBA ordering intent
M4.1_prn	DBAordPct_prn	DBA Order Rate - PRN	Secondary	% of M4.1-eligible encounters (actionable DBA order present) where the order was PRN-frequency	Reactive / as-needed prescribing pattern
M4.1_sched	DBAordPct_sched	DBA Order Rate - Scheduled	Secondary	% of M4.1-eligible encounters (actionable DBA order present) where the order was scheduled/standing	Standing-order DBA use is harder to clinically justify than PRN
M4.2	DBAadminPct	DBA Administration Rate	Primary	% of eligible PWP encounters with >=1 DBA medication administered (last calendar year)	Higher rate = more frequent actual contraindicated DBA exposure
M4.2_enteral	DBAadminPct_enteral	DBA Administra	Secondary	% of M4.2-eligible encounters (DBA medication	Enteral route relevant to aspiration / dysphagia risk in PD

		tion Rate - Enteral		administered) where the administration route was enteral	
M4.2_parenteral	DBAadminPct_parenteral	DBA Administration Rate - Parenteral	Secondary	% of M4.2-eligible encounters (DBA medication administered) where the administration route was parenteral	Parenteral DBA may carry higher acute EPS / dystonia risk
M4.3	DBAordAdminPct	DBA Order-Administration Rate	Primary	% of eligible PWP encounters with >=1 actionable DBA order that also had >=1 DBA medication administered (last calendar year)	Higher rate = ordering more often followed by administration; encounter-level proxy only, not a confirmed order-to-dose link

10.3 References

The Parkinson's Foundation Hospital Care Initiative. Parkinson's Foundation Hospital Care Recommendations. Parkinson's Foundation; 2023.

Veilleux Carpentier A, Malaty IA, LeWitt PA, et al. A Systematic Review of the Parkinson's Foundation Hospital Care Recommendations. Mov Disord Clin Pract. 2025;13(1):29–43. doi:10.1002/mdc3.70247.

10.4 About Parkinson's Foundation Hospital Care Benchmarking Toolkit

About the Toolkit

The Parkinson's Foundation Hospital Care Benchmarking Toolkit ("Toolkit"), created by the COSMOS-PD (Collaborative Observational Studies for Monitoring Outcomes and Safety in Parkinson's Disease) Collaborative, is a Parkinson's Foundation-sponsored initiative established to support benchmarking, quality improvement, research, and shared learning aimed at improving hospital care for people with Parkinson's disease.

Release 1 (Beta) was developed through a collaboration among Northwestern University/Northwestern Medicine, the University of Rochester, LSU Health Shreveport, Epic Systems Corporation, and the Parkinson's Foundation. Northwestern Medicine serves as the COSMOS-PD Data Coordinating Center (DCC).

COSMOS-PD Collaborative Founding Steering Committee

- Allan Wu, MD (Northwestern University/Northwestern Medicine; DCC)
- Ben George, MD (University of Rochester)
- Natalia Chunga, MD (LSU Health Shreveport)

The Parkinson's Foundation, including the leadership of Annie Brooks and the Hospital Care Initiative, provided strategic guidance, project coordination, dissemination support, and ongoing partnership throughout toolkit development.

Acknowledgment Request

Users of the Toolkit are requested to acknowledge the Parkinson's Foundation and the COSMOS-PD collaboration in presentations, manuscripts, abstracts, reports, and other scholarly or quality-improvement activities that substantively utilize toolkit materials, metric definitions, or implementation guidance.

Organizations using the toolkit are encouraged to share information about its use and resulting activities to help the Parkinson's Foundation and COSMOS-PD Collaborative better understand its impact and usefulness to the Parkinson's disease community.

Suggested citation:

COSMOS-PD Collaborative. *Parkinson's Foundation Hospital Care Benchmarking Toolkit, Release 1 (Beta).* Sponsored by the Parkinson's Foundation; 2026.

Contact

Questions, feedback, implementation inquiries, and collaboration requests may be directed to hospitalcare@parkinson.org.