

# Reliability and Validity of PPCs in the MHAC Program

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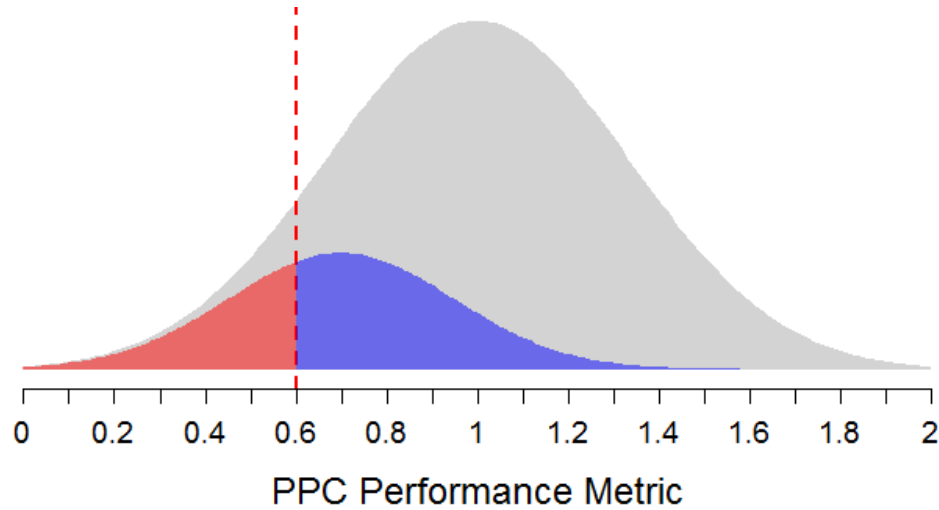
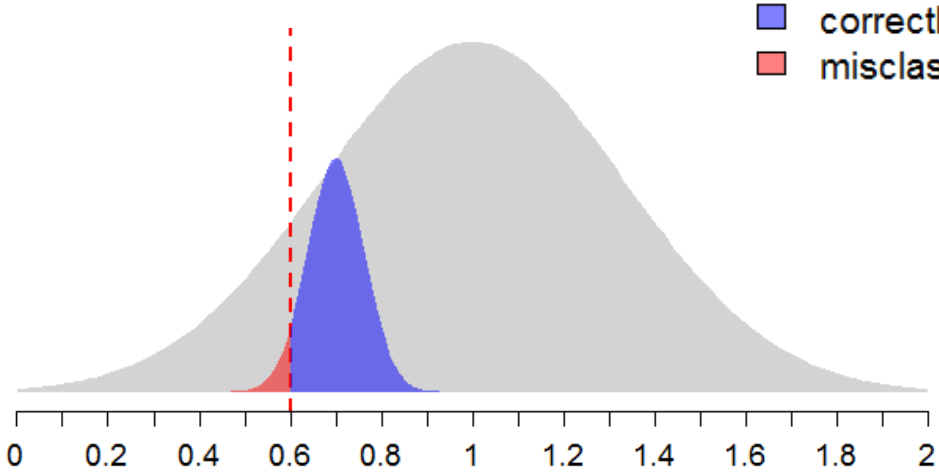
# Overview of PPC measure testing

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Testing Theme	Description
Reliability	Compares between-provider variation (signal) and within-provider sampling variation (noise)
Validity	Focuses on the PPC rates: <ul style="list-style-type: none"><li>• <b>Predictive validity</b> – correlation of PPCs across years from CY2012 – CY 2015 quarter 1 and 2</li><li>• <b>Convergent validity</b> – correlation with external measures<ul style="list-style-type: none"><li>○ Compares with Patient Safety Indicators (PSIs) from the PSI-90 composite</li><li>○ Compares with mortality rates</li></ul></li></ul>

# Measure Reliability: precision of a quality measure

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# Reliability testing: signal-to-noise framework

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- **Data:**
  - Performance period: pooled FY2014, 2015 data\*
- **Reliability standard:**
  - A PPC measure is in low reliability if its reliability estimate is less than the reliability cut-off point (0.4).
  - Serious reportable PPCs are excluded from reliability assessment.
- **Low reliability PPCs: 12 in total, majority in Tier C**
  - Tier A: PPC 38
  - Tier B: PPC 17 and 18
  - Tier C: PPC 2, 15, 20, 29, 33, 34, 44, 51, and 60

\* Indirectly standardized using FY 2014 norms

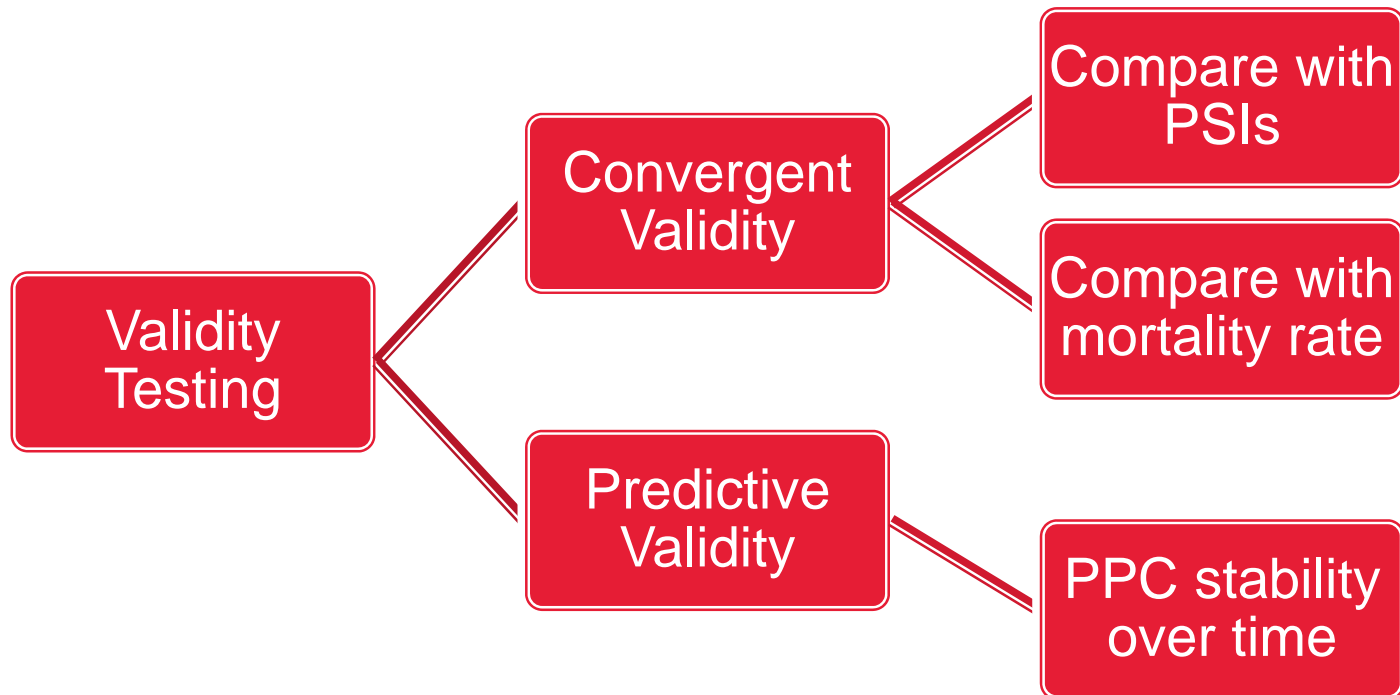
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# PPC reliability by hospital

Low reliability PPCs	Description	Tier	Number of observed PPCs in FY15	Number of hospitals with the PPC	
				All hospitals	Hospitals with low reliability rate
38	Post-Operative Wound Infection & Deep Wound Disruption with Procedure	A	28	23	23
17	Major Gastrointestinal Complications without Transfusion or Significant Bleeding	B	215	41	27
18	Major Gastrointestinal Complications with Transfusion or Significant Bleeding	B	103	38	38
2	Extreme CNS Complications	C	71	31	22
15	Peripheral Vascular Complications Except Venous Thrombosis	C	77	29	29
20	Other Gastrointestinal Complications without Transfusion or Significant Bleeding	C	113	34	34
29	Poisonings Except from Anesthesia	C	55	33	16
33	Cellulitis	C	156	40	26
34	Moderate Infectious	C	65	32	27
44	Other Surgical Complication - Mod	C	96	33	33
51	Gastrointestinal Ostomy Complications	C	89	37	24
60	Major Puerperal Infection and Other Major Obstetric Complications	C	57	27	27

# Validity testing

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# Predictive validity

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- **Predictive validity means that current results predict future performance.**
- **Data:**
  - Performance period: CY 2012, 2013, 2014, and six months of 2015 (Jan – Jun)\*
- **Predictive validity rule:**
  - A PPC performance metric has predictive validity if at least one of the studied pairs (CY 2012 vs CY 2013, CY 2013 vs CY 2014, and CY 2014 vs CY 2015 Jan – Jun) is positively correlated (and statistically significant).

\*All indirectly standardized using FY 2014 norms

# Predictive validity analysis summary

PPC Result	Tier A	Tier B	Tier C
Consistent:	PPC 3, 4, 5, 6, 7, 9, 14, 16, 24, 35, 37, 40, 42, 49, 54, 65, 66	PPC 8, 10, 11, 19, 41, 48, 27	PPC 1, 12, 13, 21, 23, 34, 36, 46, 47, 50, 51, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 67
Total	17 (85%)	7 (78%)	22 (69%)
Inconsistent:	PPC 28, 31, 38	PPC 17, 18	PPC 2, 15, 20, 29, 30, 32, 33, 39, 44, 45
Total	3 (15%)	2 (22%)	10 (31%)
Tier Total	20	9	32



# Correlations between PPCs and PSIs

PSI description	PPC description	Correlation (FY 2013)	Correlation (CY 2014)	Correlation (FY 2014)
PSI03 - Pressure Ulcer	PPC31 - Decubitus Ulcer	0.499	0.466	0.411
PSI06 - Iatrogenic pneumothorax	PPC49 - Iatrogenic Pneumothorax	0.513	0.419	0.618
PSI07 - Central line associated BSI	PPC54 - Infections due to Central Venous Catheters	0.542	0.848	0.588
PSI09 - Perioperative Hemorrhage or Hematoma Rate	PPC41 - Post-Operative Hemorrhage & Hematoma with Hemorrhage Control Procedure or I&D Proc	0.169	0.480	0.568
PSI11 - Postoperative Respiratory Failure Rate	PPC3 - Acute Pulmonary Edema and Respiratory Failure without Ventilation PPC4 - Acute Pulmonary Edema and Respiratory Failure with Ventilation PPC63 - Post-Operative Respiratory Failure with Tracheostomy	0.229	0.116	0.532
PSI12 - Postoperative PE or DVT	PPC7 - Pulmonary Embolism PPC16 - Venous Thrombosis	0.714	0.880	0.924
PSI13 - Postoperative sepsis	PPC35 - Septicemia & Severe Infections	0.219	0.692	0.432
PSI14 - Postoperative wound dehiscence	PPC38 - Post-Operative Wound Infection & Deep Wound Disruption with Procedure	0.373	0.218	0.164
PSI15 - Accidental puncture or laceration	PPC42 - Accidental Cut or Hemorrhage During Invasive Procedure	0.577	0.768	0.799

A

B

Data: PPCs use three different performance periods (FY 2013, CY 2014 and FY 2014), and are indirectly standardized using FY 2014 norms. PSIs are the risk adjusted rate from FY2013, CY 2014 and FY 2014.

## Causes of unexpected results

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- **A.** The substantial observed change in correlation between PSI 11 and the combination of PPCs 3, 4 and 63 may be due to the low reliability of PPC 63.
  - PPC 63 is currently combined with four other PPCs into PPC 67.
- **B.** PSI 14 and PPC 38 have low correlation in both periods. This may be due to the low reliability of PPC 38.

# PPCs having high correlations with mortality

PPC	Description	Tier	Correlation with mortality rate	Also low reliability?
4	Acute Pulmonary Edema and Respiratory Failure with Ventilation	A	0.405	no
14	Ventricular Fibrillation/Cardiac Arrest	A	0.450	no
9	Shock	A	0.388	no
54	Infections due to Central Venous Catheters	A	0.389	no
2	Extreme CNS Complications	C	0.453	yes
50	Mechanical Complication of Device, Implant & Graft	C	0.453	no
52	Inflammation & Other Complications of Devices, Implants or Grafts Except Vascular Infection	C	0.377	no

Data: PPCs use CY 2014 as performance period with FY 2014 norms; mortality rate uses CY 2014 risk adjusted mortality rate.