SURPRISE-PD

Using SURprise Questions to PRedict Infections and OutcomeS in Peritoneal Dialysis Patients

Maria Daraoay[1], Kamal Sud[1,2], Lukas Kairaitis[1], Eric Au[3,4], Katrina Chau[1,5]

Maria Daraoay
Clinical Nurse Consultant – Peritoneal Dialysis
Regional Dialysis Centre, Blacktown Hospital

[1] Regional Dialysis Centre, Blacktown Hospital, NSW, Australia
[2] Nepean Kidney Research Centre, Nepean Hospital and University of Sydney, NSW, Australia
[3] The Alfred Hospital, Melbourne, VIC, Australia
[4] Centre for Epidemiology and Biostatistics, University of Melbourne, VIC, Australia
[5] Blacktown Clinical School, Western Sydney University, NSW, Australia

Background of the Study

Clinical Problem

- PD-related infections remain a major cause of morbidity, hospitalisation, and transfer to haemodialysis.
- Traditional risk factors such as demographics and comorbidities are often broad and non-specific.
- These markers may not identify which individual patient is most vulnerable during PD training and early follow-up.

Study Rationale

- The “Surprise Question – would you be surprised if the patient died in the next 12 months” has been used successfully in kidney supportive care to identify patients at higher clinical risk.
- PD nurses frequently observe behavioural and training-related vulnerabilities not captured by conventional medical risk factors.
- This study explored whether PD nurses could identify subtle early warning signs before adverse outcomes occur.

Key Question: Can structured nursing judgement identify high-risk PD patients earlier?

Why this matters in PD nursing

The first year on PD is a vulnerable period where infection and technique failure can change the treatment pathway.

Our service manages approximately 320 PD patients across six PD nurses — equating to roughly 50 patients per nurse — highlighting the need for a fast, practical, and clinically sustainable screening approach within routine PD care.

31%

16 of 52 patients developed peritonitis or catheter-related infections within 12 months

17%

transferred to haemodialysis

3.8%

died

The practical question

Can nurses identify risk early enough to trigger extra support before harm occurs?

The “Surprise Question” in this study

A simple clinical judgement question was applied to three PD outcomes.

Infection

“Would you be surprised if the patient got peritonitis or catheter-related infections within 12 months?’

Death

“Would you be surprised if the patient dies within 12 months after PD commencement?’

Technique survival

“Would you be surprised if the patient is no longer on peritoneal dialysis by 12 months?’

“No, I would not be surprised” = nurse concern / predicted high risk

When nurses answered “No, I would not be surprised,” they were also asked to identify which factors contributed to their concern
1 = Health literacy concerns | 2 = Personal hygiene / aseptic concerns | 3 = Difficulty learning PD technique.

“Yes, I would be surprised” = predicted low risk

Study design and cohort

Four PD nurses independently assessed incident PD patients, with outcomes recorded over 12 months.

52
incident PD patients

4
PD nurses

2–10y
nursing experience

12 mo
outcome follow-up

Cohort profile

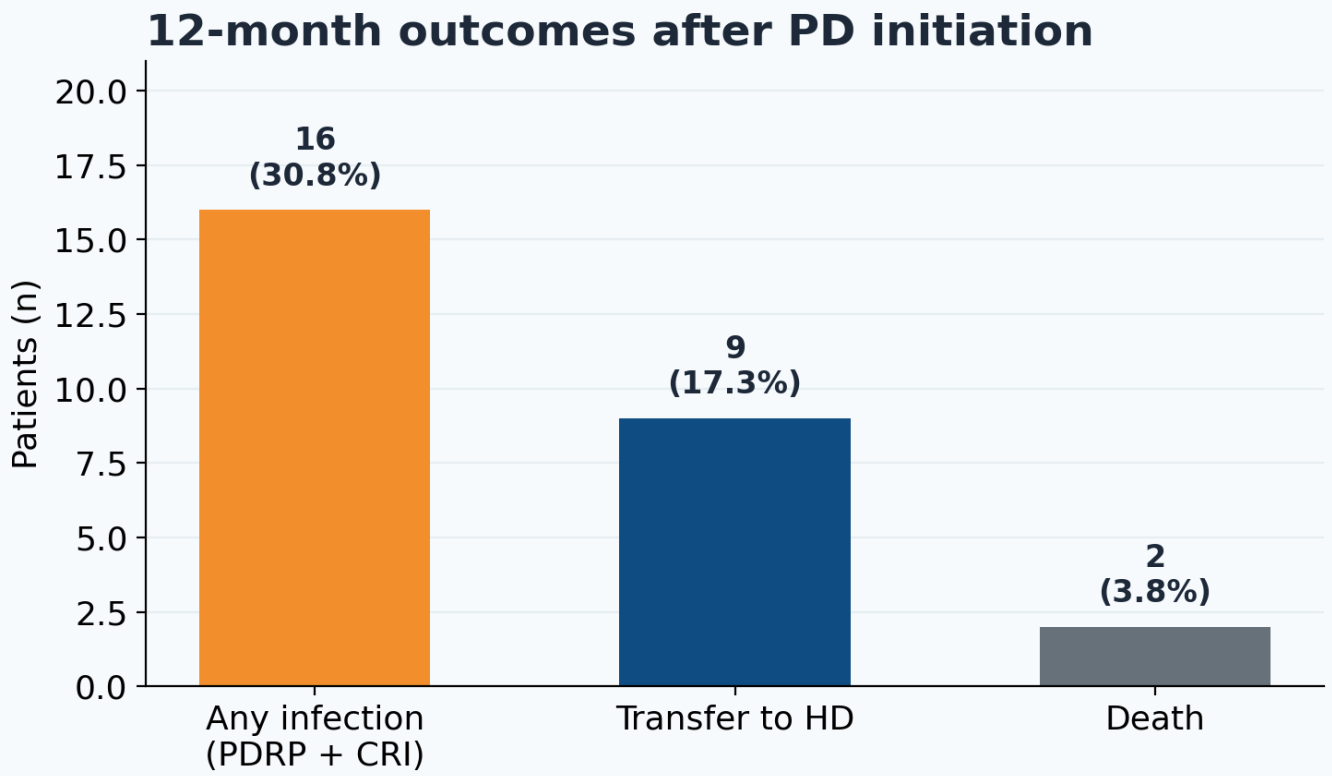
58y
mean age

58%
male
abstract: n=30

44%
diabetes
n=23

87%
hypertension
n=45

What happened at 12 months?



Infections were common

20 infection episodes were recorded in 16 patients.

Technique pathway changed

9 patients transferred to HD within 12 months.

Clinical context

This level of morbidity makes early nursing risk detection worthwhile.

Although the surprise question was applied to 3 outcomes –infection, death and transfer to HD – the majority of clinically meaningful events occurred in the infection cohort. With 9 transfers to HD and 2 mortality, there is a limited ability to perform detailed analyses for those outcomes.

Results

For the key infection question, each nurse judgement was compared with the 12-month infection outcome.

	Infection	No infection
High risk “Not surprised”	**True Positive** 34 The concern was correct	**False Positive** 21 false alarms
Low risk “Surprised”	**False Negative** 30 Missed cases	**True Negative** 123

Counts are nurse-patient judgements across 4 nurses × 52 patients = 208 observations.

This matrix explains the abstract result: the tool was stronger at identifying low-risk patients than catching every infection.

Understanding Prediction Accuracy Metrics

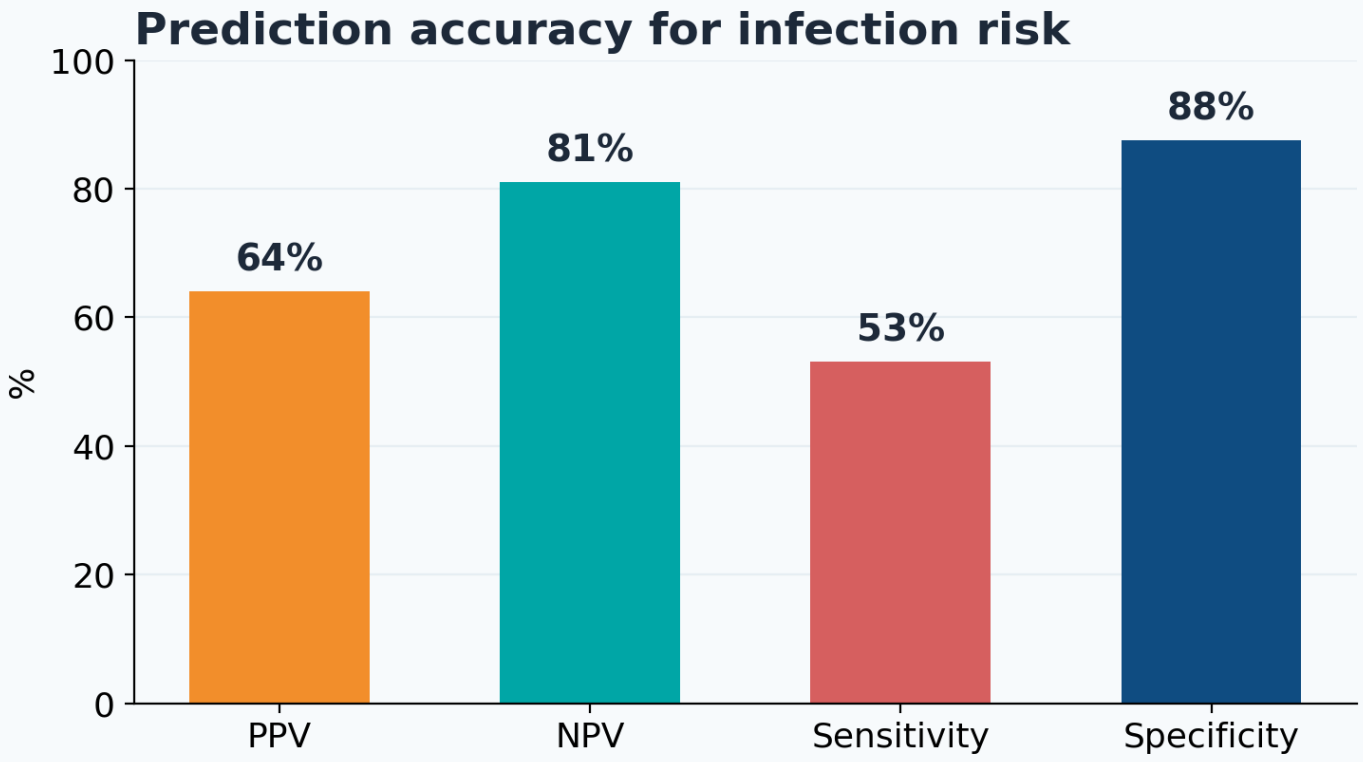
Positive Predictive Value (PPV)
If the nurse predicted a patient was high risk, how often was that prediction correct?

Negative Predictive Value (NPV)
If the nurse predicted a patient was low risk, how often did the patient remain infection-free?

Sensitivity
How well did the nurse identify patients who later developed infection?

Specificity
How well did the nurse identify patients who did not develop infection?

Key finding: stronger at ruling out risk



Interpretation for practice

NPV 81%: low-risk prediction was usually reassuring.
Specificity 88%: nurses were good at identifying patients who did not develop infection.
Sensitivity 53%: almost half of infection risk signals were missed.

Use it as a quick screening tool — not as a stand-alone predictor.

Understanding the prediction metrics

- Positive Predictive Value: When nurses predicted high risk, infection occurred 64% of the time.
- Negative Predictive Value: When nurses predicted low risk, patients remained infection-free 81% of the time.
- Sensitivity: Nurses identified 53% of patients who later developed infection.
- Specificity: Nurses correctly identified 88% of patients who did not develop infection.

What the study did well (strengths of the study)

The strongest clinical utility of the surprise question was identifying patients less likely to develop infection.

81%

negative predictive value

Abstract median

88%

specificity

Abstract median

Why this matters

In a busy renal service, a reliable "low-risk" signal can help prioritise nurse time without ignoring clinical assessment.

Strengths of the Study

- **Prospective design** – predictions recorded before outcomes occurred.
- **Meaningful pilot cohort** – 52 incident PD patients with clinically significant outcome events.
- **Innovative nursing-led approach** – applied the surprise question to PD-specific outcomes.
- **Multicultural Population** – reflects the diverse Western Sydney PD population.

What the study missed (Limitations)

The safety concern was moderate sensitivity and false-negative infection predictions.

53%

sensitivity

Abstract median

6–9

false negatives per nurse

infection occurred despite low-risk prediction

Clinical interpretation

A patient can still develop infection even when no nurse is concerned at baseline.

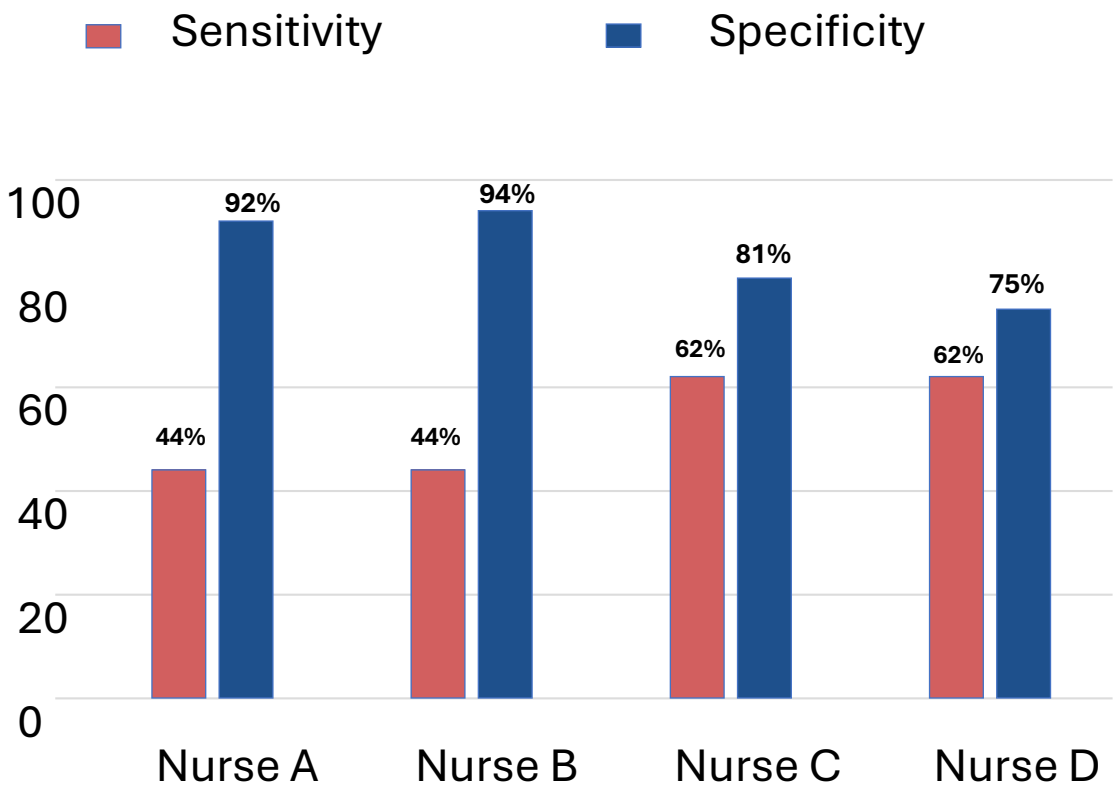
Do not use alone

Combine with clinical assessment.
Use technique assessment and literacy tools.
Review comorbidities.
Escalate if gut feeling changes over time.

Baseline intuition is valuable, but risk is dynamic. Patient's situation changes.

Nurse-to-Nurse Variation

Nurses were seeing similar patters, but used different thresholds for deciding who was a high risk



Key Observation

Sensitivity ranged from 44–62%
Specificity ranged from 75–94%

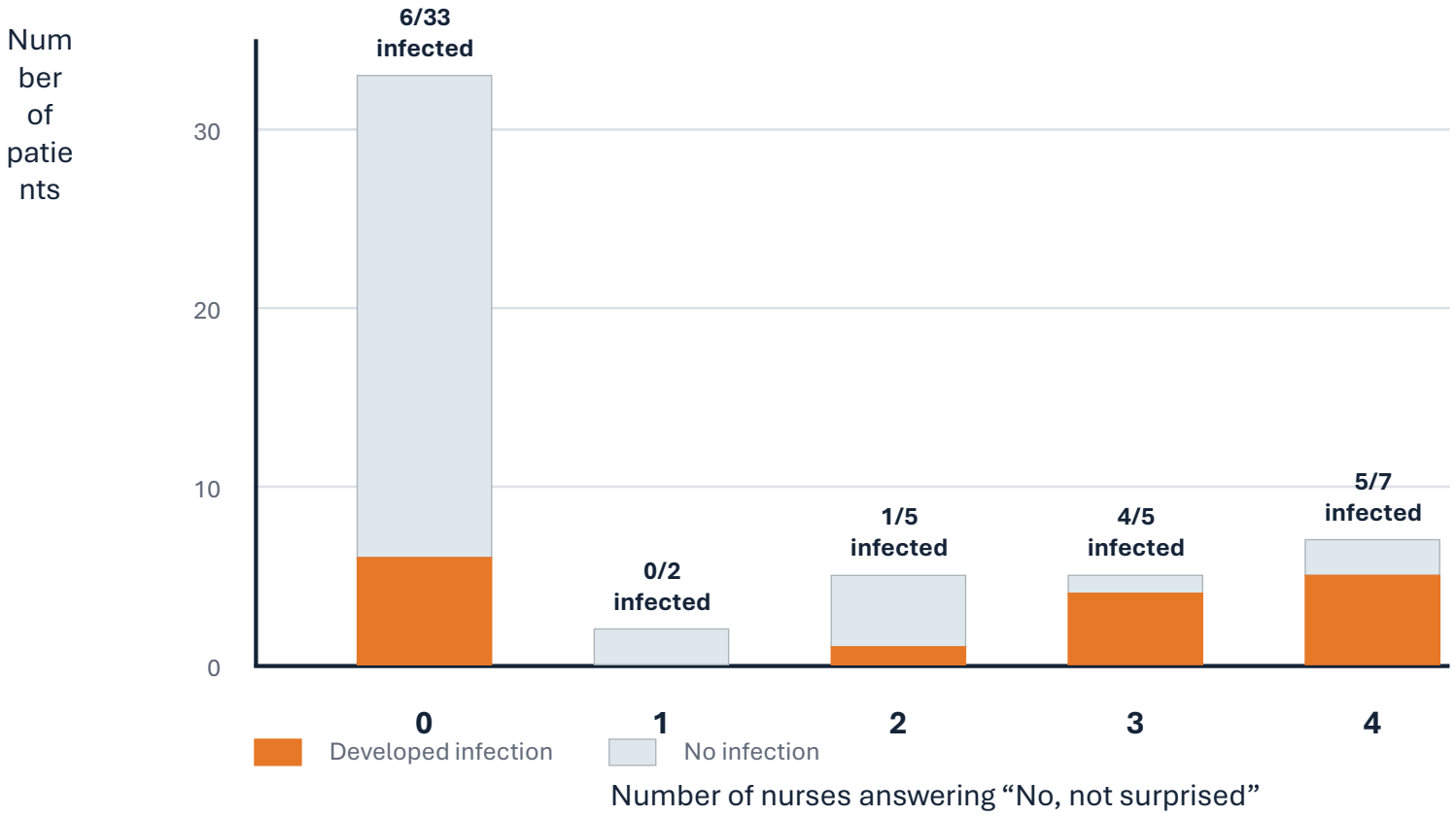
Experience did not clearly determine performance

Implication: A shared assessment tool may help standardise what nurses mean by 'high risk'.

Consensus appeared associated with higher infection risk

Each bar shows the total number of patients based on how many nurses answered “No, not surprised” to future infections

The highest-yield signal may be team consensus, not an individual score



Key comparison

≥3 nurses concerned

9/12 infected

vs

0 nurses concerned

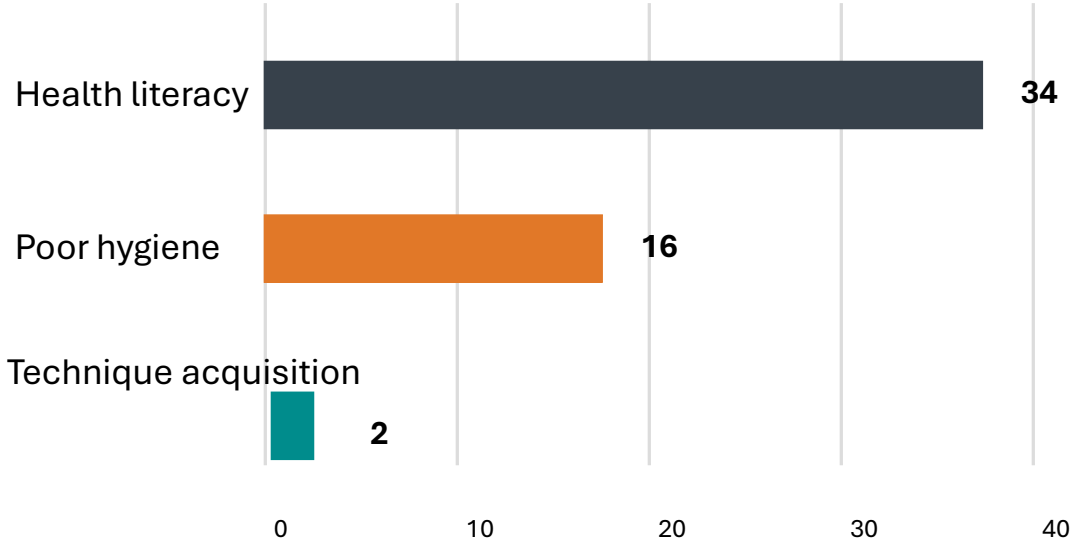
6/33 infected

Take-home: agreement between nurses may be a stronger signal than an individual nurse score.

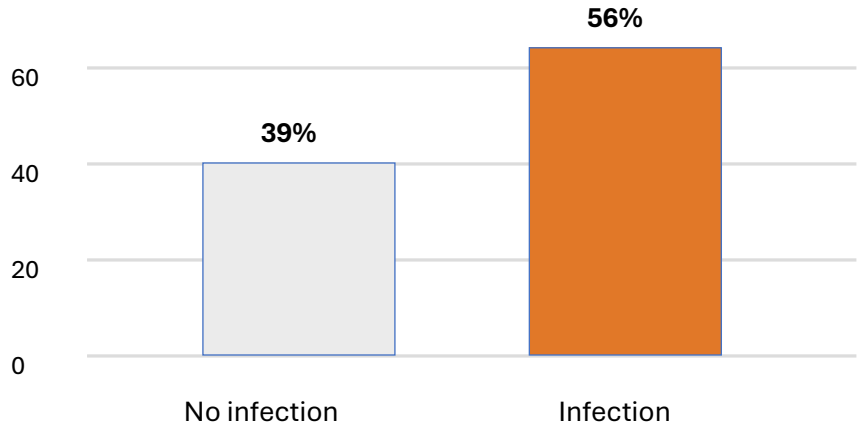
What were nurses picking up?

High-risk judgements were most commonly linked to health literacy and hygiene/technique concerns.

Most common concerns identified by nurses



Diabetes was more common in the infection group



Which means:

Nurses were not simply guessing. Their concern was anchored in observable risks during PD training: literacy, hygiene and technique acquisition. Diabetes was also more common among patients who developed infection.

Take home point: Clinical implications for renal nursing practice

Use the surprise question as a structured prompt for early support, not as a diagnostic test.

1 Ask

Ask all PD nurses the same surprise question during training or early PD review.

2 Analyse

Combine concerns with objective assessments such as literacy, technique, hygiene, comorbidity

3 Act

Trigger targeted retraining, early review, technique observation and team discussion.

A practical workflow

If it is a single nurse concern = review modifiable risks.
If there are 3+ nurse concerns = high-priority patient for team huddle.
Low-risk prediction = reassuring, but continue routine monitoring

Conclusions

Experienced nursing assessment is valuable when it is structured, shared and supported by evidence.

1 Best at ruling out risk

High Negative Predictive Value (NPV) and specificity mean low-risk predictions were usually reassuring.

2 Not enough on its own

Moderate sensitivity means some infections will be missed without ongoing assessment.

3 Consensus may be powerful

When 3+ nurses were concerned, it shows association with higher infection risk.

4 PD-related infections remained significant

Nurse concern commonly related to health literacy, hygiene, and PD technique acquisition.

Future Directions

- **Larger prospective studies are needed to validate these findings.**
- **Validated health literacy tools (e.g. BRIEF Health Literacy Screening Tool) may improve risk stratification.**
- **Further work is needed to determine whether nurse consensus scoring improves predictive accuracy**

Key References

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Thank You

"Every patient teaches us something."



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Questions & Discussion

Future Direction: Incorporating the BRIEF Health Literacy Tool

A validated tool that may complement nursing judgement and improve future risk stratification.

What does the BRIEF Tool assess?

1. How confident are you filling out medical forms by yourself?

2. How often do you need help reading hospital materials?

3. How often do you have difficulty understanding written medical information?

4. How often do you have problems learning about your medical condition?

5. How confident are you understanding health information?

Sample BRIEF Scoring

4–12 Inadequate health literacy

13–16 Marginal health literacy

17–20 Adequate health literacy

Higher scores indicate better health literacy.

Future Application
Nursing judgement + BRIEF score = Improved risk stratification

Health literacy emerged as the most common concern identified by nurses in SURPRISE-PD.

Western Sydney Renal Health Services — 2024 report

Centre	PD Patients	No. of Episodes	Person Years	Rate (95% CI)	PM per Episode (95% CI)
Total (WSRHS)	425	120	327.41	0.37 (0.30–0.44)	32.74 (27.38–39.49)
Nepean Hospital	61	16	47.75	0.34 (0.19–0.54)	35.81 (22.05–62.65)
Westmead Hospital	364	104	279.67	0.37 (0.30–0.45)	32.27 (26.63–39.49)

Western Sydney Renal Health Services -2025 report

Centre	PD Patients	No. of Episodes	Person Years	Rate (95% CI)	PM per Episode (95% CI)
Total (WSRHS)	433	92	324.5	0.28 (0.23–0.35)	42.33 (34.51–52.51)
Nepean Hospital	60	17	46.44	0.37 (0.21–0.59)	32.78 (20.47–56.27)
Westmead Hospital	373	75	278.07	0.27 (0.21–0.34)	44.49 (35.49–56.56)

Understanding Prediction Accuracy Metrics

1. SENSITIVITY

Identifies future infections

Formula: $$\text{Sensitivity} = \frac{TP}{TP + FN}$$

Your Study: $$\frac{34}{34 + 30} = \frac{34}{64} = 53\%$$

(*TP* = 34, *FN* = 30)

2. SPECIFICITY

Identifies patients who remain infection-free

Formula: $$\text{Specificity} = \frac{TN}{TN + FP}$$

Your Study: $$\frac{123}{123 + 21} = \frac{123}{144} = 85\%$$

(*TN* = 123, *FP* = 21)

3. POSITIVE PREDICTIVE VALUE (PPV)

When nurses predicted high risk

Formula: $$\text{PPV} = \frac{TP}{TP + FP}$$

Your Study: $$\frac{34}{34 + 21} = \frac{34}{55} = 62\%$$

(*TP* = 34, *FP* = 21)

4. NEGATIVE PREDICTIVE VALUE (NPV)

When nurses predicted low risk

Formula: $$\text{NPV} = \frac{TN}{TN + FN}$$

Your Study: $$\frac{123}{123 + 30} = \frac{123}{153} = 80\%$$

(*TN* = 123, *FN* = 30)

TP = True Positive | **FP** = False Positive | **TN** = True Negative | **FN** = False Negative