Enhancement of Medication Safety through collaboration with the Clinical Department for Simulation Training on High Alert Medication Administration

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The Issue: Systemic Challenges

Medication incidents recorded on a quarterly basis indicate a persistent, systemic challenge ratter than isolated anomalies. The core concern centers on High-Alert Medications—drugs carrying a heightened risk of causing significant patient harm when used in error.

Contributing Factors

Two years of incident reviews by the Nursing Services Division identified the "Staff Factor" as the most frequent cause, specifically:

- Limited clinical experience among nursing staff.
- Deviations from established standard operating procedures (Failure to comply).
- Inadequate baseline knowledge.

Status: Alert

Recurring Incidents Demand Proactive Intervention

Human errors

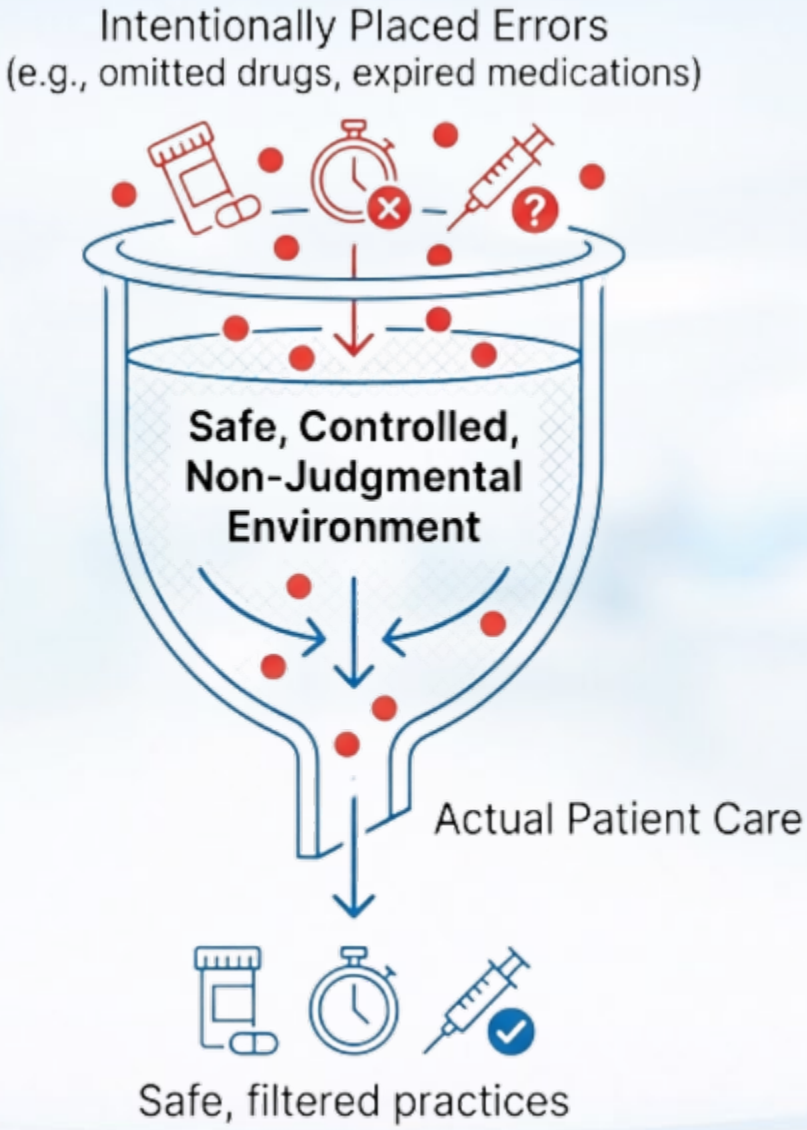
- **Most Frequent Error Factor: Unsafe Acts - Decision errors (47.98% occurrence rate).**
- The research suggests for proactive training (understanding when errors occur) with retrospective analysis.

The number and occurrence rate of error factors in medication-related adverse events (n = 248).

Error Factors of HFACS (Acronym)	Number of Errors	Occurrence Rate of Error Factors
Unsafe acts		
Decision errors (d)	119	47.98%
Skill-based errors (s)	49	19.76%
Perceptual errors (p)	23	9.27%
Violations (v)	57	22.98%
Preconditions for unsafe acts		
Technological environment (te)	21	8.47%
Adverse mental states (ms)	86	34.68%
Physical/mental limitations (l)	92	37.10%
Communication, coordination, planning (cc)	22	8.87%
Adverse physiological states (ps)	27	10.89%
Unsafe supervision		
Inadequate supervision (is)	75	30.24%
Planned inappropriate operations (pi)	58	23.39%
Failure to correct problem (fc)	98	39.52%
Supervisory violations (sv)	17	6.85%
Organizational influence		
Resource management (rm)	55	22.18%
Organizational climate (oc)	75	30.24%
Organizational process (op)	118	47.58%

Source: Human Error Analysis and Modeling of Medication-Related Adverse Events in Taiwan Using the Human Factors Analysis and Classification System and Logistic Regression (2023).

The Safe Failure Funnel



Mechanism of Action

Simulation training addresses **human error** by **providing a controlled environment** where **healthcare professionals can practice, make mistakes, and learn from them without harming actual patients.**

Target Outcome

Boost **situational awareness** and the **ability to detect hazards before** they reach the patient, addressing knowledge gaps and **reinforcing safe behaviors.**

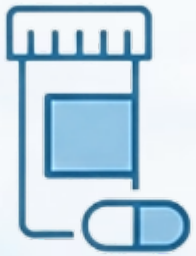
Source: Clinical Simulation in Nursing Students' Safe Medication Administration: A Systematic Review (2024).

Planning – Workgroup formation

The Workgroup:

The Nursing Services Division (NSD) analyzed medication error reports and trends to collect baseline data.

A collaborative working group of clinical department representatives and experienced facilitators (NSD and M&G) aligned scenarios with actual clinical practices.



High Alert medication preparation.

Last dose / stat dose of medication.

Medication dosage calculation.

Allergy checking / Check ID for unknown cases.

Lab report reading discrepancy.

Intravenous line tracing / safe use of pumps.

Implementation - Enrollment

- Nurses who have **less than 5 years of post-registration** clinical experience were nominated by Ward Managers via online enrollment system.
- There were A.M. and P.M. sessions. A max. of 4 quota in each session. Each session was lasted for 90 minutes.

Simulation on Medication Safety Training for M&G Nurses 2025

Enrollment Form for Simulation Training on High Alert Medication for M&G Nurses 2025, RTSKH

Dear All,
Kindly enroll eligible staff by filling in the sessions below for arrangement of the simulation session.
Thank you a lot.

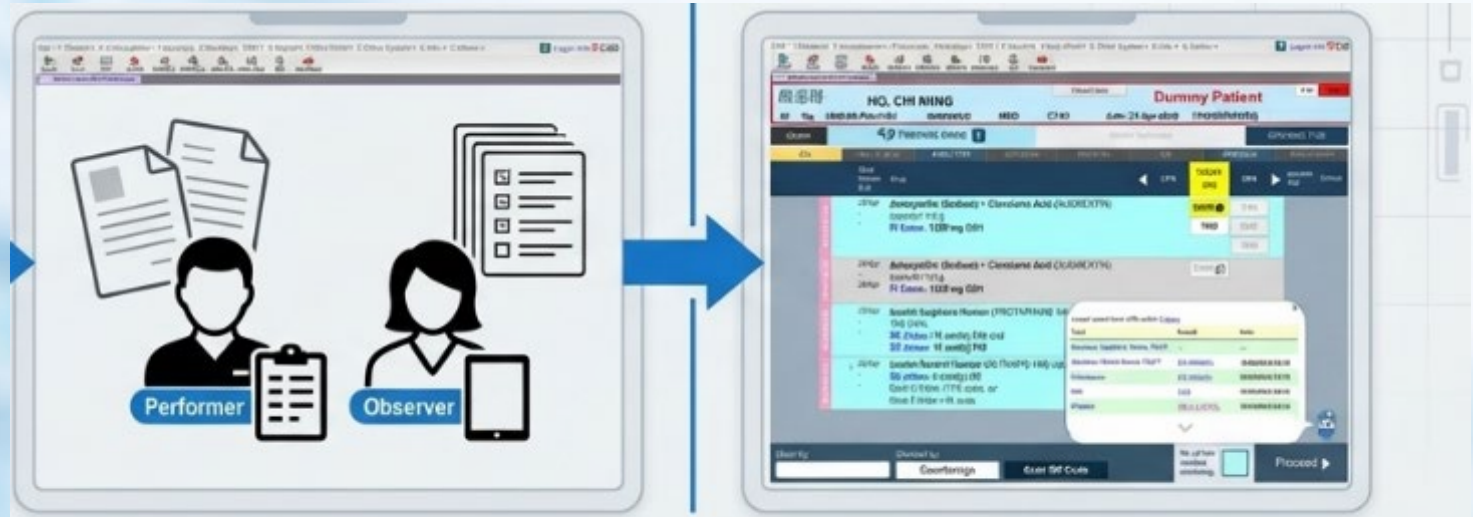
- 1st week 28 April - 2 May 2025
- 2nd week 5- 9 May 2025
- 3rd week 12- 16 May 2025
- 4th week 19- 23 May 2025
- (please choose one time slot only)

The options will NOT be available once occupied with 4 participants.

29 April 2025 – 23 May 2025 (26 sessions, 84 participants)

Mon	Tue	Wed	Thu	Fri
	29 Apr Session A.M. (3)	30 Apr Session A.M. (2)	PH	2 May Session A.M. (4) Session P.M. (1)
PH	6 May Session A.M. (3)	7 May Session A.M. (4) Session P.M. (4)	Nurses' Day celebration	9 May Session A.M. (4) Session P.M. (4)
12 May Session A.M. (4) Session P.M. (3)	13 May Session A.M. (3) Session P.M. (4)	14 May Session A.M. (4) Session P.M. (2)	15 May Session A.M. (4)	16 May Session A.M. (4) Sessions P.M. (4)
19 May Session A.M. (4)	20 May Session A.M. (3)	21 May Session A.M. (3) Session P.M. (2)	22 May Session A.M. (4) Session P.M. (1)	23 May Session A.M. (4) Session P.M. (3)

Implementation – Live run



Briefing

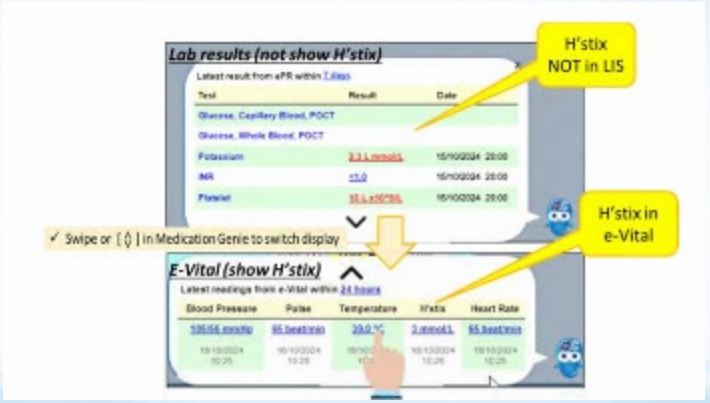
Participants alternated between performer and observer roles, receiving case background and required tasks.

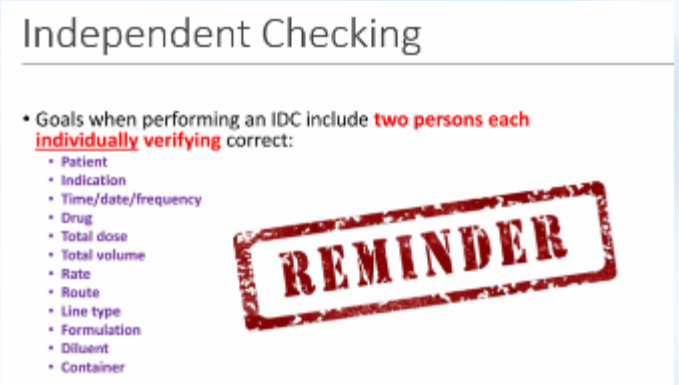
Live Run

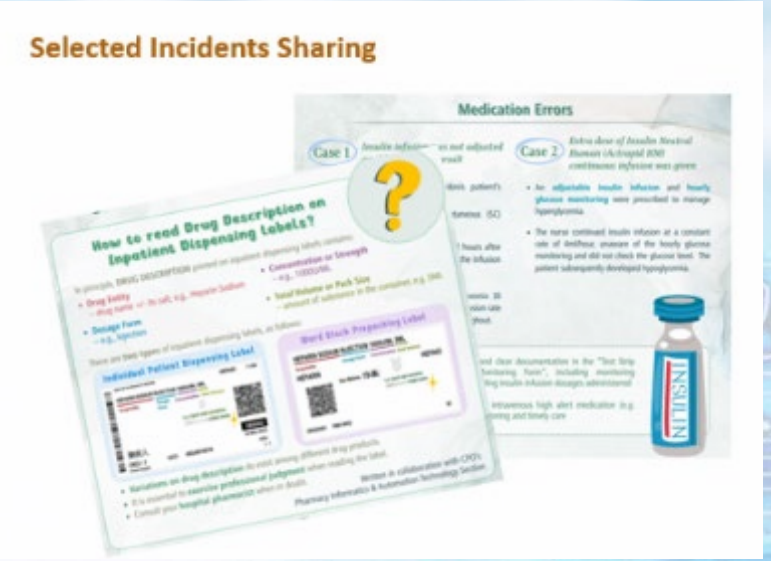
The simulation mirrored live ward chaos. Participants faced embedded challenges: wrong patients, incorrect administration times, unclear orders, and inconsistent lab readings.

Implementation – Debriefing

- When participants finished the scenario, they were encouraged to :
  - Reflect from experience
  - Praise the good practice, learn from others
  - Reveal errors for further discussion and develop strategy to prevent the future errors.
- Highlights of medication safety alert and selected incidents sharing were given to close up the debriefing session.







Assessment Methodology: measuring Both Knowledge and Application

Cognitive Assessment

The Pre/Post-Test

Designed to measure absolute knowledge gain regarding high-alert medications before and after the intervention. Focuses entirely on theoretical understanding.

Practical Application

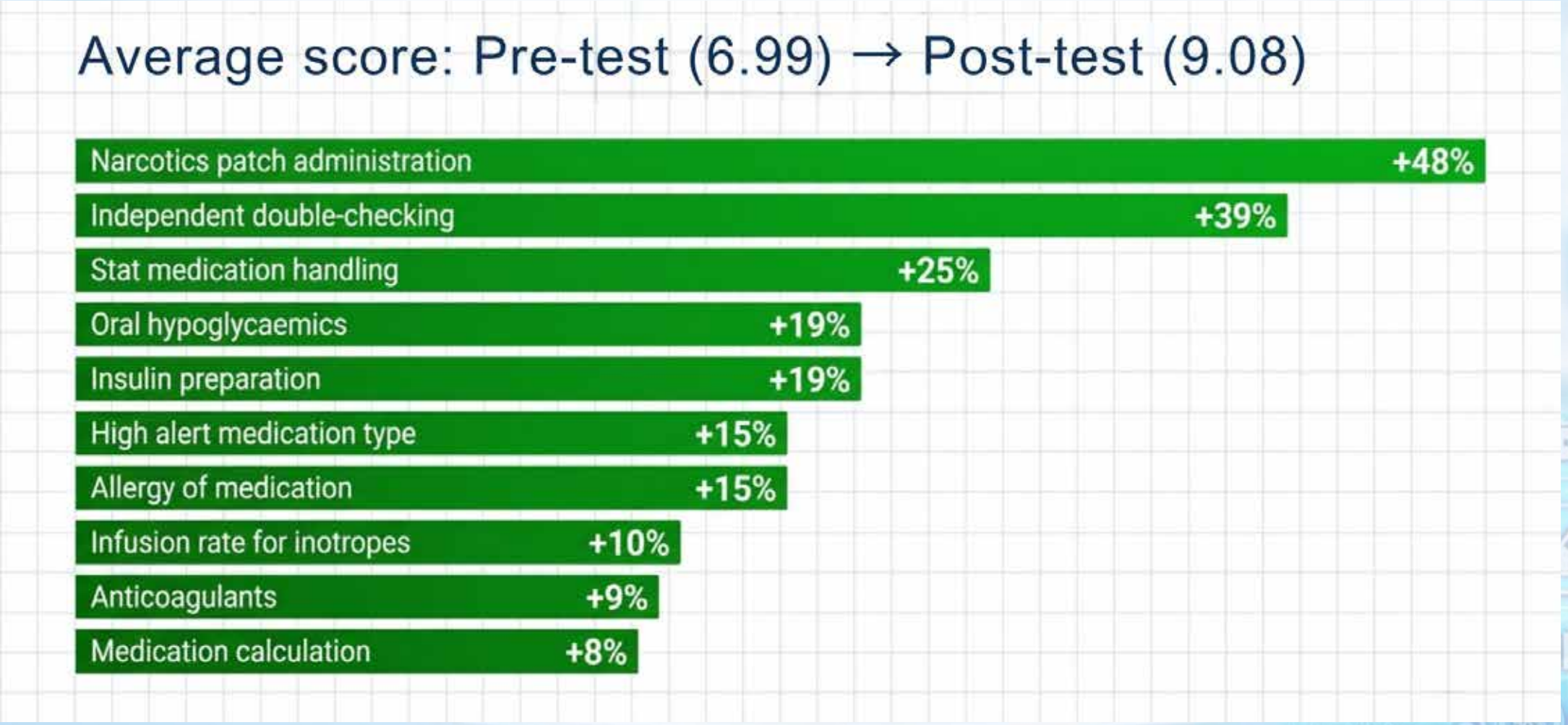
The Live Performance Checklist

Conducted live throughout the scenario. Focuses on safe execution, technique, and adherence to best practices.

Checklist Criteria:

- General principles
- 5 Rights
- Administration technique
- Independent double-checking
- Use of infusion pumps
- Sharps handling
- Documentation

Result – Knowledge improvement

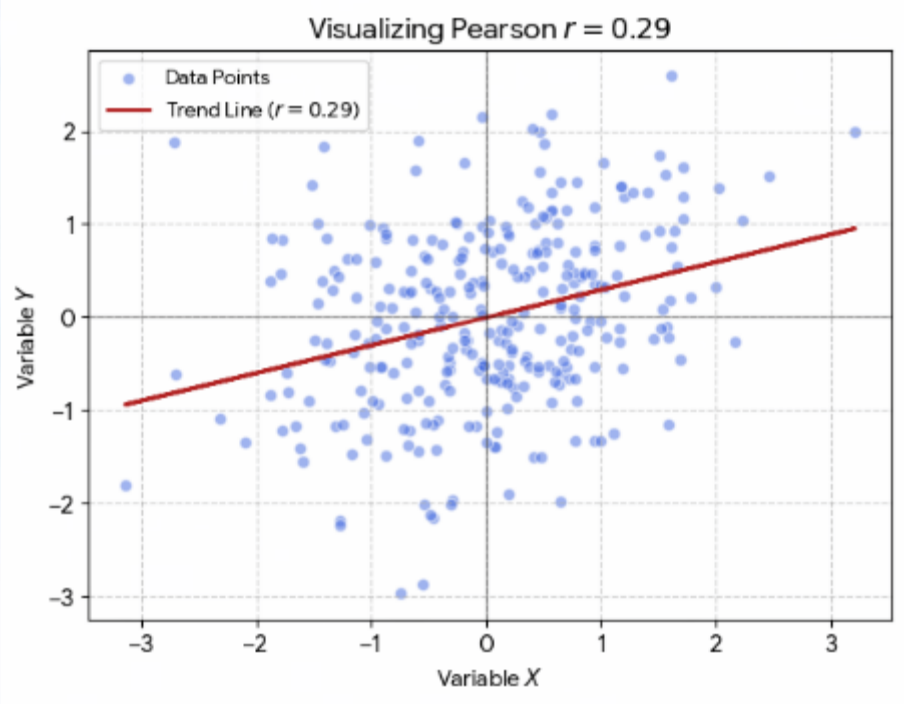


Result – Year of Experience

2.6 YEARS

Average post-registration experience of participants

Analysis revealed a weak positive correlation between years of experience and medication knowledge (Pearson's r = 0.29)



Junior nurses could obtain knowledge and experience in simulation training.
Experienced nurses could review practice gap against potential risk.

Result – Performance errors

Observed Errors

Despite theoretical knowledge gains, practical execution errors still occurred in the live scenarios:

- Independent double-checking: **32% error error rate**
- Allergy checking: **26%**
- Infusion Pump use: **19%**
- Incorrect timing: **14%**
- Medication preparation: **12%**
- Patient identification: **10%**

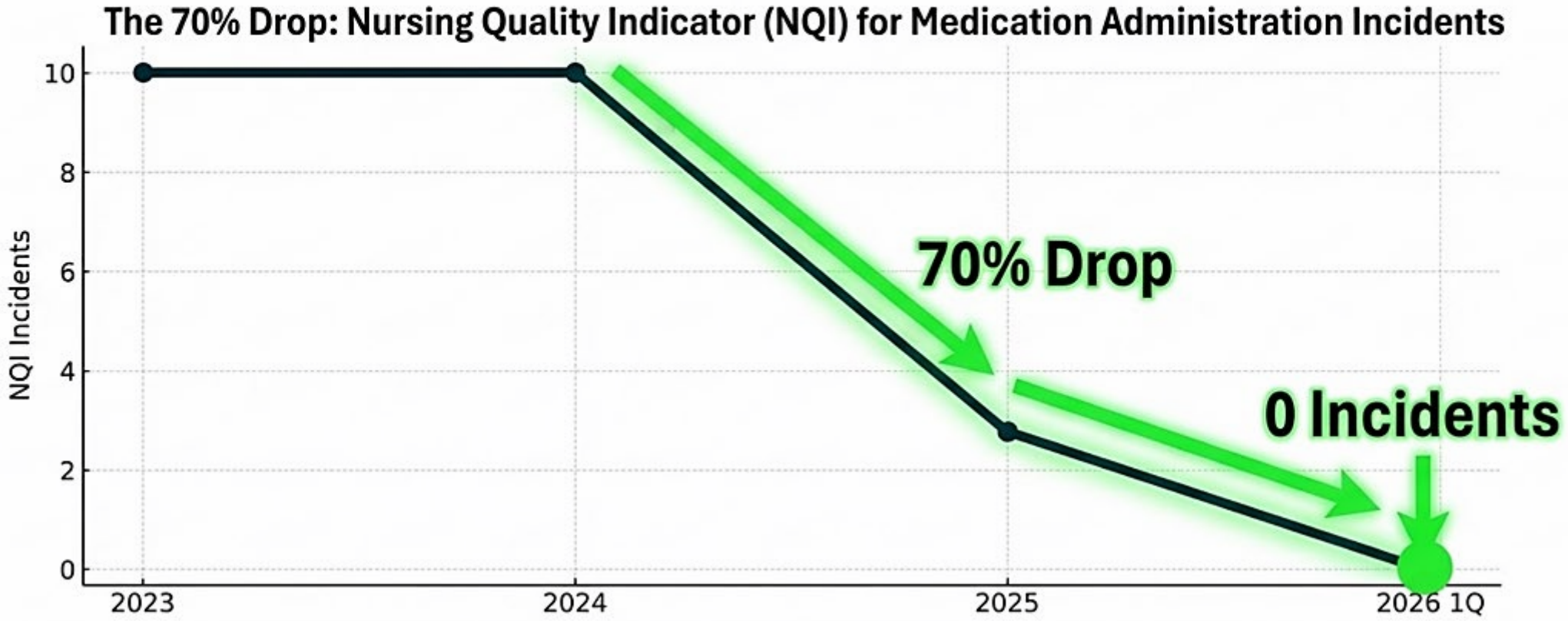
Observed Good Practices

- Self-Correction: **Proper independent double-checking was observed successfully correcting errors** that had already been initiated.
- Proactive Care: Participants initiated interventions, such as **utilizing cardiac monitors for cases requiring potassium correction**.
- Holistic Nursing: **Shift from task-oriented approaches to patient-centered care,** evidenced by the application of anxiety relaxation techniques.

Result – Medication incident reduction

Hospital-Level Analysis

Total medication incidents (prescribing, dispensing, and administration) **decreased** from 23 in 2024 to 18 in 2025, representing a **21.7% reduction.**



Evaluation from participants

Recommend simulation to others

Effective in improving understanding

Enhanced knowledge of safety

Overall satisfaction

Overall program rating Excellent & Good: 94%

> Very practical... clarifies concepts.

> Good to learn from mistakes in a safe space.

> Pointed out common errors of AOM and the true importance of double-checking.

Strength & Limitation

Internal Cognitive Gains

- Stimulates critical thinking regarding daily clinical practices.
- Exposes and corrects individual blind spots in a safe environment.
- Facilitates peer-to-peer learning from observed good practices.
- Shares critical lessons learned directly with frontline nursing staff.

Operational & Systemic Constraints

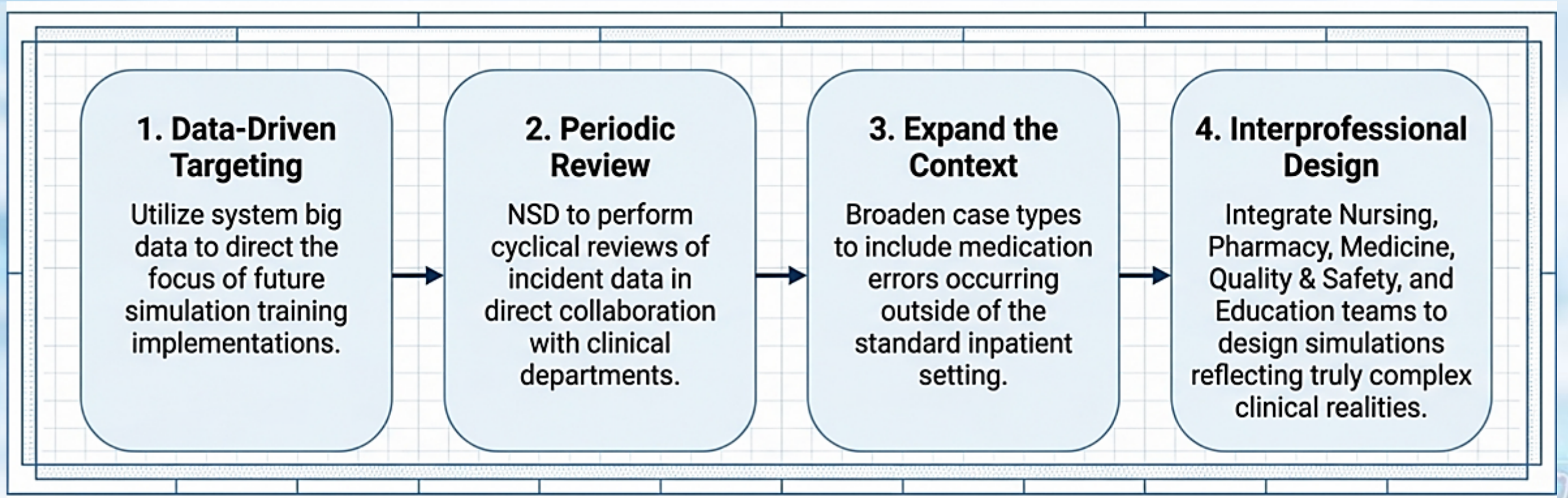
- Implementation has not yet covered all nurses in the division.
- Requires intensive management coverage, including time compensation and relieving staff from active duty.

The Synergy Equation

Simulation Training + Continuous Department Initiatives = Secured Culture of Medication Safety

Medication incident reduction requires a synergistic effect. Simulation acts as the catalyst, but continuous departmental effort is the sustainer.

Implication & Conclusion



Simulation-based training safely allows nurses to practice error prevention, serving as a vital CQI intervention that promotes sustainable, long-term patient safety improvements.

Acknowledgement

- Working group members & facilitators
  - Ms. Esther HO (Cardiac)
  - Mr. YK MAN (Acute Med.)
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  - Ms. Susan LAM (Acute Med.)
  - Ms. Sabrina HO (Geri.)
  - Mr. Gabriel TAI (Geri.)
  - Mr. Jason WONG (ICU)
  - Mr. Adrian NGAN (NSD)
- Supervisor
  - Mr. C W WONG, SNO (Q&S)
- Management support
  - Mr. C P LEUNG, GM(N)
  - Ms. Babbitt WOUN, SNO (T&D)
  - Ms. Gloria TSE, DOM (M&G)
  - Ms. Ida PANG, DOM (M&G)