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# How Simulation Supports Recognition of Dying in Nursing Education: A Realist Review of Learning Mechanisms, Contextual Conditions, and Transfer from Simulated Encounters to Clinical Practice

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**Abstract**

Recognising that a patient may be dying is an interpretive clinical accomplishment rather than a single-act diagnostic decision. Nursing students must integrate changing physiological, functional, communicative and relational cues while managing uncertainty and the emotional consequences of end-of-life care. Simulation is widely used to prepare students for such encounters, but improvement within a simulated setting cannot be assumed to transfer into clinical recognition of dying. To explain how, why, for whom and under what circumstances simulation may support nursing students' recognition of dying and transfer of learning from simulated encounters to clinical practice. A realist review was undertaken using iterative programme-theory development, theory-driven searching, relevance–richness–rigour appraisal, context–mechanism–outcome reasoning and programme-theory refinement. Four bounded evidence-search routes identified 48 records. After removal of five duplicates, 43 records were screened, 29 reports underwent detailed eligibility assessment and 24 evidence reports were included in the realist synthesis. Simulation most plausibly supported recognition through five interacting processes: calibrated noticing of ambiguous cues; emotionally consequential psychological safety; explanatory reappraisal during debriefing; contextual and relational authenticity; and opportunities to retrieve and enact learning in clinical placements. Knowledge, confidence, reflective ability and simulated performance represented proximal outcomes rather than evidence of clinical transfer. Transfer was more likely when clinical placements supplied comparable patient trajectories, continuity of contact, supervisory support, access to contextual information and permission to voice uncertainty. Excessive emotional load, cue fixation, low contextual authenticity and restrictive clinical environments could interrupt the proposed pathways. Simulation can contribute to learning needed for recognition of dying, but its effects are contingent. The refined programme theory locates transfer in the interaction between simulation design, learner interpretation, debriefing, clinical opportunity and workplace conditions rather than in simulation exposure alone.

**Keywords:** Simulation-based education, Recognition of dying, Palliative care, Nursing education, Realist review, Clinical learning transfer

## Introduction

Recognising that a patient is approaching death involves interpreting trajectories rather than identifying a single definitive sign. Clinical deterioration, frailty, altered communication, diminishing response to treatment and changes in functional status may accumulate gradually, while prognostic uncertainty persists. An integrative review of clinicians' recognition of dying showed that recognition develops through interpretation of multiple

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forms of information over time and is affected by professional judgment, uncertainty and the availability of contextual knowledge [1]. Organisational conditions also matter. Hospital nurses and doctors describe continuity, interprofessional communication, time and access to longitudinal information as important conditions for acknowledging that a patient may be entering the final phase of life [2].

For nursing students, learning about dying occurs within an additional emotional and professional transition. A qualitative meta-synthesis found that students' encounters with patient death involve anxiety, uncertainty, communication difficulties, emotional labour and dependence on supportive clinicians who can help them interpret what has occurred [3]. First experiences of patient death may therefore become formative learning events, but their educational meaning depends on preparation, supervision, reflection and the clinical environment in which the experience occurs [4]. Learning to recognise dying cannot consequently be reduced to memorising signs or completing a communication exercise.

Undergraduate palliative-care curricula remain heterogeneous in content, timing and educational approach [5]. This matters because practising nurses outside specialist palliative services continue to report uneven knowledge and confidence across symptom management, communication, psychosocial care and end-of-life decision-making [6]. Attitudes towards caring for dying patients are likewise shaped by prior experience and workplace context rather than by factual knowledge alone [7]. These findings create an important educational problem: nursing programmes must prepare students for a clinical judgment that combines cue recognition, uncertainty management, relational communication and action within organisational constraints.

Simulation offers an opportunity to expose students to such complexity before an equivalent clinical encounter occurs. Yet evidence that students perform, reflect or report greater confidence after simulation does not establish that they will recognise dying more effectively when a real patient's trajectory is ambiguous. A realist review is therefore appropriate because the educational question concerns contingent explanation: what features of simulation activate which forms of reasoning or emotional engagement, for which learners, and under what conditions can those changes become usable in clinical practice?

*Initial programme theory*

The initial programme theory treated simulation as a structured context capable of activating several mechanisms rather than as an intervention with a uniform effect. In a prelicensure palliative and end-of-life simulation programme, students demonstrated changes in proximal educational outcomes including palliative-care knowledge and reflective capacity [8]. Qualitative work from the same educational domain showed that learning was influenced by prior exposure to death, the perceived credibility of the scenario and the quality of facilitation [9]. Complex palliative simulation also places demands on self-regulation: learners must manage anxiety, monitor their reasoning and remain cognitively flexible while responding to emotionally charged information [10]. These findings generated the first proposition that emotionally credible simulation may promote learning when students experience enough psychological safety to remain engaged without removing the seriousness of the situation.

A second proposition concerned contextual and relational authenticity. Pedagogical approaches combining clinical modelling and palliative simulation suggest that students learn communication partly by observing and rehearsing how clinicians respond to uncertainty and patient or family concerns [11]. Socio-material analysis further indicates that simulation learning is produced through interaction among learners, educators, material arrangements, scenario structure and subsequent clinical environments [12]. Authenticity was therefore conceptualised less as technological fidelity than as the extent to which a scenario required learners to interpret information, relationships and competing demands similar to those encountered in practice.

A third proposition concerned reflection and explanatory revision. End-of-life simulation studies have linked knowledge, self-awareness and simulated performance, indicating that what learners understand about themselves may influence how they respond within an encounter [13]. Narrative inquiry has also shown that simulation can produce disorienting experiences that prompt students to reconsider assumptions about dying and their professional role [14]. Reflection was accordingly treated as a potential mechanism only when it changed the learner's explanation of what was noticed, overlooked or prioritised. This distinction was important because the broader simulation-transfer literature demonstrates that transfer is frequently inferred from self-report or short-term outcomes rather than observed directly in clinical practice [15].

The fourth proposition concerned cue processing. Virtual simulation of deteriorating patients can improve proximal recognition-related knowledge and self-efficacy [16], yet students may still fixate on individual cues, conduct incomplete assessments or fail to integrate information into a coherent interpretation [17]. Some students later describe recalling simulated deterioration scenarios when responding to real clinical situations [18], providing evidence that simulation memories can become resources for action. Nevertheless, reviews of cue recognition demonstrate that clinically salient information can remain unnoticed or be interpreted incorrectly even during simulation [19]. The initial programme theory therefore proposed that repetition would support recognition only when simulation required learners to integrate evolving cues rather than respond to an obvious diagnostic label.

These propositions are summarised in **Table 1**. They were deliberately framed as testable explanations: each specifies circumstances in which a mechanism could be activated and observations that would weaken the proposed pathway.

**Table 1.** Initial programme-theory propositions for simulation-supported recognition of dying

| Proposition | Starting context | Candidate mechanism | Expected educational outcome | Observation that would weaken the proposition |
|---|---|---|---|---|
| Calibrated noticing | A scenario presents gradual, ambiguous change rather than an explicit terminal label | Learner actively compares, integrates and reprioritises evolving cues | More coherent interpretation of changing patient trajectory | Performance depends mainly on a single obvious cue or memorised trigger |
| Emotionally consequential safety | The encounter is psychologically safe while retaining realistic emotional significance | Anxiety is regulated sufficiently for sustained attention and meaning-making | Engagement, reflective processing and willingness to articulate uncertainty | Emotional overload narrows attention, or excessive comfort produces superficial engagement |
| Relational authenticity | Patient/family responses and competing clinical demands influence what the learner must decide | Learner treats communication and relational information as clinically meaningful evidence | Better integration of interpersonal and clinical information | Fidelity is technically high but relationships have no consequence for reasoning |
| Explanatory reappraisal | Debriefing reconstructs what was noticed, missed, assumed and acted upon | Learner revises the explanation guiding future recognition | More differentiated clinical reasoning and reflective awareness | Debriefing remains descriptive, evaluative or reassurance-focused |
| Transfer opportunity | Clinical placement contains sufficiently analogous patient trajectories and supportive supervision | Previously constructed reasoning is retrieved and adapted to a real situation | Use of simulation-derived learning in practice | Learning remains proximal because no relevant opportunity, continuity or permission to act is available |



## Materials and Methods

The review followed realist principles of programme-theory development, iterative searching, evidence appraisal and theory refinement. Realist searching differs from a one-stage exhaustive effectiveness search because retrieval proceeds in relation to developing explanatory questions and may require several complementary strategies [20]. Evidence appraisal therefore considered not only conventional methodological credibility but also whether a source was relevant to a programme-theory proposition and sufficiently rich to explain how a context, mechanism or outcome was connected [21]. Programme-theory searches can legitimately draw on complementary retrieval routes when each route is transparently documented and contributes distinct explanatory material [22].

The review question was: How, why, for whom and under what circumstances does simulation support nursing students' recognition of dying, and what conditions influence transfer from simulated encounters to clinical practice? The realist design focused on generative explanation rather than estimating a single average intervention effect [23]. Initial programme theory was developed from palliative-care simulation, recognition-of-dying, cue-recognition and transfer literature and was subsequently tested against supportive, contradictory and context-dependent evidence [24].

Four bounded evidence-search routes were executed on 22 October 2026 using PubMed-indexed retrieval. The routes addressed: palliative/end-of-life simulation in nursing students; clinical recognition of dying; simulation transfer and debriefing; and focused palliative simulation. Eligibility was restricted to literature published from 2017 through 2025. Eligible evidence had to contribute directly to at least one programme-theory component: context, learning mechanism, recognition-related outcome, clinical-transfer process, rival explanation or implementation boundary. Quantitative, qualitative, mixed-method and review-level evidence could be included because explanatory contribution rather than design hierarchy determined eligibility. Journal quartile was not used as a study-selection criterion.

Records were deduplicated before title-and-abstract screening. Reports passing screening underwent detailed eligibility assessment. At this stage, sources were excluded when they provided only general readiness or satisfaction outcomes without interpretable mechanism or transfer evidence, when dying-recognition-specific contributions could not be separated from broader educational content, or when generic transfer findings were too distant from palliative, dying or analogous recognition processes.

Evidence fragments were extracted according to setting, learner characteristics, simulation characteristics, contextual conditions, proposed or observed mechanisms, proximal outcomes, transfer evidence, contradictory findings and applicability boundaries. Appraisal considered relevance, explanatory richness and the rigour of the inference being imported into the synthesis. This approach avoids treating an entire paper as uniformly strong or weak when only one part of its evidence may be used to test a particular programme-theory proposition.

Analysis proceeded through iterative context–mechanism–outcome reasoning. Evidence supporting an initial proposition was compared with cases in which the expected outcome did not occur. Mechanisms were distinguished from activities: for example, debriefing was treated as an educational context, whereas reconsideration of previously unnoticed cues or assumptions was treated as a possible mechanism. Similarly, scenario fidelity was distinguished from the learner's perception that relational and clinical information was consequential. Propositions were retained, narrowed, combined or rejected according to these comparisons.

Selection reporting was structured transparently using PRISMA-style arithmetic while retaining the realist analytic design [25]. The numeric flow therefore documents which evidence entered the synthesis; it does not imply that the review was converted into a conventional systematic-effectiveness review.

The executed evidence-selection process is shown in **Figure 1**.

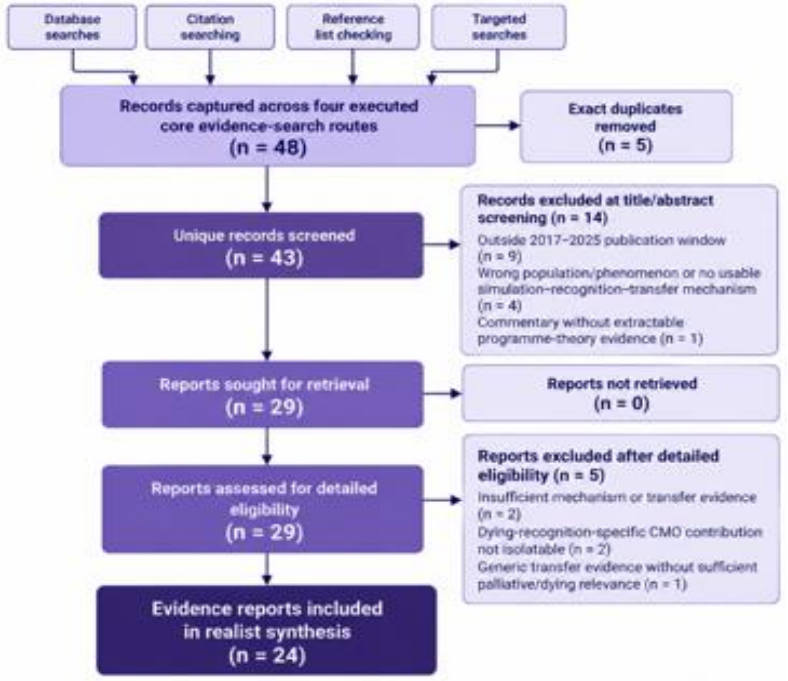



**Figure 1.** RAMESES-informed PRISMA-style flow of evidence selection for the realist review

## Results and Discussion

The four core search routes yielded 48 records. Five exact duplicates were removed before screening, leaving 43 unique records. Fourteen records were excluded during title-and-abstract screening and 29 reports were retrieved for detailed assessment. No report sought at the eligibility stage was unavailable. Five reports were excluded after detailed review, resulting in 24 reports contributing substantive evidence to programme-theory testing and refinement.

The included evidence was heterogeneous by design and explanatory function. It comprised palliative and end-of-life simulation studies, qualitative accounts of learner experience, studies of clinical judgment and deterioration recognition, work examining transfer from simulation to practice, and review-level syntheses capable of testing individual programme-theory links. Methodological diversity was useful because no single study design could establish the whole pathway from simulated experience to recognition of a dying patient in practice.

Broader simulation evidence supported the plausibility that repeated clinical decision practice can improve aspects of nursing students' decision-making, although intervention effects vary across settings and measures [26]. Importantly, improvement was not uniform across outcomes. A simulation-based case-study investigation found gains in knowledge while failing to demonstrate an equivalent differential advantage in clinical judgment, showing that proximal cognitive learning and judgment performance can diverge [27]. Learner stage also influenced how clinical judgment appeared in simulation, indicating that prior educational and clinical experience forms part of the context within which mechanisms operate [28]. Longitudinal work suggested that judgment can develop across repeated simulation experiences over a nursing programme rather than emerging from a single

exposure [29]. Collectively, these findings weakened any initial proposition in which simulation exposure itself was treated as the principal causal explanation.

Evidence concerning debriefing refined the proposed reflective mechanism. Collaborative reflection after virtual simulation has been associated with improvements in reflective and problem-solving processes [30]. Qualitative examination of facilitation showed that the treatment of learners' mistakes can either open or close opportunities for reflection depending on how feedback is framed [31]. Psychological safety was similarly conditional: its educational value lies in supporting participation, uncertainty disclosure and cognitive engagement, but safety does not imply the removal of challenge or emotional consequence [32]. The programme theory was therefore revised from a simple pathway of "simulation followed by debriefing" to a more specific mechanism of explanatory reappraisal, activated when students can reconsider why they attended to some cues, overlooked others and interpreted the evolving situation as they did.

Palliative and end-of-life simulations provided more direct evidence for contextual authenticity. Standardised-patient approaches allowed learners to rehearse communication and end-of-life decision processes in encounters in which another person's responses shaped the interaction [33]. High-fidelity simulated immersion also improved measured preparedness-related outcomes in students learning end-of-life care [34]. These proximal benefits were consistent with the initial programme theory but did not demonstrate bedside recognition of dying. Stronger transfer plausibility emerged when simulation was embedded in clinical placements. Students participating in in-situ simulation described the experience as closely connected to subsequent ward practice because the physical environment, workflows and professional expectations were shared [35]. Contextual authenticity was consequently refined to mean functional resemblance in what information and relationships matter, rather than resemblance in appearance alone.

Reflection remained an important mechanism across other simulation designs. A simulation game was associated with development of reflective thinking while qualitative findings suggested that repeated participation helped learners reconsider their responses [36]. Simulation combined with problem-based learning likewise supported clinical reasoning processes relevant to noticing, interpretation and response [37]. Programme-wide simulation evaluations showed that students place considerable value on debriefing and reflective components [38], although satisfaction cannot be interpreted as evidence of clinical transfer. Randomised comparison of video-assisted and oral debriefing further demonstrated that debriefing design can alter the learner's reflective experience [39]. No single modality emerged as a universally necessary condition; what mattered theoretically was whether the debrief enabled a credible reconstruction of reasoning.



**Table 2** characterises the included evidence according to the explanatory work it performed in the realist synthesis rather than ranking study designs as interchangeable levels of proof.

**Table 2.** Characteristics of included evidence according to its contribution to programme-theory refinement

| Evidence cluster | Typical source designs | Principal context represented | Main explanatory contribution | Important limitation for this review |
|---|---|---|---|---|
| Palliative and end-of-life simulation | Pre/post, quasi-experimental, qualitative and mixed-method studies | Undergraduate nursing programmes and simulation laboratories | Emotional engagement, communication, authenticity, reflection and proximal preparedness | Most outcomes occur within or immediately after simulation |
| Recognition of dying and end-of-life practice | Qualitative studies and evidence syntheses | Hospital and clinical end-of-life care | Shows that recognition depends on trajectory, continuity, interprofessional information and uncertainty | Primarily practitioner evidence rather than simulation studies |
| Cue recognition and deterioration simulation | Simulation studies and scoping reviews | Acute-care learning scenarios | Explains noticing, cue integration, fixation, situational awareness and reasoning failure | Deterioration is analogous to but not synonymous with recognition of dying |
| Simulation-to-practice transfer | Scoping, qualitative and narrative evidence | Simulation followed by clinical placement | Identifies opportunity, supervision, contextual resemblance and retrieval of prior learning as transfer conditions | Transfer is commonly self-reported and infrequently observed directly |

| | | | | |
|---|---|---|---|---|
| Debriefing and reflective-learning evidence | Randomised, qualitative, mixed-method and integrative studies | Post-simulation facilitation | Explains reflective reappraisal, treatment of error, psychological safety and cognitive challenge | Debriefing effects depend on facilitator behaviour and learner context |
| Repeated simulation and clinical-judgment development | Longitudinal, quasi-experimental and programme-level studies | Multi-semester or curriculum-integrated simulation | Supports accumulation of judgment through repeated exposure rather than one-off training | Clinical judgment outcomes remain broader than dying recognition |

Across these evidence clusters, five refinements were retained. First, calibrated noticing replaced the broader idea of exposure: simulation was most theoretically useful when learners had to integrate ambiguous changes rather than respond to a conspicuous terminal cue. Second, emotionally consequential safety replaced an assumption that greater psychological comfort would necessarily improve learning. The mechanism required sufficient security to admit uncertainty while preserving enough emotional and cognitive demand to make the interpretation consequential.

Third, explanatory reappraisal replaced generic reflection. Debriefing contributed when students revisited what they had noticed, ignored, assumed and prioritised and could construct a more defensible interpretation for future encounters. Fourth, contextual authenticity was reformulated as relational and functional authenticity. The key issue was whether patient responses, family concerns, time pressure, incomplete information and professional relationships changed what the learner had to interpret or do.

Finally, the strongest refinement concerned transfer. The evidence did not justify a direct pathway from successful simulation performance to recognition of dying in clinical practice. Transfer required both opportunity and permission. Opportunity referred to encountering sufficiently analogous trajectories, having enough continuity to observe change and possessing access to the information needed to interpret that change. Permission referred to the learner's practical ability to voice uncertainty, seek confirmation, participate in end-of-life reasoning and have observations taken seriously by supervising clinicians. Where either condition was absent, proximal learning could remain unused despite a successful simulation experience.

The resulting programme theory therefore distinguishes three levels of outcome. Proximal outcomes include knowledge, self-confidence, reflective awareness and performance within simulation. Intermediate outcomes involve improved articulation and integration of clinically relevant cues. The distal outcome—appropriately recognising and communicating concern that a patient may be dying in real practice—remains the least directly demonstrated and the most dependent on the clinical environment. This distinction prevents simulation success from being interpreted automatically as evidence of transfer and provides the basis for the explanatory interpretation developed in the Discussion.



This realist review indicates that simulation can contribute to learning needed for recognition of dying, but the explanatory pathway is more conditional than a simple relationship between simulation exposure and improved clinical performance. Recognition of dying is itself a trajectory-based interpretive process in which clinicians assemble changing physiological, functional, communicative and contextual information while tolerating uncertainty [1]. The synthesis therefore refined the initial programme theory around **calibrated noticing**: students need opportunities to distinguish meaningful change from background information, revisit an interpretation as a trajectory evolves and recognise when several individually ambiguous observations become clinically consequential.

This interpretation helps explain why improvements in knowledge, confidence or simulated performance cannot be treated as interchangeable outcomes. Simulation research supports improvements in clinical decision-making at an aggregate level [26], yet individual studies demonstrate that knowledge gains may occur without a corresponding advantage in clinical judgment [27]. The distinction matters especially in end-of-life education. Knowing commonly associated signs of dying is different from judging that a particular patient's pattern of change warrants reconsideration of goals, escalation of concern or discussion with a supervising clinician. Recognition therefore requires an interpretive mechanism rather than retrieval of an isolated fact.

The second refinement concerns emotional engagement. Encounters with patient death can be disturbing for students and are shaped by previous exposure, cultural meanings and the support available in clinical environments [3]. Palliative simulation provides a protected setting, but protection alone does not explain learning. Students must feel sufficiently secure to disclose uncertainty and mistakes while still experiencing the situation as consequential. Qualitative simulation evidence indicates that anxiety and self-regulation interact with learning during complex palliative scenarios [10], while the wider simulation literature shows that psychological safety has both benefits and boundaries [32]. The resulting mechanism is best described as emotionally consequential safety. Excessive threat may narrow attention or suppress participation; an encounter stripped of meaningful challenge may produce engagement without substantial interpretive revision.

Debriefing further refined this mechanism. The synthesis did not support treating debriefing merely as a routine post-scenario component. Collaborative reflection can strengthen problem-solving and reflective processes [30], while facilitators' treatment of mistakes shapes whether learners explore or defend their reasoning [31]. End-of-life simulation can also create disorienting experiences that prompt revision of assumptions [14]. These findings support explanatory reappraisal as the mechanism of interest: learners reconstruct why they noticed particular cues, why they discounted others, what assumptions shaped their response and how a different interpretation might become available during a future encounter. The mechanism can fail even when debriefing occurs if discussion remains descriptive, evaluative or reassurance-oriented.

Authenticity was similarly refined. Technical fidelity alone does not reproduce the conditions under which dying is recognised. Socio-material evidence suggests that simulation learning is produced through interactions among people, physical arrangements, rules and subsequent clinical environments [12]. Standardised-patient and end-of-life simulations add relational consequences because patient or family responses alter what the learner must interpret and communicate [33]. In-situ simulation can reduce contextual distance still further by embedding learning in the same physical and professional environment in which later clinical action may occur [35]. For this review, relational and functional authenticity therefore refers to whether uncertainty, patient preferences, family responses, workflow, incomplete information and professional relationships influence the learner's reasoning.

The largest evidential gap lies between successful simulation learning and clinical transfer. A scoping review of nursing simulation transfer identified relatively limited evidence of longer-term transfer and substantial reliance on self-reported outcomes [15]. Students can describe applying simulation-derived learning during later clinical encounters [18], but such accounts do not establish that transfer will occur whenever relevant knowledge has been acquired. The refined programme theory therefore requires both opportunity and permission. Opportunity means encountering sufficiently analogous clinical trajectories, having enough continuity to observe change and gaining access to the information required to interpret that change. Permission refers to whether students can raise concern, admit uncertainty, seek corroboration and participate in reasoning about dying without being excluded by hierarchy or role expectations.

This contextual requirement aligns with evidence from clinical practice. Recognition of dying is influenced by continuity, communication and organisational conditions [2]. A learner may therefore possess an appropriate interpretive repertoire yet be unable to enact it when placements are fragmented, patient contact is brief, supervisors do not invite reasoning or end-of-life discussions occur outside the student's participation. Transfer should consequently be understood as a relationship between learner capability and an environment that makes use of that capability possible.



The review also identifies important limits. Evidence from deterioration simulation informs cue processing and clinical judgment but deterioration and dying are not equivalent phenomena [17]. Some deteriorating patients recover, while dying may occur through gradual decline without a dramatic acute event. Findings from deterioration simulation therefore support mechanisms of noticing, integration and reasoning but cannot establish that identical cues or responses apply to dying. Likewise, proximal improvements in preparedness, confidence or satisfaction must not be interpreted as patient-level benefit. Direct evidence that simulation improves real-world recognition of dying remains comparatively limited.

The principal contribution of the refined programme theory is thus an explanation of conditional transfer. Simulation may construct a repertoire for noticing, interpreting and discussing potentially dying trajectories. Whether that repertoire becomes clinical recognition depends on the interaction between scenario design, emotional engagement, reflective reconstruction and the affordances of subsequent practice. Simulation is therefore most plausibly understood as preparing learners for recognition rather than independently producing recognition.

*Implications for nursing education*

Simulation design should make interpretive uncertainty visible. Scenarios intended to prepare students for recognition of dying should not depend only on unmistakable terminal signs or an explicit diagnostic label. Evidence on cue recognition shows that students may overlook salient information, fixate on a single observation or fail to integrate several cues [19]. Scenarios should therefore present evolving information that requires students to reconsider an initial interpretation while distinguishing deterioration, reversible problems and possible dying.

The emotional demands of these encounters should also be calibrated. Students differ in previous exposure to dying and in their capacity to regulate anxiety during complex simulation [9]. Psychological safety should enable uncertainty, questioning and error disclosure without eliminating the moral and emotional significance of the encounter. This requires facilitation that neither humiliates learners nor prematurely reassures them.

Debriefing should examine the reasoning process underlying recognition. Asking only whether the student identified the correct clinical state provides limited information about mechanism activation. Debriefing should instead reconstruct which cues were noticed, which were discounted, when the learner's interpretation changed, what relational information mattered and what additional information was sought. Facilitator responses to

mistakes are particularly important because errors can become resources for reflection only when learners can examine them without defensiveness [31].

**Table 3** presents refined context–mechanism–outcome configurations for simulation-supported recognition of dying.

**Table 3.** Refined context–mechanism–outcome configurations for simulation-supported recognition of dying

| Context requiring deliberate educational design | Mechanism activated in the learner | Proximal or intermediate outcome | Condition needed for clinical transfer | Likely failure configuration |
|---|---|---|---|---|
| Ambiguous, evolving trajectory with competing interpretations | Calibrated noticing and cue integration | More coherent explanation of patient change | Exposure to analogous trajectories and sufficient continuity | Learner waits for a single obvious terminal cue |
| Psychological safety combined with credible emotional consequence | Sustained engagement and regulated uncertainty | Greater willingness to articulate uncertainty and reconsider judgment | Supervisors invite questions and tolerate provisional reasoning | Threat suppresses participation, or excessive comfort weakens engagement |
| Patient/family responses materially influence scenario decisions | Relational interpretation | Integration of interpersonal and clinical information | Real placements permit interaction with patients, families and the team | Communication becomes detached from clinical reasoning |
| Debriefing reconstructs noticed, missed and misinterpreted information | Explanatory reappraisal | Revised reasoning available for later retrieval | Later encounters provide opportunities to retrieve and adapt the revised explanation | Debriefing remains descriptive or performance-centred |
| Repeated simulation across increasing complexity | Pattern differentiation and adaptive retrieval | More flexible judgment across scenarios | Curriculum and placement experiences are temporally connected | Repetition rehearses the same superficial response |
| Clinically embedded or functionally authentic simulation | Context-linked retrieval | Reduced distance between simulation reasoning and practice | Learner has practical permission to voice and act on concern | Workplace hierarchy prevents enactment despite learning |



Curricular sequencing should also recognise that transfer rarely follows a single educational event. Longitudinal simulation evidence suggests that judgment develops across repeated encounters [29]. A programme could therefore progress from early cue interpretation and communication toward scenarios that require learners to manage competing explanations, patient preferences, family concerns and interprofessional uncertainty. The purpose of increasing complexity would be to widen the learner's interpretive repertoire rather than merely make scenarios technically more difficult.

Clinical-placement integration is especially important. Simulation and placement should not function as independent educational worlds. Where feasible, educators can ask students to identify later clinical situations that resembled, contradicted or complicated prior simulated experiences and then revisit those experiences through guided reflection. Such linkage directly addresses the transfer problem highlighted in the simulation-to-practice literature [15].

Assessment should distinguish proximal learning from distal transfer. Confidence, satisfaction, knowledge tests and performance within simulation are legitimate educational outcomes, but none alone demonstrates recognition of dying in real practice. Transfer-oriented assessment requires evidence that students can notice evolving trajectories, explain their interpretation, seek corroborating information, communicate uncertainty and adapt reasoning to actual clinical constraints. This distinction is summarised in **Table 4**.

**Table 4.** Educational implications linked to the evidence required to demonstrate transfer

| Educational action | Intended mechanism | Immediate evidence that learning occurred | Stronger evidence needed for transfer | Interpretation boundary |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Use ambiguous rather than diagnostic scenarios | Calibrated noticing | Learner integrates several evolving cues | Comparable cue integration during clinical placement | Correct simulation answer alone is insufficient |
| Calibrate emotional challenge and psychological safety | Regulated engagement | Learner articulates uncertainty and remains cognitively engaged | Similar willingness to raise uncertainty with clinical supervisors | Comfort or confidence is not equivalent to recognition |
| Conduct reasoning-focused debriefing | Explanatory reappraisal | Learner can explain how interpretation changed | Learner retrieves and adapts the revised explanation in later encounters | Reflection reported immediately may not persist |
| Include consequential patient/family interaction | Relational interpretation | Communication changes in response to patient/family information | Clinical reasoning incorporates real patient/family preferences | Standardised-patient realism does not reproduce every clinical relationship |
| Repeat simulation across increasing complexity | Adaptive retrieval and pattern differentiation | Reasoning becomes less dependent on single cues | Flexible recognition across different patient trajectories | Repetition can reinforce superficial strategies |
| Link simulation explicitly with placement reflection | Contextual retrieval | Student identifies similarities and differences between settings | Observed use of prior learning during practice | Self-reported transfer should not be treated as objective performance |
| Assess workplace conditions alongside learner capability | Opportunity and permission to enact learning | Supervisor and learner identify potential opportunities to participate | Student is able to voice, justify and appropriately escalate concern | Failure to act may reflect context rather than lack of learning |

The final refined programme theory is shown in **Figure 2**. It represents clinical transfer as conditional rather than automatic and includes explicit failure pathways where the mechanism may not activate or may not be usable in practice.



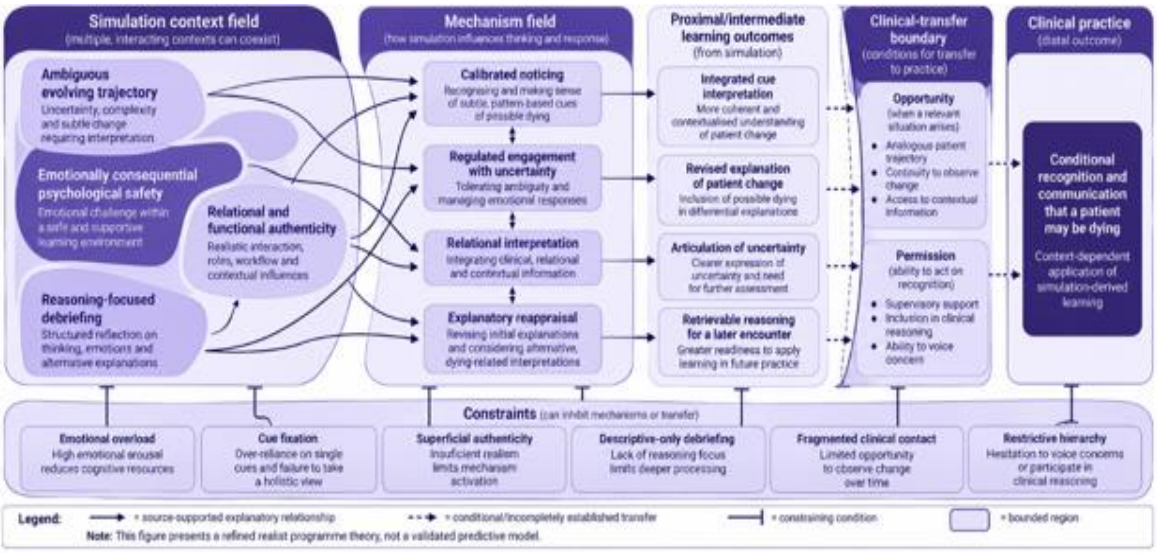



**Figure 2.** Conditional transfer from simulated encounters to recognition of dying in clinical practice

## Conclusion

Simulation can support nursing students' preparation to recognise dying when it requires interpretation of ambiguous trajectories, preserves meaningful emotional engagement, makes relational information consequential and uses debriefing to reconstruct reasoning. Its educational effects should be separated into proximal learning, intermediate cue integration and distal clinical transfer. The latter remains conditional on opportunities to encounter relevant patient trajectories and permission to participate in clinical reasoning. The refined realist

programme theory therefore positions simulation as preparation for recognition whose clinical expression depends on both learner mechanisms and the environments in which those mechanisms must later be used.

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