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Turning Practice into Policy: Qualitative Determinants and Interventions for Accurate UCOD Reselection

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A B S T R A C T
Accurate reselection of the Underlying Cause of Death (UCOD) is vital for mortality statistics. Errors persist when workflows, coordination, and digital controls are weak. This study examined multilevel drivers of UCOD accuracy and designed policies for hospital records units. We ran a qualitative study in four hospitals in Batu, using in-depth interviews with four key informants involved in MCCOD completion/reselection and one focus group with four participants from clinical, records, and managerial roles. Transcripts were analyzed using thematic analysis across personal (knowledge, skills, self-efficacy), interpersonal (communication, pre-final peer review, feedback), and organizational (SOP/SLA, EMR support, audit, workload) levels. Accuracy hinged on two moments: time-bounded clinical–records clarification with evidence, and a pre-final peer review focused on causal sequence and UCOD etiology. A policy package emerged: a one-page SOP with SLA covering Draft MCCOD → Clarification → Reselection → Peer review → Finalization → System entry; a one-page two-focus peer-review checklist; a dashboard of four indicators (sequence consistency, correct UCOD etiology, MMDS compliance, adherence to mortality rules); minimal EMR rules (ban ill-defined or symptom UCOD, hard-stop required fields, warn on illogical chains); and a 30-second self-check with brief case-based micro-learning. UCOD accuracy is a socio-technical outcome. A compact, staged package anchored in SOP/SLA, pre-final peer review, simple dashboards, and EMR guardrails offers a feasible route to strengthen mortality reporting.

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INTRODUCTION

An urgent need for reliable hospital-level mortality data arises because accurate determination of the *Underlying Cause of Death* (UCOD) on the death certificate underpins the quality of mortality statistics, steers health policy, and enables targeted resource allocation (Gamage et al, 2021). The death certificate functions as the entry gateway of information into the system; thus, small upstream errors can amplify downstream—ranging from misclassification of causes to bias in program indicators. In practice, recurrent mistakes—such as listing a single diagnosis without a causal sequence, using symptom terms as the UCOD, or reversing the causal chain—are not merely issues of the individual certifier (Hart et al, 2020). Rather, they reflect untidy work processes, inconsistent collaboration norms, and information infrastructures that lack adequate "safety rails." In service settings with diverse case profiles (degenerative, infectious, trauma), complexity increases due to variability in referral capacity, heterogeneity in EMR adoption, and differences in form design, making data quality highly dependent on local governance. These phenomena affirm that UCOD reselection accuracy is not the product of a single act, but the outcome of a system in which people, processes, and technology operate simultaneously (Rusdi et al, 2022; Chung et al, 2022).

The core problems observed in the field combine micro- and macro-level barriers. At the micro level, variation in understanding causal chains (immediate–intermediate–underlying causes), confidence when clinical data are limited, and non-uniform writing habits trigger repeated deviations in documents that should be standardized. At the meso–macro levels, the absence of a mature reselection SOP, unclear PMIK–physician clarification pathways, lack of consistent pre-final peer review, and minimal audit feedback loops render corrections ad hoc and difficult to institutionalize. EMRs that should help often lack simple prompts or business rules (warnings for empty key fields, prohibitions on symptom terms as UCOD, detection of illogical sequences), so the system fails to alert users to typical errors. High workload and limited resources exacerbate bottlenecks, allowing small mistakes to become systemic when no quality guardrails exist at critical process points.

LITERATURE REVIEW

Conceptually, the data-quality framework—accuracy, completeness, consistency, timeliness, and *fitness for use*—provides the primary lens for assessing UCOD reselection outputs, while a systems-based quality perspective (input–process–output–outcome) helps map where interventions should be placed so that behavior change becomes the norm rather than the exception. For diagnostic inquiry, root-cause analysis (fishbone, 5-Why) structures the decomposition of human factors (knowledge, skills, self-efficacy); methods (SOPs, checklists, peer review); machines/systems (EMR, forms); materials/data (sufficiency of clinical evidence); environment (workload, information flow); and management (policy, audit). Through a social-ecological lens, these factors cluster across three intertwined levels—personal, interpersonal, and organizational—that together shape the *work-as-done* in medical records units (Tilahun et al, 2021; Falissard & Boutron, 2020).

Prior studies across service contexts show consistent error patterns—use of non-etiologic terms, misalignment between UCOD and clinical findings, and fragile completion formats—and cumulatively indicate that multi-level interventions outperform stand-alone trainings. Case-based MCCD training and simple self-checks improve individual consistency; pre-final peer review with specific feedback strengthens in-process quality control; scheduled audits and indicator dashboards track deviations over time; and adding EMR prompts/business rules reduces recurrent mistakes (Rusdi et al, 2022). However, the evidence also shows that technology without governance is insufficient: without formal mandates for reselection pathways, clarification SLAs, and cross-professional accountability, improvements tend to be unstable and recede when service pressure rises (Jhonson et al, 2021).

The urgency is strategic. Under national health insurance and performance targets, biased mortality statistics obscure priorities, distort resource allocation, and weaken program evaluation. At the hospital level, accurate death documentation supports patient safety (through case learning), regulatory compliance, and the perceived quality of care. Downstream data—from registries to published performance indicators—depend on meticulous upstream processes at the point of certificate entry. Ensuring UCOD reselection accuracy is therefore a quality investment with layered benefits: better documents, healthier data, sharper decisions (Park & Kim, 2022).

Given that the problem is rooted in daily practice, culture, and coordination, a qualitative approach is needed to surface practitioner logic, unrecorded risk points outside SOPs, and the cross-professional dynamics that determine the timeliness of clarification. By eliciting the experiences of implementers (PMIK, certifying physicians, quality teams), qualitative inquiry can map context-specific pain points, assess the fit between written policy and real work, and formulate realistic quick wins ahead of structural reforms. The thematic focus centers on factors affecting UCOD reselection accuracy—individual knowledge and self-checks; peer review and feedback; and support from SOPs, EMR, and audits—with the ultimate aim of drafting operational policies that are executable and monitorable at the medical records unit level.

As a solution direction, this study positions unit-level policy as the key lever: standardizing the reselection SOP with defined flow, roles, and clarification SLAs; institutionalizing pre-final peer review with a standardized feedback form; strengthening monthly audits via a dashboard of four accuracy indicators (causal sequence, UCOD etiology, evidentiary alignment, and formatting hygiene); and optimizing the EMR with simple prompts/business rules that act as automatic quality guardrails. This package is bound by a managerial feedback loop so field findings translate into measurable quarterly improvements, with unit leadership ownership and internal champions as prerequisites for sustainability (Ge et al, 2025; Zaki & Sobh, 2023).

In sum, this qualitative study seeks to elucidate the factors influencing UCOD reselection accuracy at personal, interpersonal, and organizational levels; map root causes that hinder reporting quality; and formulate specific, practical, and measurable operational policy recommendations for medical records units

to improve hospital mortality reporting. The expected output is not merely a list of problems but a policy design ready for day-to-day integration—from quick wins to structural improvements—so that UCOD accuracy becomes a consistent, accountable standard of work.

METHODOLOGY

This study employed a qualitative, exploratory design across four hospitals in Batu City to examine factors influencing the accuracy of *Underlying Cause of Death* (UCOD) reselection and to formulate policy directions for the medical records unit. Data sources comprised in-depth interviews with four key informants (certifying physicians/PMIK) and one focus group discussion (FGD) with four cross-functional participants. The interviews traced critical points in the reselection process (construction of the causal chain, etiologic identification, application of MMDS and mortality rules) while probing factors at three levels: personal (knowledge, skills, experience, self-efficacy), interpersonal (communication, peer review, feedback, supervisory support), and organizational (SOP/flow, EMR/system support, audit, workload). Document observation used an abstraction form covering four accuracy outcomes (consistency of the causal sequence, correctness of UCOD etiology, MMDS compliance, and adherence to mortality rules) to verify prior quantitative findings and map policy–practice gaps. The FGD validated the themes and prioritized policy options using an impact–feasibility matrix (standardization of SOP and clarification SLA, institutionalization of pre-final peer review with a structured feedback form, strengthening indicator audits, and adding prompts/business rules in the EMR).

Instruments included a semi-structured interview guide, an observation abstraction form, and an FGD guide with a prioritization sheet; all were pilot-tested to ensure item clarity. Data were analyzed inductively using thematic analysis: initial coding, *codebook* development, theme synthesis, and construction of a theme–evidence matrix linking factors (personal–interpersonal–organizational) to accuracy outcomes and operational policy design. Trustworthiness was ensured through source and method triangulation, brief member checking with key informants, peer debriefing, and an audit trail, with reporting aligned to SRQR principles. Ethical considerations encompassed ethics committee approval, informed consent, and anonymization. To uphold qualitative rigor, we addressed credibility, dependability, and transferability by adhering to the Standards for Reporting Qualitative Research (SRQR) guidelines (O'Brien et al., 2014).

RESEARCH RESULT

Based on in-depth interviews with four key informants and one FGD with four cross-functional participants, the qualitative findings converge on a policy package that directly targets the determinants of UCOD reselection accuracy at three levels (personal, interpersonal, organizational) and at critical process points (clarification, reselection, peer review, finalization, system entry). Informants emphasized that accuracy deviations most often stem from unclear clarification pathways, the absence of consistent pre-final peer review, and minimal digital

safety guardrails; the FGD then confirmed the order of policy priorities and practical implementation steps so they remain realistic under routine workloads.

The first policy is the standardization of a UCOD reselection SOP that specifies the workflow, roles, supporting evidence, and clarification SLAs. Interviews revealed variation in understanding of "who contacts whom" and "when to revise the causal chain," leading to delayed or undocumented corrections. The FGD agreed on a one-page SOP mapping the steps—draft MCCOD → clinical–records clarification with minimum evidence (core clinical notes/relevant tests) → reselection → peer review → finalization → system entry—accompanied by clear SLAs (distinct timelines for routine vs. urgent cases). Implementation entails appointing a person-in-charge at each hospital, piloting the SOP for one reporting cycle, and updating the document based on field feedback.

The second policy is the institutionalization of pre-final peer review with a standardized feedback format. Interviews indicated that informal peer review reduces errors in causal sequence and etiology, but is often sidelined when units are busy. The FGD endorsed a light, dual-focus peer review—checking sequence and UCOD etiology—using a one-page form with two check boxes and a short rationale field; this document serves as an auditable learning record. Implementation begins by pairing cross-professional reviewers (clinical–PMIK) per shift, targeting 100% coverage in month one (stabilization), then moving to proportional sampling with oversampling of complex cases.

The third policy is a dashboard-based audit of accuracy indicators to ensure structured feedback. Interviews highlighted the absence of a feedback loop, while the FGD endorsed four outcome indicators as the quality compass: consistency of the causal sequence, correctness of UCOD etiology, MMDS compliance, and adherence to mortality rules. Implementation consists of brief weekly entries by the person-in-charge, monthly visualization (indicator scores and trends), and concise quality huddles producing three prioritized follow-ups. This mechanism links SOPs and peer review to results, not merely procedural compliance.

The fourth policy is the introduction of minimal prompts/business rules in the EMR or digital forms as automatic quality guardrails. Interviews noted that recurrent errors often persist because the system issues no warnings; the FGD approved three readily deployable guardrails: banning symptom terms in the UCOD position, hard stops for mandatory fields left blank, and warnings for illogical causal chains (e.g., etiologic leaps). Implementation includes simple configuration by local IT or use of templated forms with basic validation, alongside a limited override mechanism requiring a written reason when a prompt is bypassed.

The fifth policy complements individual capacity: a 30-second pre-final self-check (verify logical sequence, verify etiology, avoid mechanistic/symptom terms) and case-based micro-learning. Interviews showed that self-efficacy increases when staff have concrete check tools and context-matched examples; the FGD approved pocket cards/mini-templates placed near workstations and a

10–15 minute "case of the week" at shift start. Implementation is simple, low-cost, and quickly improves practice consistency.

To bind the package, the FGD recommended three implementation phases: (1) Stabilization (Month 1): ratify the SOP, run 100% peer review, activate minimal prompts, and start the dashboard; (2) Scaling (Months 2–3): refine the SOP from feedback, set peer-review sampling, consolidate micro-training, and hold monthly quality huddles; (3) Consolidation (after Month 3): integrate the dashboard into hospital quality committee meetings, set quarterly targets, and refresh training for new staff. Identified risks—staff rotation, workload peaks, limited IT support—are mitigated by appointing an internal champion per unit, providing ready-to-use templates, and aligning audit deadlines with operational calendars to minimize added burden.

Overall, the qualitative results delineate a consistent pathway for change: personal and interpersonal factors improve when self-checks and peer review are standardized, while organizational factors strengthen through SOP–SLA, indicator audits, and digital guardrails. Layered implementation—rapid, lightweight, and documented—shifts UCOD reselection accuracy from dependence on individual actors to a stable, monitorable standard of work.

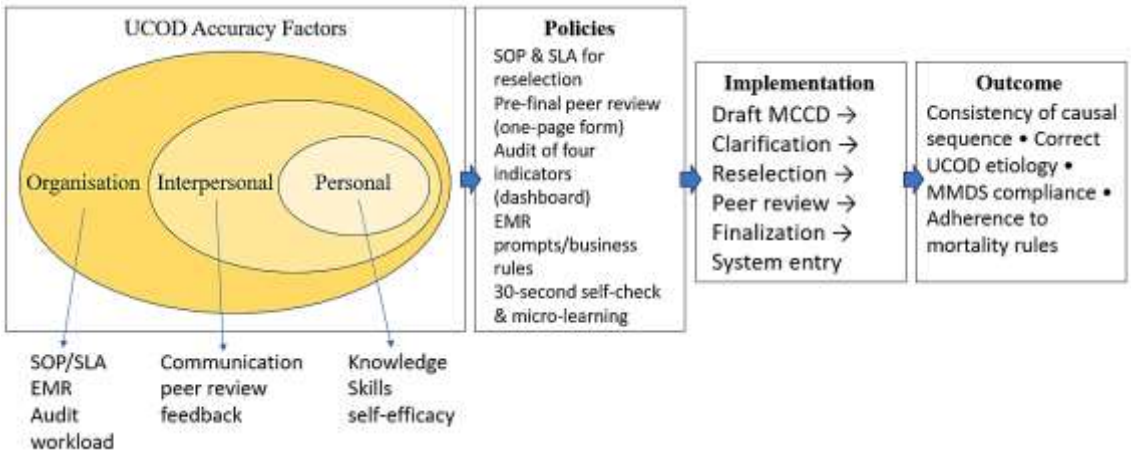

Figure 1. From Factors → Policies → Implementation → UCOD Accuracy Indicators

DISCUSSION

The qualitative findings position UCOD reselection accuracy as an output of a socio-technical system involving individual capacity, collaboration norms, and organizational governance that safeguards critical process points (clinical–records clarification, reselection, pre-final peer review, finalization, and system entry) (Singh et al, 2024). This pattern aligns with service- and data-quality frameworks in which *fitness for use* (accuracy, completeness, consistency, timeliness) is not merely a data attribute but the product of structures and processes engineered so that the correct decision becomes the easiest and most supervised choice.

The study's multi-level integration echoes Tilahun et al.'s findings from Ethiopia, which show that data quality and use are shaped simultaneously by individual characteristics (valuation of data, training, professional

ethos/patriotism, supervision), relational/interpersonal dynamics (coaching, peer-to-peer learning), and organizational features (culture, incentives, infrastructure, accountability, turnover) (Tilahun et al., 2021). This congruence matters because the FGD-agreed policy package—micro *self-check* and micro-learning (personal); pre-final peer review with concise feedback (interpersonal); and clarification SOP–SLA, indicator audits, and EMR prompts/business rules (organizational)—explicitly maps levers at each level. Contextually, Tilahun emphasizes incentives across levels; in our setting, non-financial accountability (e.g., indicator dashboards and managerial member-checking) serves as a viable early substitute before formal incentive designs.

The types and impacts of the most harmful errors also intersect with Gamage et al.'s experimental evidence simulating ten MCCOD error types, showing that reporting ill-defined conditions as UCOD has a *very high* effect on coding outcomes, whereas other errors are relatively "absorbed" by coding rules (Gamage et al., 2021). This justifies focusing our policies on high-value guardrails: banning symptom/ill-defined terms in the UCOD position, hard stops for mandatory fields, and warnings for illogical causal sequences—combined with a two-focus peer review (sequence and etiology). By concentrating safeguards on the most dangerous error class, policies avoid alert fatigue while maximizing signal-to-noise at the point of process.

As an outcome measurement foundation, Flagg & Anderson's list of *unsuitable UCODs* offers a concrete, context-sensitive metric. With 34.7% of U.S. 2018 death records containing unsuitable UCODs (2.2% ill-defined; 12.7% immediate/intermediate; 19.8% nonspecific) and a 0.6% annual decrease since 2013 mainly due to fewer nonspecific UCODs, this indicator is a suitable "compass" for routine dashboard audits (Flagg & Anderson, 2021). In our design, the *unsuitable UCOD* share complements four accuracy indicators (sequence consistency, correct UCOD etiology, MMDS compliance, adherence to mortality rules), ensuring the feedback loop monitors not only procedural compliance but also substantive content quality.

Training remains central but is insufficient on its own. The D4H evaluation across five countries by Hart et al. showed 28–43% reductions in errors via varied strategies (TOT, direct, online) (Hart et al., 2020). Yet these experiences also stress early stakeholder engagement and local committees to build diagnostic culture. Our findings provide the mechanism: without prescriptive SOP–SLA, standardized peer review, indicator audits, and digital prompts, training effects fade under operational pressure. Hence, staged implementation (stabilize—scale—consolidate) and appointing internal champions are positioned as the "bridge" from training to sustained habit.

The scale and patterns reported by Pastor et al. in Madrid—91% of DCs with errors; 38.4% with incorrect causal chains; 16.2% not using the official document—underscore that problems are systemic and require digitalization and end-to-end process reinforcement (Pastor et al., 2023). Similarly, Zaki & Sobh's RCA in Egypt (reporting 100% error) categorizes root causes into personnel, procedures, measurements, materials, equipment, and environment, and proposes a six-step *best practice* for death management bridging clinical and

medicolegal aspects (Zaki & Sobh, 2023). In our context, the mapped process ("draft → clarification → reselection → peer review → finalization → entry") and the enforcement of SOP–SLA plus EMR prompts/business rules serve as a practical translation of RCA toward executable error-proofing without awaiting major transformations.

Finally, predictive technologies should be positioned as augmentation, not substitution. Fang et al. show that a wide-and-deep CNN model achieved precision ~95.8%, recall ~92.1%, F1 ~93.8%, and AUC ~96.0% for UCOD inference across 403,547 deaths, with performance declining as the causal chain lengthens (F1 97.1% for single-cause → 79.5% for four-cause chains) (Fang et al., 2023). These figures open opportunities for an AI "second reader" to flag unusual patterns or more specific etiologic candidates. However, CDS literature warns about alert fatigue and the need for justified overrides; thus, AI is best added only after basic guardrails (business rules and standardized peer review) are stable, keeping the system human-centered and accountable.

CONCLUSIONS AND RECOMMENDATIONS

UCOD reselection accuracy is a socio-technical outcome produced by the alignment of individual capacity (knowledge, skills, self-efficacy), team norms (timely clinical–records clarification and concise pre-final peer review), and organizational governance (clear SOP/SLA, lightweight EMR guardrails, routine audit). The most reliable improvements occur when two process moments—early clarification and pre-final peer review—are time-bounded, documented, and supported by simple digital checks that block high-impact, recurrent mistakes. A pragmatic package therefore emerges: a one-page SOP with SLA defining who-does-what-by-when from Draft MCCOD → Clarification → Reselection → Peer review → Finalization → System entry; a two-focus pre-final peer-review form (sequence and etiology); a monthly dashboard tracking four accuracy indicators; three high-value EMR rules (ban ill-defined/symptom UCOD, hard-stop mandatory fields, warn on illogical chains); and a 30-second self-check with brief case-based micro-learning. Local ownership through unit champions, a data steward, and short quality huddles converts one-off fixes into routine practice.

Evaluate this policy package using multi-site pre–post or stepped-wedge designs with standardized accuracy endpoints and basic cost-effectiveness; complement with process/realist evaluation to elucidate mechanisms, context, fidelity, and where feasible assess the incremental value and usability of advanced digital supports after foundational controls are stable.

ADVANCED RESEARCH

This qualitative, single-region study with a small number of informants relies on self-reported perceptions, lacks direct document/process observation, and does not include concurrent quantitative endpoints—limiting generalizability and causal inference while leaving variation in digital maturity and incentive structures underexplored. Future research should use multi-site pre–post or stepped-wedge designs with standardized accuracy outcomes (e.g., unsuitable-UCOD %, sequence consistency, etiologic correctness, MMDS

compliance), process metrics (time-to-clarification, peer-review coverage, EMR-override rates), and basic cost-effectiveness. Complement impact evaluation with process/realist evaluation to unpack mechanisms, context, and fidelity, and where digital capacity allows pilot incremental guardrails and a transparent AI "second reader" only after foundational SOP–SLA and peer-review controls are stable.

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