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SELECTIVE GROUND TRUTH IN ADAPTIVE MEDICAL AI: PREVENTING EXPERT DRIFT IN PCCP-GOVERNED SYSTEMS

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Background and Aims

Adaptive clinical AI systems increasingly retrain on real-world behavioral data. When clinician or patient overrides are recorded as non-adherence, retraining datasets risk encoding contextual expertise as error. This study examines how labeling schemas influence ground truth integrity in PCCP-governed adaptive systems.

Methods

Adaptive retraining pipelines were analyzed using automated insulin delivery (AID) systems as representative clinical AI environments. Within the U.S. FDA Predetermined Change Control Plan (PCCP) framework, a conceptual metric—Residual Governance Effort (RGE)—was introduced to quantify the magnitude of human corrective intervention required to maintain safe system performance. Structured override labeling, including context-specific reason coding, was evaluated as a safeguard against misclassification during retraining.

Results

Override events frequently encode high-resolution clinical judgment unavailable to model feature space, including sensor instability, competing physiological signals, and situational constraints. When reduced to non-adherence, retraining pipelines optimize toward behavioral conformity rather than outcome-aligned safety. This produces expert drift: a systematic distortion of ground truth in which valid human correction is reclassified as model error, degrading subsequent model performance.

Conclusions

Adaptive medical AI operating under PCCP-based frameworks requires ontological separation between governance-informed overrides and user error. Context-aware override labeling—including structured reason coding—preserves expert signal within retraining datasets, prevents bias accumulation, and maintains clinical validity in continuously evolving models.

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