

### Duke RCA Cause Tree

(1) Front Line Personnel Performance Gap (FLPPG)							(2) Equipment Performance Gap (EPG)		
(3) DUHS Personnel			(4) Contract Personnel		(5) Vendor Personnel				

(A) Procedure	(B) Training	(C) Process Controls	(D) Communication	(E) Human Engineering	(F) Supervision	(G) Hazard/Defect ID and Analysis	(H) Human Error/Cognition	(Q) Equipment	ROOT CAUSES
<b>(A1) Drift (deviation)</b>	<b>(B1) No Training</b>	<b>(C1) No process controls defined</b>	<b>(D1) Not done/delayed</b>	<b>(E1) Interaction with devices</b>	<b>(F1) Preparation of staff</b>	<b>(G1) Change Control Issue</b>	<b>(HA) Attention</b>	<b>(Q1) Preventive Maintenance or Reliability</b>	<b>(M) Management System</b>
A1a-No documented procedure	B1a-Did not plan to train	C1a1-No process control defined	D1a-No method available or not done	E1a-Labeling of equipment or locations confusing or incomplete	F1a-Staff not prepared sufficiently	G1a-Change identification issue	HAA-Unawareness	Q1-PM not sufficient or not done	<b>(M1) Standards, Policies or Admin. Controls (SPAC) Not Sufficient</b>
A1b-Procedure not accessible	B1b-Need not identified	C1a-No independent verification/team-check required	D1b-Delay in communication	E1b-Layout of equipment and supplies problematic	F1b-Work requirements not clear	G1b-No change assessment performed	HAB-Perceived pressure to complete task	Q1a-Critical equipment not identified	M1a-Not defined
A1c-Procedure not followed	B1c-Training not completed	C1b-No STOP defined for review	D1c-Method not appropriate or not sufficient	E1c-Alerts, visual displays not sufficient	F1c-Briefing not carried out	G1c-Change assessment not sufficient	HAC-Task too complex	Q1b-Implementation issue	M1b-Boundaries too loose
A1d-Procedure use optional	<b>(B2) Training Not Adequate</b>	C1c-Indep Verification, team-check not performed as required	D1d-Deficits in electronic communication or documentation	E1g-Insufficient manual backup devices (e.g. manual BP cuff)	F1d-Pilot testing not completed	G1d-Change assessment not timely	HAd-On-the-job distraction	Q1c-Data interpretation issue	M1c-Unclear, contradictory, ambiguous, incorrect
A1e-Staff did not know procedure	B2a-Scope not well defined	<b>(C2) Process Controls not sufficient</b>	D1e-Required communication not defined (in policy/procedure)	E1d-Alarm/monitoring fatigue	F1e-Scheduling of staff	G1e-Risk Acceptance issue	<b>(HB) Misjudgment</b>	Q1d-Troubleshooting, corrective action issue	M1e-Accountability not defined
<b>(A2) Not Sufficient</b>	B2b-Precepting/concurrent training not adequate	C2a-Independent verification, Team-check needs redesign	D1f-Quality of Documentation substandard	E1e-Variation in unit, dept set-ups	F1f-Real-time feedback not provided for incorrect performance	<b>(G2) Proactive Risk/Safety Analysis issue</b>	HBA-Cognitive overload	<b>(Q2) Failures/Other</b>	M1f-Planning, scheduling or tracking of work activities not sufficient
A2d-Necessary scenarios not included	B2c-Testing of knowledge/skill not sufficient	C2c-Errors not excluded or corrected before moving on in work stream	<b>(D2) Handoff Not Sufficient</b>	E1f-Insufficient equipment, supplies	<b>(F2) Staff Assignment</b>	G2a-Analysis not performed	HBB-Habit intrusion (automatic thinking mode vs conscious mode)	Q2-Known problem with equipment not fixed	<b>(M2) SPAC Not Deployed</b>
A2f-Confusing or contradictory	B2d-Insufficient practice after training		D2a-No standard process	E1g-Human interaction with devices	F2a-Staff not qualified	G2b-Analysis not sufficient	HBC-Spatial disorientation	Q3-Unexpected Failure	M2a-Staff not aware of SPAC
A2g-Need clarification of limits	B2e-Sustainment training not sufficient		D2b-Not used or not complete	E1h-Appropriate tools, equipment not used	F2b-Impaired (fatigue, emotions, other)	G2c>Action, mitigation identification issue/gap	HBE-Wrong assumptions	Q4-Equipment storage not sufficient	M2c-Not Enforced
A2h-Details not appropriate (+/-)	B2f-Trainers not sufficiently qualified		D2c-Defined handoff process not sufficient	<b>(E2) Environment</b>	F2c-Conflict between team members	G2d>Action implementation issue	HBF-Lack of information validation/verification (including over-reliance on technology)	Q5-Equipment settings impact not fully understood	M2d-Accountability not reinforced
A2i-Checklist not sufficient/non-existent	B2g-Training not consistent		D2d-Wrong Instructions	E2a-Noisy or other environmental stressors	F2d-Assignment inappropriate	G2e-Risk acceptance issue	HBG-Misinterpretation of information		M2e-Recently changed
A2j-Allows too much interpretation	B2h-Insufficient training resources		<b>(D3) Communication Barriers</b>	E2b-Insufficient protective equipment/garb available	F2e-Insufficient staff; inappropriate staff qualifications	<b>(G3) Reactive Risk/Safety Analysis Issue</b>	<b>(HC) Committed Actions not Carried Out</b>		<b>(M3) Compliance Oversight, Problem Identification</b>
A2k-Overlaps or gaps between procedures or policies			D3a-Standard terminology not used	<b>(E3) Workload</b>	F2f-Supervisor not qualified	G3a-Incident reporting issue	HCA-Shortcuts evoked		M3a-Insufficient monitoring, auditing
			D3b-Read-back/repeat-back not used	E3a-Complexity: knowledge-based decision making	<b>(F3) On-site supervision</b>	G3b-Investigation issue/insufficient	HCB-Task too complex		M3b-Monitoring, auditing scope not sufficient or not defined
			D3c-Hierarchy/Tension barrier (did not speak up)	E3b-Complexity: concurrent monitoring/tasking overload	F3a-Inadequate supervision or too much supervision	G3c>Action, mitigation implementation issue	HCC-Inappropriate order		M3c-Communication to staff group about performance not sufficient
			D3d-Unfamiliar or non-standard terminology or abbreviations used	E3c-Complexity: calculation and data manipulation required	F3b-Teamwork deficits	G3d-Risk acceptance issue	HCD-On the job distractions		M3d-Effective feedback not consistently deployed (individuals)
				E3d-Complexity: repetitive cognitive tasks	F3c-Workload imbalances not corrected by supervisor		HCE-Inadequate tracking of actions		M3e-Follow-through on action plans not sufficient
				<b>(E4) Mitigating Controls</b>	F3d-Improper performance not corrected		<b>(HD) Inadequate Skills or Knowledge</b>		M3f-No response to audit or monitoring findings
				E4a-Cannot identify errors			HDA-Tunnel vision, confirm bias		
				E4b-Cannot mitigate errors			HDB-Inadequate training, missed training		
							HDC-Not familiar with job performance standards		
							HDD-Not familiar with task		
							HDE-Not familiar with availability of information		
							<b>(HE) Inadequate Mental State to Complete Task</b>		
							HEA-Boredom		
							HEB-Lapse of memory		
							HED-Fear or intimidation		
							HEE-Illness, fatigue, injury		
							HEF-Overconfidence		
							HEG-Inadequate incentive		

Adapted from ABS Consulting Cause Map