OTAS© and FMEA in the assessment of surgical teamworking

Lessons learned and future directions

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Surgical teamwork

- Conceptual and empirical work started in 2003
- Aims
  - Develop conceptual models
  - Develop assessment tools
- Focus
  - Surgeon embedded into a team
    - → Teamwork
  - Other aspects of the operative environment
    - → Distractions and disruptions

Methods

- Conceptual development
  - Literature reviews
- Observation
- Self-report
  - Interviews
  - Surveys

Approaches

- Holistic, global approach
  - Assessment of teamwork (OTAS©)
- Detailed, task-specific approach
  - Information transfer (FMEA & interviews)

Observation Teamwork Assessment for Surgery© (OTAS)©

- Aim:
  - Comprehensive and robust measure of teamwork
  - Theory-driven
    - Dickinson & McIntyre (1997) model
  - Capturing entire team
  - Capturing objective and subjective aspects of teamwork
  - Research tool

Phases and stages

Phase	Stage 1	Stage 2	Stage 3
Pre-Op	Pre Op planning & preparation	Patient ‘sent for’ to Anaesthesia	Patient set up to Op readiness
Intra-Op	Incision to reaching target organ	Op specific procedure	Prep to close to closure complete
Post-Op	Reversal of anaesthesia to exit	Recovery and transfer	Feedback and self assessment

Task checklist & behaviour ratings

Tasks

Patient
Equipment/provisions
Communication

Surgeon observer:
Task completion (%)

115 tasks per procedure

Behaviours

Communication
Coordination
Cooperation/back up behaviour
Leadership
Monitoring/Awareness

Psychologist observer:
Ratings on 6-point scale

Scoring:
per behaviour
per phase
per subteam

45 scores per procedure

Construct validation

Are there expert-novice rater differences in the scoring of OTAS?

Methods

- 12 elective urological procedures
- 3 blind raters
  - 2 experts (20+ OTAS obs each)
  - 1 novice
- Analysis
  - Pair 1: expert-expert raters (NS-AH)
  - Pair 2: expert-novice raters (NS-ML)
  - Correlations and mean differences

Correlations: expert-novice

	Communication	Coordination	Leadership	Monitoring	Cooperation	Total OTAS
Pre-op	-0.03	0.07	-0.19	-0.16	0.19	-0.08
Intra-op	**0.60****	0.43	0.32	**0.57***	0.19	**0.60****
Post-op	-0.20	0.15	0.15	**0.52***	0.32	0.25

Correlations: expert-expert

	Communication	Coordination	Leadership	Monitoring	Cooperation	Total OTAS
Pre-op	**0.64****	**0.59***	**0.58***	**0.51***	**0.77*****	**0.74****
Intra-op	-0.28	**0.92*****	**0.63****	**0.62****	**0.94*****	**0.76*****
Post-op	0.30	**0.82*****	**0.69****	**0.65****	0.46	**0.72****

Mean differences: expert-novice

	Communication	Coordination	Leadership	Monitoring	Cooperation	Total OTAS
Pre-op	-0.58	**-0.63***	-0.53	**-0.84***	-1.37	**-0.79****
Intra-op	**-1.33*****	**-1.44*****	**-1.47*****	**-1.33*****	**-1.17*****	**-1.45*****
Post-op	**-1.00****	**-0.83***	-0.33	**-1.00****	**-1.44*****	**-0.92****

Mean differences: expert-expert

	Communication	Coordination	Leadership	Monitoring	Cooperation	Total OTAS
Pre-op	**-0.59***	0.24	-0.24	0.06	-0.18	-0.14
Intra-op	-0.41	-0.12	0.35	0.18	0.18	0.04
Post-op	**-1.06****	**0.59***	-0.06	-0.47	-0.35	-0.27

Conclusion

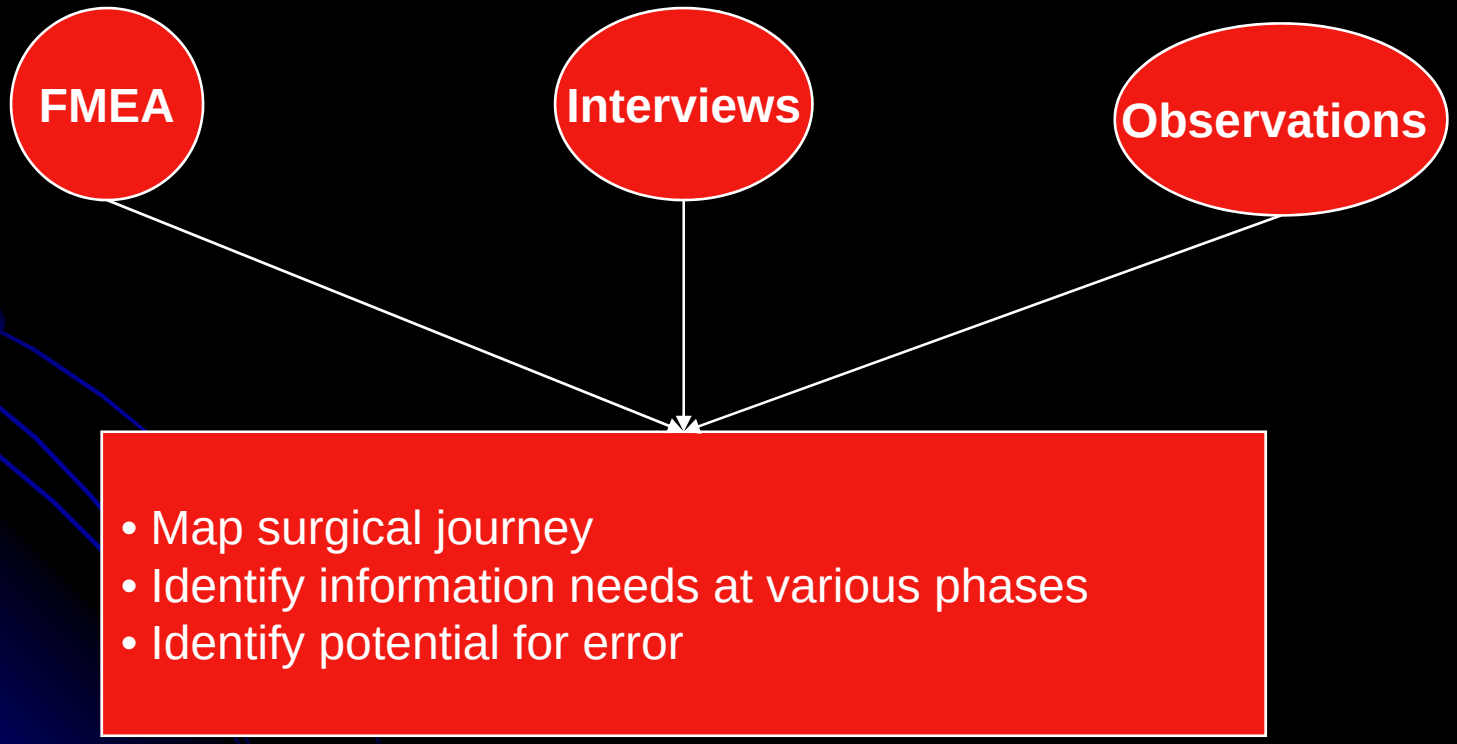
- Evidence of construct validity in expert vs novice raters comparison

Information transfer in surgery

What are the information needs and potential for error in surgical care pathways for major surgery?

Project outline

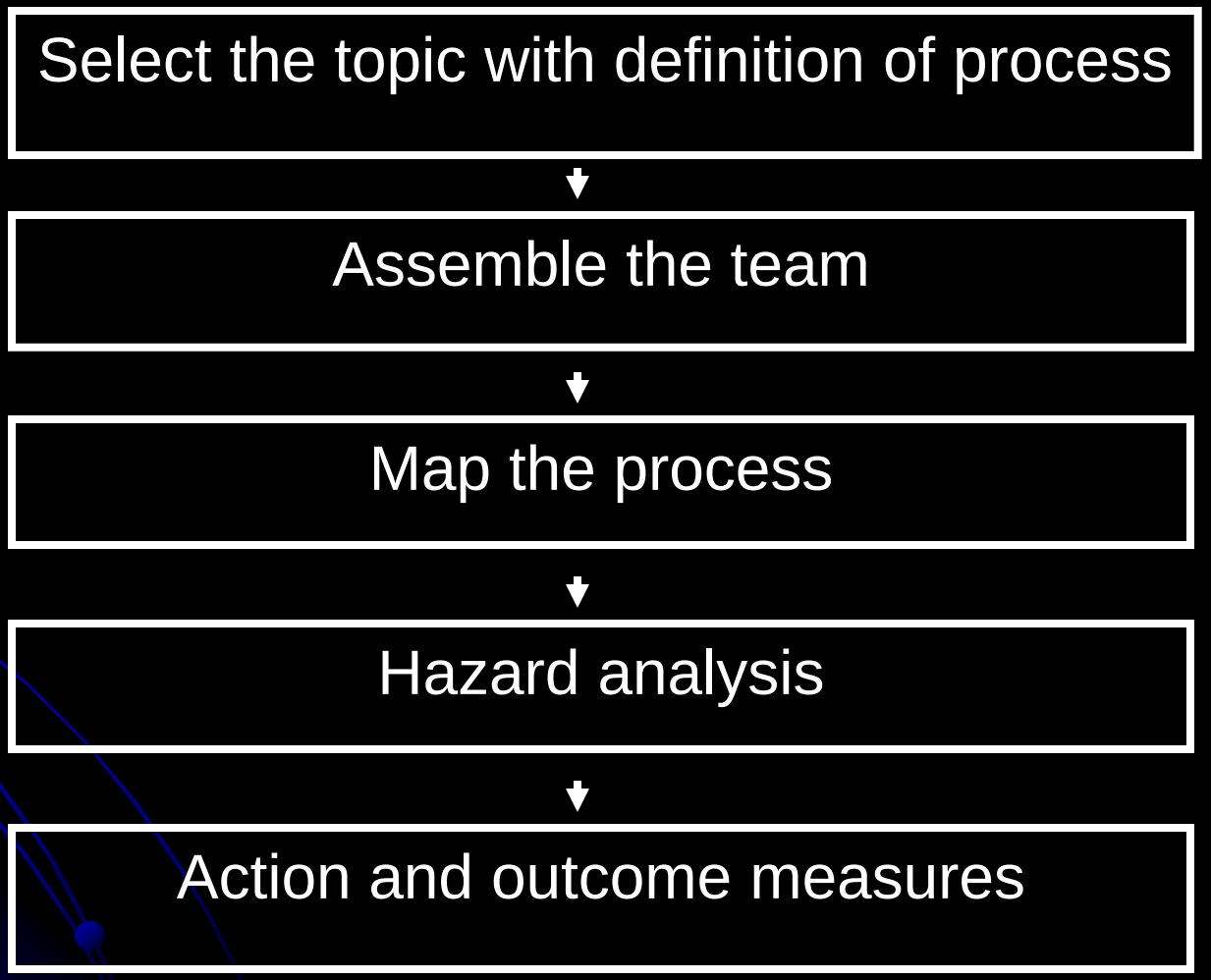
- Project Phase I (Diagnostic Phase)



Methods (i)

- FMEA
  - Failure modes in information transfer
  - Prospective analysis
- 14 healthcare professionals
  - Nurses, surgeons, anaesthetists
- Two focus group sessions

FMEA flow chart



Patients' Surgical Journey

Scheduling the case

Assessment & preparation for surgery

Theatre transfer & preoperative checks

Induction of anaesthesia & operation

Postoperative handover

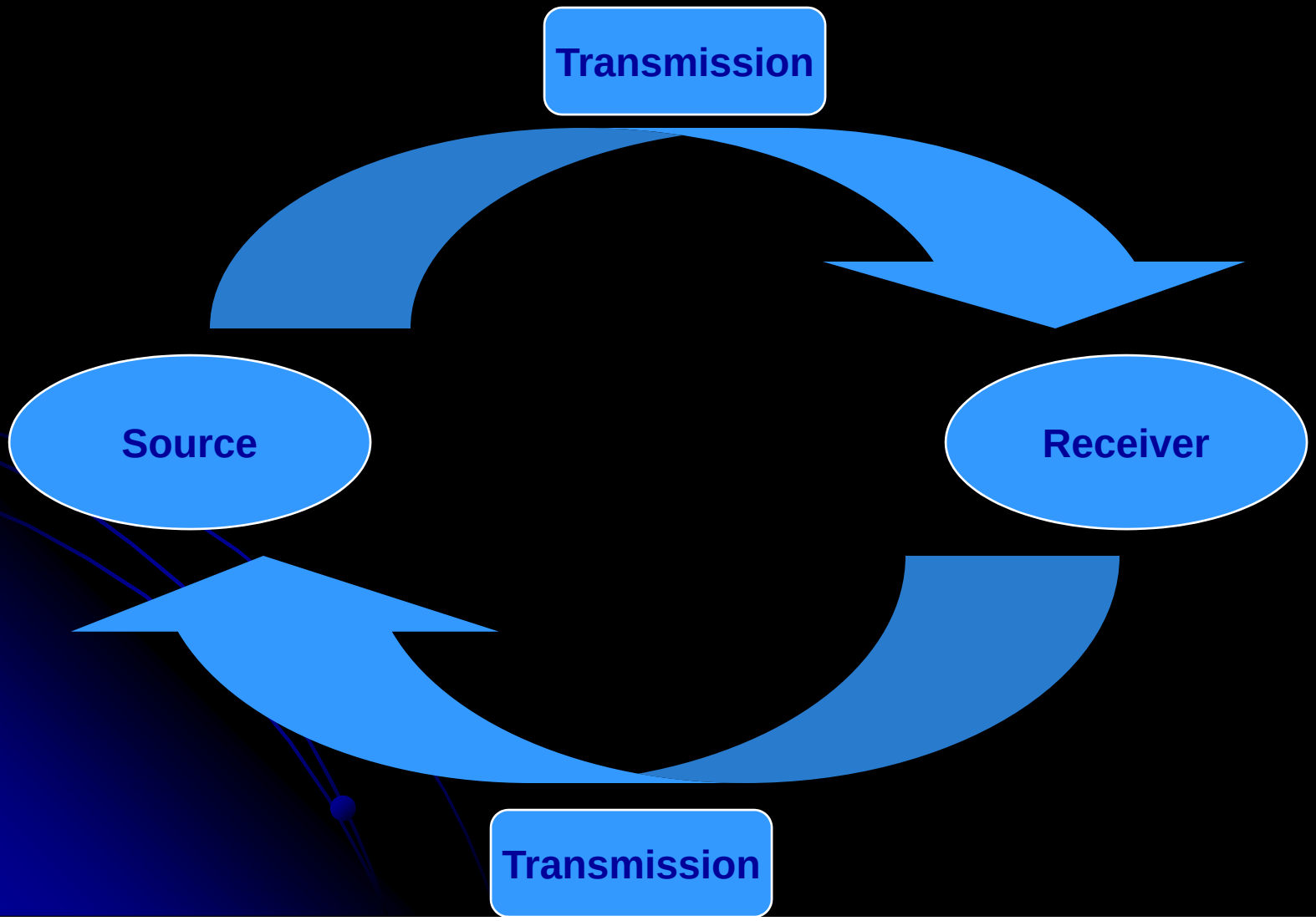
Daily ward care

2	**Preassessment & Preparation for surgery FMEA**	
	Tasks	**Failure modes**
2.1	Attends Preassessment	Misses preassessment
2.2	Information taken from Patient & notes	Old notes and Investigation not seen
		Incomplete information taken from patient
		Wrong information taken from notes/Patient
2.3	Blood Investigations	
2.3.1	Request Blood Investigations including group & save	Failure to request Blood Investigations
		All required investigations not requested
2.3.2	Check Blood Investigations	Failure to check Investigations
		Checked but action not taken
		Checked but action delayed
2.4	Radiological Investigations	
2.4.1	Request radiological Investigations e.g- Cxray	Failure to request radiological Investigations
		All required investigations not requested
2.4.2	Check radiological Investigations	Failure to check investigations
		Checked but action not taken
		Checked but action delayed
2.5	Special Investigations	
2.5.1	Request special Investigations e.g- Echo, Pulmonary funcation tests	Failure to request special Investigations
		All required Investigations not requested
2.5.2	Check Investigations	Failure to check Investigations
		Checked but action not taken
		Checked but action delayed
2.6	Pathology/ Biopsy Results	Failure to check histopathology results
2.7	Speciality Referral	
2.7.1	Request speciality referral	Failure to request speciality referral
		Inadequate referral
2.7.2	Check speciality referral	Failure to check the referral
		Checked but instructions not followed

Methods (ii)

- Semi-structured interviews
- Sample (N=18)
  - 7 Surgeons, 5 Anaesthetists, 6 Nurses
- Interviews transcribed and analysed for content (themes)

Information transfer process



Example: postop handover

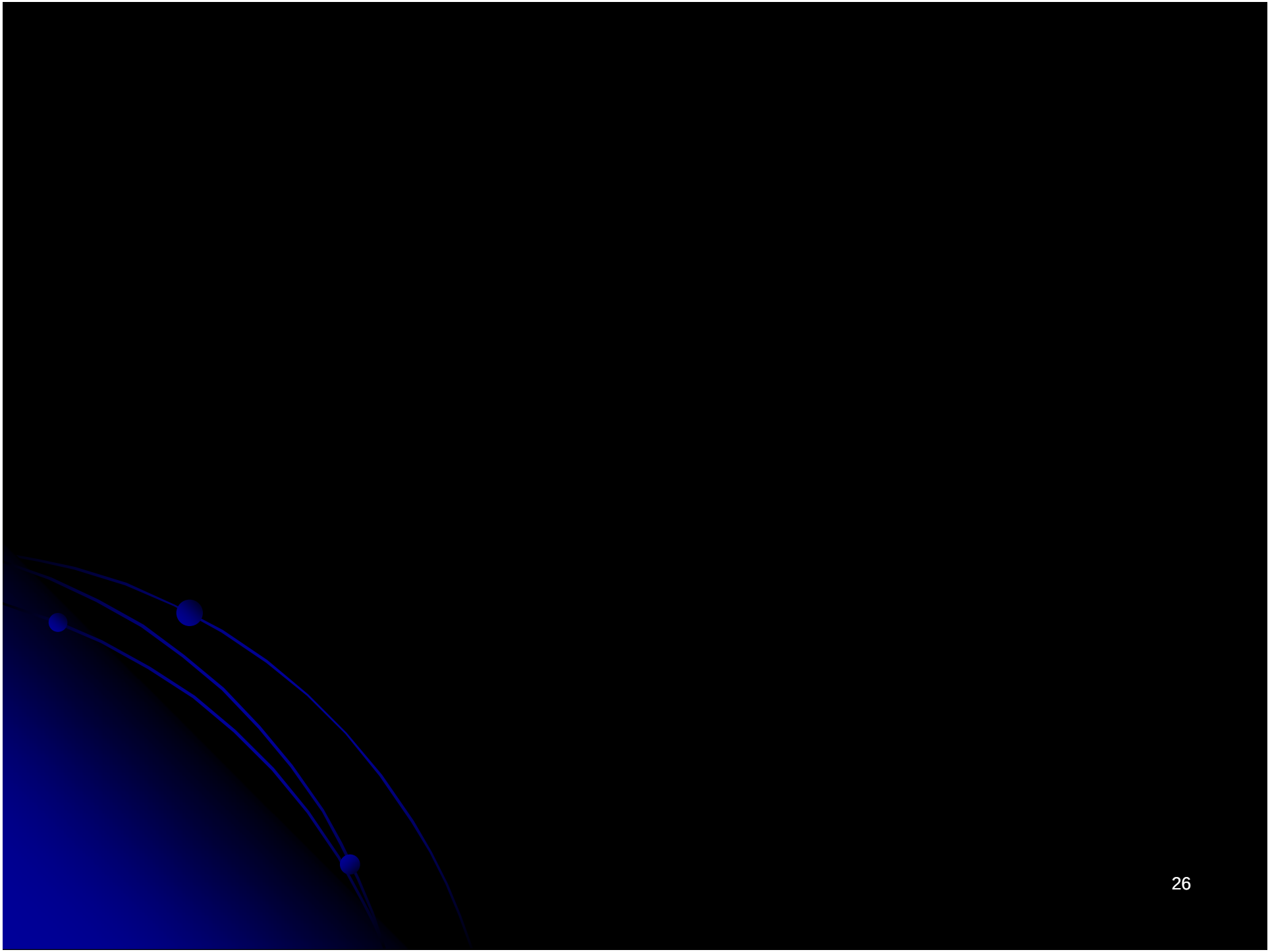
- Source failures (n=15)
  - Failure to write postop instructions
  - Handover incomplete
  - Information at different places
- Transmission failures (n=3)
  - Operation notes not transferred
  - Debriefing does not happen
- Receiver failures (n=1)
  - Nurse multitasking, not gaining full info

Conclusion

- Potential failures in information transfer identified through a triangulated approach to ensure validity
  - FMEA
  - Interviews with experts
  - Observations (to be carried out)

Discussion

- Need for multimodal assessment
  - Global assessment of teamwork vs focused assessment of aspects of it
    - E.g., information transfer
- Cross validation studies



Hazard matrix scores

Severity Score	Patients' Likely Outcome	Description
1	Minor	No injury, increased length of stay or increased length of care
2	Moderate	Increased length of stay or increased level of care for 1-2 patients
3	Major	Permanent lessening of bodily function, disfigurement, surgical intervention required, increased length of stay>3 days, increased level of care>3 patients
4	Catastrophic	Death, transfusion reaction, surgery/procedure on the wrong patient or wrong part of body

Probability Score	Rating	Description
1	Remote	Unlikely to occur (may happen sometime in 2-5 yrs)
2	Uncommon	Possible to occur (may happen sometime in 1- 2yrs)
3	Occasional	Probably will occur (may happen several times in 1 yr)
4	Frequent	Likely to occur immediately or within a short period (may happen several times in1 month)

Detectability Score	Rating	Description
1	Always	Certain to detect before an error/adverse event
2	Likely	High likelihood to detect before an error/adverse event
3	Unlikely	Low likelihood to detect before an error/adverse event
4	Not possible	Almost certain not to detect before an error/adverse event

Please give the score for the most likely outcome for that failure (>50% of the times), Assuming there are no further checks down the line of that process.

Preassessment & preparation for surgery

- Source failures (n=10)
  - Information staggered
  - High-risk cases not flagged up
  - Specialist referrals unclear
- Transmission failures (n=13)
  - Lack of interdisciplinary communication
  - Communication not transparent
- Receiver failures (n=5)
  - Investigations not checked
  - Specialists opinion not followed

Theatre transfer

- Source failures (n=15)
  - List changed multiple times
  - Incomplete handover from ward to theatre team
  - Notes, consent, wristband missing
- Transmission failures (n=6)
  - Change of lists not communicated
  - Failure of info transfer from Anaesthetic to theatre staff
- Receiver failures (n=8)
  - Equipment not checked
  - ITU/HDU availability not checked

Daily ward care

- Source failures (n=12)
  - Decisions unclear
  - Nurses not available for ward rounds
  - Notes documentation poor
- Transmission failures (n=8)
  - Lack of communication between surgical team and nurses
  - Poor communication within surgical team
- Receiver failures (n=1)
  - Care pathway not followed