The strengths and weaknesses of

single speciality
vs.
inter-speciality
vs.
interprofessional

Simulation-based Education and Training

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SIMPO 10th September 2025 BRNO

Conflicts of interest

- None

- Photographs of learners were taken with consent

Simulation-based Education and Training (SBET)

Single speciality / single discipline SBET refers to training individuals in relation to unique skills sets particular to a specific discipline (e.g. medical and sub-specialties, nursing, midwifery, pharmacy, etc.)

Inter-speciality / cross-speciality SBET refers to a situation where two or more (often medical) specialities train together (e.g. anaesthesiology and surgery)

Interprofessional / multiprofessional / interdisciplinary / multidisciplinary SBET refers to a situation where professionals from various healthcare disciplines learn about, from, and with each other to enable effective collaboration and improve patient outcomes; it is often referred to as **Simulation-based Team Training (SBTT)**

Single speciality (SS)

- Focused on specific knowledge and skill sets including material of little relevance to other specialities
- Targets specialties where essential skills can be realistically simulated using equipment across a large spectrum of fidelity
- Allows standardization of under- and post- graduate specialist training
- It often takes place off site in simulation laboratories
- Simplifies the logistics of organizing simulation training

SS modalities

- Case studies and problem-based discussions to built and improve soft skills, e.g. decision-making and problem solving

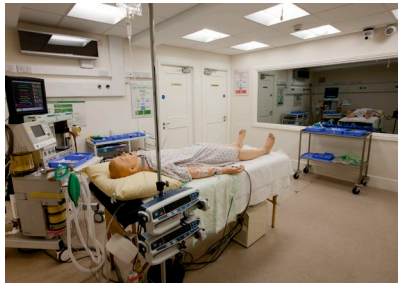
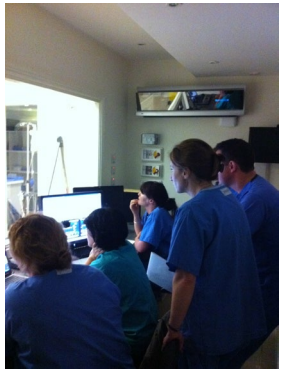
- Serious games - a fun yet purposeful and engaging learning game combining certain learning objectives with game elements that require decision-making, action and problem-solving

- Procedural skills training using low-. medium-, high-, virtual or augmented reality simulators

- High-fidelity manikin-based simulations that integrate knowledge, technical and non-technical skills to manage complex clinical events all while ensuring patient safety through risk-free training





SS anaesthesiology SBET

- Adaptation of *"Training Crew To Work In Teams"* concept (NASA 1970; Cockpit Resource Management CRM - Lauber 1979; Anesthesia Crisis Resource Management ACRM - Gaba 1980's)

- Learn how to be a good team member and coordinate patient care with other disciplines in high-fidelity simulation scenarios; other disciplines are role played by confederates or participants

- Acquisition and application of fundamental skill sets (EBA UEMS ETR 2018; Savoldelli 2024)

- Training and evaluation of anaesthesia non-technical skills (ANTS - Fletcher 2003)

- Practice effective communication tools e.g. close-loop communication (Boyd, 2014; SBAR, Lo 2021; SNAPPI, Weller 2014); graded assertiveness tools (CUSS, Eppich 2015)

- Use of checklists (WHO - Haynes 2009; RSI - Morris 2022) and algorithms (ACLS, DAS, MH, anaphylaxis, LAST)

EJA

Eur J Anaesthesiol 2024; **41**:43–54

OPEN

ORIGINAL ARTICLE

Integration of simulation-based education in anaesthesiology specialist training

Synthesis of results from an Utstein Meeting

Georges L. Savoldelli, Crina L. Burlacu, Marc Lazarovici, Francisco Maio Matos and Doris Østergaard, Utstein Simulation Study Group

Table 1 Top 10 scenarios and procedures for which all trainees should be trained. I and proportions participants cited a given scenario or procedure

Critical clinical scenarios	
Crisis situations	Handling the difficult airway
	Anaphylaxis
	Malignant hyperthermia
	Cardiac arrest
	Local anaesthesia toxicity, high block
	Cardiogenic Shock, Embolus
Specific patient groups	Obstetrical crisis situations
	Trauma and massive bleeding
	Crisis situations in paediatrics
Adverse events	Disclosure and debriefing of team
Procedures	
Airway	Basic
	Advanced
	Cricothyroidotomy
Vascular access	Central line
	Arterial line
	Peripheral vein
	Intraosseous
Nerve blocks	Central nerve blocks
	Peripheral nerve blocks
Point of care ultrasound	Heart, lung, abdomen, etc.

10 CURRICULUM DOMAINS

- Boot camp/initial training
- Airway management
- Regional anaesthesia
- Point of care ultrasound
- Obstetric anaesthesia
- Paediatric anaesthesia
- Trauma
- Intensive care
- Critical events in anaesthesia
- Professionalism & difficult conversations

Table 2 SBET airway management course

Overall learning goals		
Provide all anaesthesiology residents with structured training in the equipment and techniques most frequently used during routine clinical practice and advanced AWM		
Develop and practice the social and cognitive skills relevant to AWM		
Learning objectives	**Examples of educational strategies and tools**	**Methods of formative evaluation and measurable learning outcomes**
Knowledge		
Normal airway anatomy and raise awareness of difficult airway anatomy.	Interactive lectures	Pre- and post-MCQs
Oxygenation and ventilation physyiology; methods for optimising oxygenation, improve ventilation and extending apnoeic time	E-learning	Formative assessment
General and specific pharmacology relevant to AWM, e.g. NMBA, reversal agents in anaesthesia	Guidelines/selected publications[23–25,30]	
Monitoring techniques, e.g. pulse oximetry, capnography	Website of difficult airway societies	
Airway assessment	Selected social media resources	
Airway rescue techniques, how to anticipate and plan for and manage a difficult airway		
Cognitive aids (e.g. AWM guidelines)		
Poor AWM outcomes and deficiencies related to judgement, communication, planning, equipment and training		
Clinical skills	**Examples of hands-on clinical skills stations using part-task trainers**	
To develop basic and advanced airway skills (following a longitudinal competence-based training curriculum)	Face mask ventilation techniques; direct and videolaryngoscopy; SAD insertion and intubation via SAD; Flexible Bronchoscopy; HFNO; e-FONA techniques; Lung isolation techniques	OSCE (checklist, global rating scale) video assessment (self, peers, faculty)
To familiarise with and practice using equipment and techniques commonly used in clinical practice	Video-assisted demo of rescue techniques	Work-based assessment during routine cases (DOPS)
To familiarise with and practice guidelines relevant to each institution/region/country	Expert live demonstration	Peer and expert feedback
To familiarise with and practice rescue airway management protocols and guidelines[31–37]		Portfolios
Simulation for applying knowledge, clinical skills and social and cognitive skills (non-technical)	**Examples of HF simulated airway scenarios followed by debriefing**	
To integrate knowledge, airway skills, and social/cognitive skills in the management of simulated airway crisis	Unanticipated difficulties in routine AWM	Structured reflective debrief by trained faculty[23–25,30]
To develop social and cognitive skills, e.g., anticipation and planning, task management, communication and team working, decision-making and situation awareness	Unanticipated difficulties in rapid sequence induction	ANTS taxonomy[29]
To understand the role of human factors and ergonomics in airway crisis[37]	Intraoperative hypoxia secondary to airway devices displacement/blockage	Learning plans
To train together with other specialities (e.g. general surgery, emergency medicine, otorhinolaryngology residents) and understand their roles	Displaced tracheostomy	Work-based assessment
To encourage reflection on one's own and peers' performance in a safe simulation environment	Unrecognised oesophageal intubation	
To learn how to receive and give constructive feedback aimed at reflection and learning	Cannot intubate cannot oxygenate & eFONA	
To devise learning plans to bring home to the training supervisor	Difficult/failed extubation	

ANTS, anaesthetists' non-technical skills; AWM, airway management; DOPS, direct observation of procedural skills; e-FONA, emergency front of neck access; HF, high-fidelity; HFNO, high-flow nasal oxygen; MCQ, multiple choice questions; NMBA, neuromuscular blocking agents; OSCE, objective structured clinical examination; SAD, supraglottic airway devices.

Savoldelli G, et al. 2024

College of Anaesthesiologists Simulation Training (CAST)

Simulation Courses	Description
SAT 1-3	
Anaesthesiology Emergencies	A simulation course covering anaesthetic emergencies arising from environmental and technical problems
ARREST (Anaesthesiology Related Rare Emergency Simulation Training)	A simulation course covering anaesthetic emergencies arising from rare clinical events
COAST (Crisis in Obstetric Anaesthesiology Simulation Training)	A simulation course covering obstetric and obstetric anaesthesia scenarios for doctors working in or about to work in Obstetric Anaesthesia posts
PAE (Paediatric Anaesthesiology Emergencies)	A simulation course covering paediatric emergencies and paediatric anaesthesia scenarios for doctors working in or about to work in Paediatric Anaesthesia posts
SICC (Simulation in Intensive and Critical Care)	A simulation course covering intensive care medicine scenarios for doctors working in or about to work in ICM
SAT 4-6	
CDMP (Clinical Decision Making in Paediatrics)	A simulation course covering senior paediatric decisions and scenarios for doctors working in or about to work in Paediatrics at a senior level
A-CRISIS	A simulation course covering crisis management in the operating theatre
Managing Adverse Events (MAE)*	A multi-specialty simulation course covering anaesthesia and surgery ; covers both anaesthetic and surgical complications; covers technical and non-technical skills
Multidisciplinary Anaesthesiology Surgery Crisis Operation Training One (MASCOT 1)*	A multi-specialty simulation course covering anaesthesia and surgery ; covers both anaesthetic and surgical complications; covers technical and non-technical skills
MASCOT 2/Trauma	A multi-specialty simulation course covering anaesthesia, surgery and emergency medicine; non-technical skills

Irish Journal of Medical Science (1971 -) (2018) 187:1051–1056
https://doi.org/10.1007/s11845-018-1778-1

ORIGINAL ARTICLE

The College of Anaesthetists of Ireland Simulation Training programme: a descriptive report and analysis of course participants' feedback

Aine Cafferkey[1] · Elizabeth Coyle[1] · David Greaney[1] · Sinead Harte[1] · Niamh Hayes[1] · Miriam Langdon[1] · Birgitt Straub[1] · Crina Burlacu[1]

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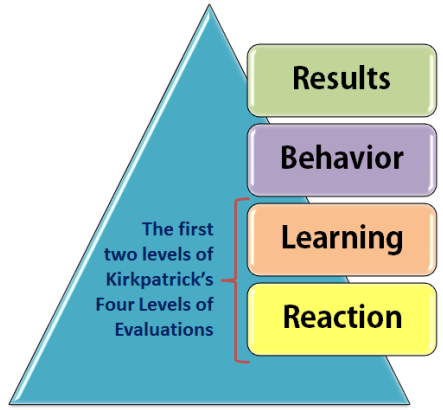
Statement	AE	ARREST	PAE	COAST
S1	5 [4-5]	5 [4-5]	5 [4-5]	5 [4-5]
S2	5 [4-5]	5 [4-5]	5 [4-5]	5 [4-5]
S3	5 [4-5]	5 [4-5]	5 [4-5]	5 [4-5]
S4	5 [4-5]	5 [4-5]	4 [4-5]	5 [4-5]
S5	5 [4-5]	5 [4-5]	5 [4-5]	5 [4-5]
S6	4 [4-5]	4 [4-5]	5 [4-5]	5 [4-5]
S7	5 [4-5]	5 [4-5]	5 [4-5]	5 [4-5]
S8	5 [4-5]	4 [4-5]	5 [4-5]	5 [4-5]

S1 The course met the stated educational objectives.
S2 The course matched my own training needs.
S3 I found the course relevant to my stage of training.
S4 I found the course relevant to my current clinical practice.
S5 The methods of delivery were adequate to the courses stated objectives.
S6 The pace of the course was adequate.
S7 I am overall satisfied with the course.
S8 The course will change my future practice.

	Number of matched forms analysed	Mean pre-course confidence (SD)	Mean post-course confidence (SD)	*P* value
ARREST scenario				
1	97	4.3 (2.1)	7.3 (1.5)	< 0.001
2	54	6.6 (1.9)	7.4 (1.5)	< 0.001
3	50	4.6 (1.8)	7.5 (1.5)	< 0.001
4	78	7.1 (1.5)	7.9 (1.1)	0.05
5	22	5.9 (1.8)	8 (1.6)	< 0.001
6	7	6.3 (2.6)	6 (3.3)	0.7
AE scenario				
1	14	5.3 (2.2)	7.5 (1.4)	< 0.001
2	40	4.3 (2.1)	6.9 (1.7)	< 0.001
3	2	5 (2.8)	6 (0)	0.7
4	11	3.4 (2)	6.5 (1.7)	0.003
5	1	7	8	–
COAST scenario				
1	160	4.6 (2.3)	7.5 (1.7)	< 0.001
2	158	6.4 (2.5)	8.1 (1.6)	< 0.001
3	160	4.9 (2.2)	7.6 (1.6)	< 0.001
4	160	5.5 (1.9)	7.5 (1.6)	< 0.001
5	166	5.7 (2.3)	7.7 (1.6)	< 0.001
6	161	5.7 (2.2)	8 (1.5)	< 0.001
PAE scenario				
1	42	5.4 (2.3)	7.9 (1.2)	< 0.001
2	144	4.7 (2.1)	7.5 (1.4)	< 0.001
3	23	4.5 (2.3)	5.5 (2.1)	0.05
4	143	3.9 (1.2)	7.5 (1.5)	< 0.001
5	151	4.9 (2.1)	8.1 (1.5)	< 0.001
6	51	5.4 (2.3)	7.8 (1.3)	< 0.001
7	87	4.1 (1.9)	7.8 (1.5)	< 0.001
8	145	4.9 (2.3)	7.3 (1.6)	< 0.001



Outcomes of SS anaesthesiology SBET

- Evidence from multiple studies and reviews supports the effectiveness of SBET in achieving **Level 1** (satisfaction) and **Level 2** (knowledge and skills development) outcomes (Lorello 2013; Kennedy 2014; Su 2023);
- There is also evidence at **Level 3 and 4** for essential anaesthesiology technical skills

  Airway training (Naik 2001, Samuelson 2016)

  Cardio-vascular bypass weaning (Brupaccher 2010)

  Central vascular access (Madenci 2014; Burden 2012; Shieh 2015)

  Ultrasound guided regional anaesthesia (Niazi 2012)

  POCUS (Ferrero 2014, Ramsingh 2015)

- Simulation education strategies performed better than non-simulation interventions in relation to changes in behaviour (Lorello, 2013)
- Increased ability to speak up after a course designed to teach ANTS (Matos, 2020)
- The role of virtual, augmented reality and artificial intelligence is not clear (Duffy, 2023)

Inter-speciality (IS)

Strengths

- A vehicle for teaching, rehearsing and analysing inter-speciality performa
- Improves cross-speciality interaction and understanding
- Promote familiarity with peers
- Develops a culture of patient safety

Weaknesses

- Some of single-speciality goals are difficult to achieve
- Difficult to organize from a logistical standpoint

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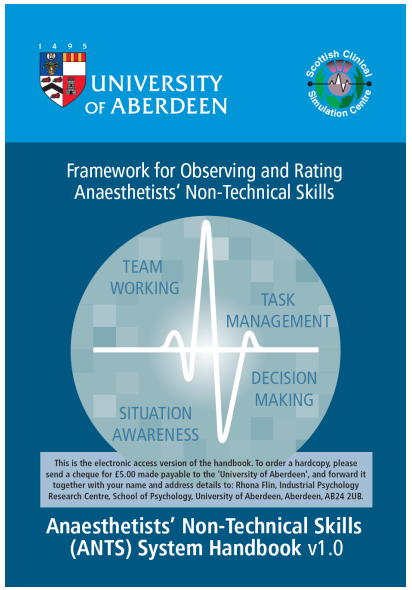
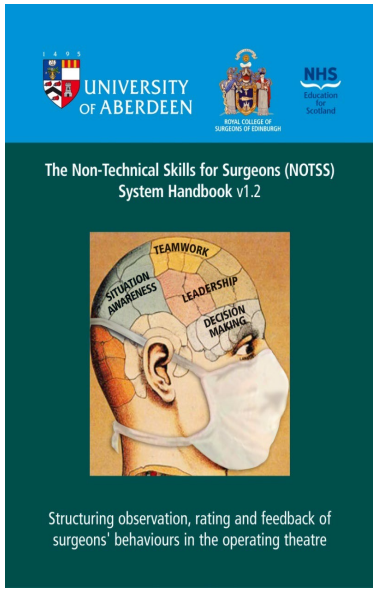
CAI & RCSI inter-speciality MASCOT

- A model of combined-specialty training equally relevant to all specialties
- Common learning objectives with strong emphasis on cross-speciality crisis
- Practice and demonstration of
  - specialty-specific knowledge and technical skills
  - common non-technical skills : ANTS, NOTSS, and CRM principles





Some of the 'likes'

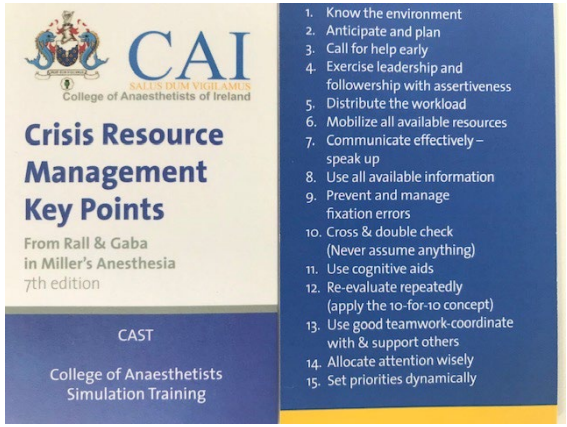
'combined with anaesthetics very useful'

'different specialities enhanced the course'

'best I have experienced compared to ATLS, CRISP'

'interesting to hear the point of view of surgical team'

'interactions with real surgeons'



Feedback questionnaire (Likert scale; 1 = strongly disagree; 5 = strongly agree)	A N = 46	S N = 42	P-value
Q1: The course met the stated objectives	4.26	4.42	0.26
Q2: The course matched my own learning needs	4.13	4.21	0.62
Q3: I found the course relevant to my stage of training	4.26	4.21	0.47
Q4: I found the course relevant to my practice	4.32	4.14	0.30
Q5: The methods of delivery were adequate to the course stated objectives	4.21	4.42	0.18
Q6: The pace of the course was adequate	3.89	4.14	0.23
Q7: I am overall satisfied with the course	4.28	4.30	0.89
Q8: The course will change my future practice	4.00	3.95	0.44

Feedback questionnaire (Likert scale; 1 = strongly disagree; 5 = strongly agree)	A N = 42	S N = 41	EM N = 23	P-value
Q1: The course met the stated objectives	4.38	4.41	4.39	0.97
Q2: The course matched my own learning needs	4.28	4.31	4.30	1.0
Q3: I found the course relevant to my stage of training	4.41	4.46	4.26	0.5
Q4: I found the course relevant to my practice	4.31	4.32	4.21	0.8
Q5: The methods of delivery were adequate to the course stated objectives	4.35	4.56	4.47	0.2
Q6: The pace of the course was adequate	4.04	4.51	4.36	0.01
Q7: I am overall satisfied with the course	4.29	4.47	4.39	0.47
Q8: The course will change my future practice	4.16	4.14	3.95	0.53

What we've learnt from MASCOT ?

Dislikes & suggestions..

- 'scenarios biased towards anaesthetic complications'; 'slight predominance of anaesthetic crisis of less relevance to surgical trainees'
- 'weighted towards anaesthetics and general surgery/general trauma'; 'not much relevant surgical scenarios for each sub-speciality'; 'very general surgery orientated; more speciality-specific scenarios'; 'ICU/ED scenarios may be more relevant to surgical training'
- 'maybe have actual changes in the surgical field portrayed in some way on the screen e.g. bleeding'

Improvements

- Pre-course reading - ANTS & NOTSS
- Emphasis on explaining the learning objectives during introduction
- Shift in the simulated crisis trigger from one speciality end to the other
- Enhanced specialty-specific realism: environment, equipment & moulage
- Allocation of scenarios to participants according to sub-surgical specialty interests
- Mix of OR-, ED- and ICU-based scenarios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Interprofessional (IP) or **Simulation-based Team Training (SBTT)**

“Work Together Train Together “

- Training teams as they work so they perform safely when it matters most to patients
- More effective for learning teamwork skills than training individuals separately (National Academies Press, 1994)
- A model endorsed by highly influential healthcare expert organizations (IOM, 2003; WHO, 2010 & 2021; The Lancet Commission, 2022)
- Recommended by world renowned expert authorities in SBET (Gaba 2010) & organizational psychology and team science (Salas, 2005)
- Team training strategies and interprofessional learning interventions have led to enhanced teamwork behaviours, clinical processes and patient outcomes (Weaver, 2014; Webster, 2024)

Panel 2: A sample of innovations in the education of health professionals between 2010 and 2019

Competency-based education

Teaching:

- Entrustable professional activities (EPAs) as requirements for graduation[14–16]
- New frameworks of professional activities and markers of progress, such as the EPAs used by the Association of American Medical Colleges[17] or the markers used by the American Board of Internal Medicine[18]
- Emphasis on the implementation of competency-based education across all disciplines, particularly medicine and nursing[15,16,18,19]

Development stages:

- Difficulty in balancing generic versus specialised competencies throughout education[20,21]
- Recognition of interprofessionalism and teamwork as important competencies[22–26]

Important entities:

- Community-based organisations[27,28]
- Employers in private and public sectors[21,28–31]
- US Federal Government for Graduate Medical Education Funding[24]

Implementation challenges:

- Establishing relevant competency-based curricula[19,32,33]
- Reliable assessment of competencies[34–39]
- Establishing the long-term effects[40–43]
- Leadership[19,44–47]
- Global health[48–52]

Interprofessional education

Competencies for interprofessional collaborative practice:

- Collaboration among disciplines to develop important competencies[53]
- Need for efficient and multidisciplinary health-care teams to address population health[54–56]
- Interprofessional collaboration between health and non-health students, such as the Praboromarajchanok Institute (Nonthaburi, Thailand) doing activities with both nursing and engineering students[57]

Settings:

- Experiential engagement in authentic, real-world settings that are crucial for learning, development of professional identity, and social responsibility[58–60]

Critical skills, training, and identity:

- Leadership skills essential for success[54,61,62]
- Uniprofessional versus interprofessional identity (ie, identity as a health-care worker *vs* identity as a team)[63,64]

Implementation challenges:

- Emergence of strategies to develop, implement, and assess interprofessional education[65,66]
- Small amount of evidence of successful implementation[67]
- Structural, cultural, financial, and curricular barriers[61,68–72]

Information technology-facilitated education

Knowledge management:

- Repository for knowledge and data analytics, such as Coursera[73,74]
- Wearable technology, such as smartwatches, and electronic health records linkages

Pedagogic changes:

- Flipped classrooms[75]
- Computer-facilitated synchronous and asynchronous learning[76]

Distance and outreach:

- Outreach outside the institution and globally[77–79]
- Vodcasts (video podcasts), podcasts, and microvideos[80]

Simulation and artificial intelligence:

- Use of virtual patients and avatars[81]
- Telesimulation[82]
- Serious games[83,84]
- Augmented reality[85]
- Interprofessional education facilitated by simulation[86,87]

Lancet Commission – Health Papers, 2022

- Recognize the limitations of professional education and continuing professional development which are traditionally done in silos
- Acknowledge the importance of **specialist knowledge and skills** for handling well-specified speciality-specific clinical functions
- Define **essential skills** for the future workforce; patient-centred communication skills; Inter-disciplinary and coordination skills; Digital and AI-related skills; Green skills
- Emphasizes the importance of **common functions and skills** that are shared across all professions, i.e. **transversal skills**

What makes a healthcare team effective ?

e.g. ,
WHO Checklists
Handovers
Regular updates
SNAPPI
SBAR

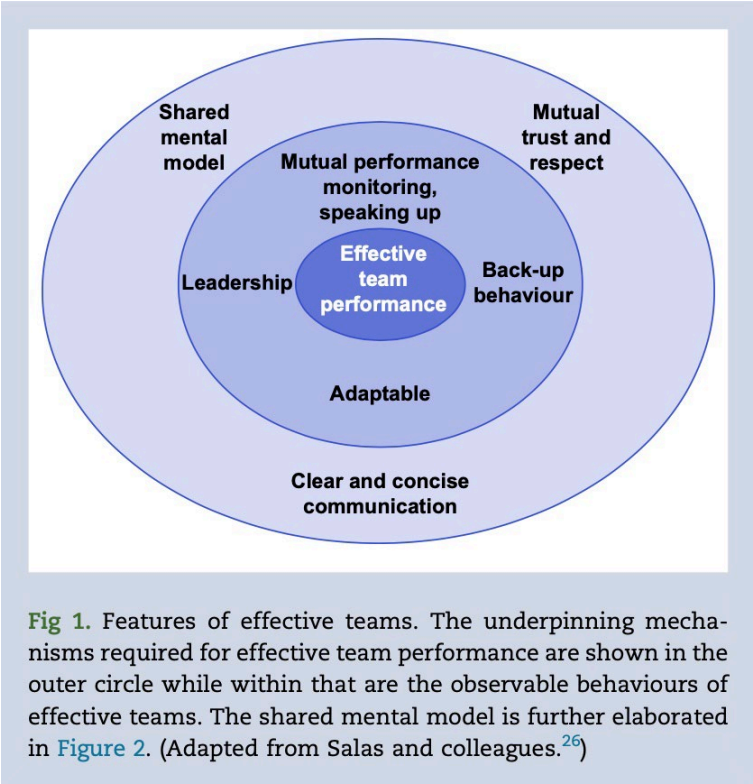


Fig 1. Features of effective teams. The underpinning mechanisms required for effective team performance are shown in the outer circle while within that are the observable behaviours of effective teams. The shared mental model is further elaborated in Figure 2. (Adapted from Salas and colleagues.[26])

e.g.,
Introduction of new members
Addressing by name
In situ simulation

e.g., Directed & closed-loop communication

Weller J, et al. BJA. 2024

IP learning interventions that improve team effectiveness

Principle- and method-based training

- CRM
- TeamSTEPPS
- SBTT

Tools-based training

- SBAR
- Debriefing checklist
- Interprofessional rounds
- Communication tools
- Triggering tools (e.g., dashboards)

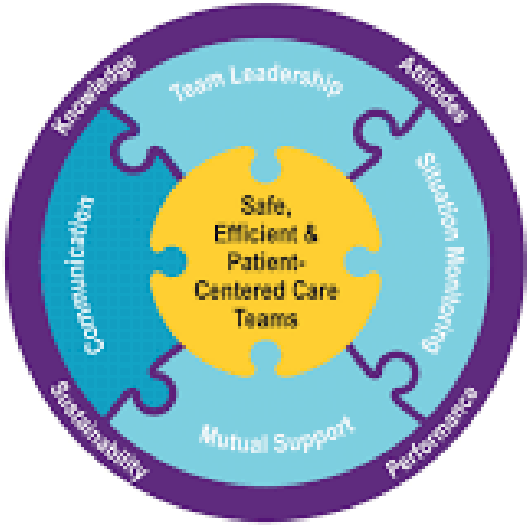
ORGANIZATIONAL RE(DESIGN)

Buljac – Samardzic M, et al. Human resources for health 2020

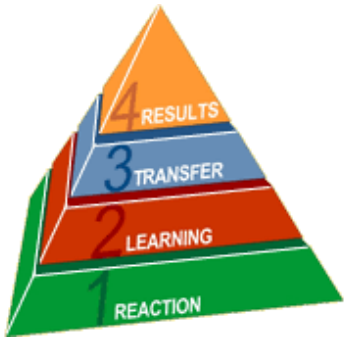
Table 2. Fifteen Crisis Resource Management (CRM) key principles published by Rall et al[13] considered as a template for the debriefing of the scenarios.

Know the environment
Anticipate and plan
Call for help early
Exercise leadership and followership
Distribute the workload
Mobilize all available resources
Communicate effectively
Use all available information
Prevent and manage fixation errors
Cross (double) check
Use cognitive aids
Re-evaluate repeatedly
Use good teamwork
Allocate attention wisely
Set priorities dynamically

TeamSTEPPS®
Team Strategies & Tools to Enhance Performance & Patient Safety



S Situation
B Background
A Assessment
R Recommendation



Does team training work ?

- Learners' reaction to team training largely positive
- Enhanced self-efficacy or confidence in one's ability to engage in effective teamwork behaviour
- Improvements in behaviour using team self-rating or validated observational tools

  e.g., improved communication, coordination and cooperation; improvement dimensions of safety culture/climate, improved communication openness and mutual support
- Improvements in patient outcomes

  e.g., decrease preoperative delays, increased compliance with antibiotics administration; reduction in transfusion & medication errors; decreased needlestick injuries; decreased morbidity and mortality
- Sustainable team processes at 6 months & 12 months

Weaver SJ, et al. BMJ Qual Saf 2014; 23: 359-372

Journal of Applied Psychology
2016, Vol. 101, No. 9, 1266–1304

0021-9010/16/$12.00 http://dx.doi.org/10.1037/apl0000120

Saving Lives: A Meta-Analysis of Team Training in Healthcare

Ashley M. Hughes and Megan E. Gregory
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26,971 studies screened,

487 reviewed,

129 eligible

Table 4
Meta-Analytic Results for the Effectiveness of Healthcare Team Training

Variable	*k*	*N*	*d*	δ	*SD*	%Var	95% CI LL	95% CI UL
Reactions	5	161	.48	.53	.11	61.63	.33	.73
Learning	79	6,346	.79	.89	.61	.45	.66	1.11
Affective learning	38	3,204	.71	.80	.51	1.00	.58	1.02
Cognitive learning	28	1,750	.75	.84	.75	.56	.36	1.32
Skill-based learning	48	3,678	.87	.98	.75	.14	.63	1.33
Transfer	63	9,442	.62	.67	.37	1.48	.52	.82
Affective transfer	15	2,624	.62	.66	.34	1.45	.44	.89
Cognitive transfer	3	307	.55	.59	.19	6.46	−.09	1.27
Skill-based transfer	57	10,366	.71	.77	.64	.32	.59	.94
Teamwork performance	45	6,012	.44	.48	.58	1.51	.29	.66
Clinical task performance	22	6,665	.92	1.00	.40	.03	.74	1.24
Medical errors	8	330	−.47	−.50	.31	11.89	−.88	−.13
Results	47	43,749	.33	.37	.30	.97	.21	.52
Organizational outcomes	31	5,822	.30	.34	.21	8.88	.19	.49
Safety climate	24	4,313	.28	.31	.18	12.47	.14	.48
Non-ICU length of stay	3	722	.16	.18	.10	25.44	−.01	.37
Patient outcomes	20	47,465	.37	.38	.24	.50	.10	.66
Patient satisfaction	2	1,133	.34	.37	.07	8.44	.05	.70
Patient mortality	5	36,825	−.33	−.36	.09	.62	−.45	−.26

Note. *k* = number of samples; *N* = sample size; *d* = standardized mean difference in a repeated measures metric; δ = corrected standardized mean difference in a repeated measures metric; *SD* = corrected standard deviation in a repeated measures metric; %Var = percent of variance accounted for by sampling error; CI = confidence interval; LL = lower limit; UL = upper limit; ICU = Intensive care unit.

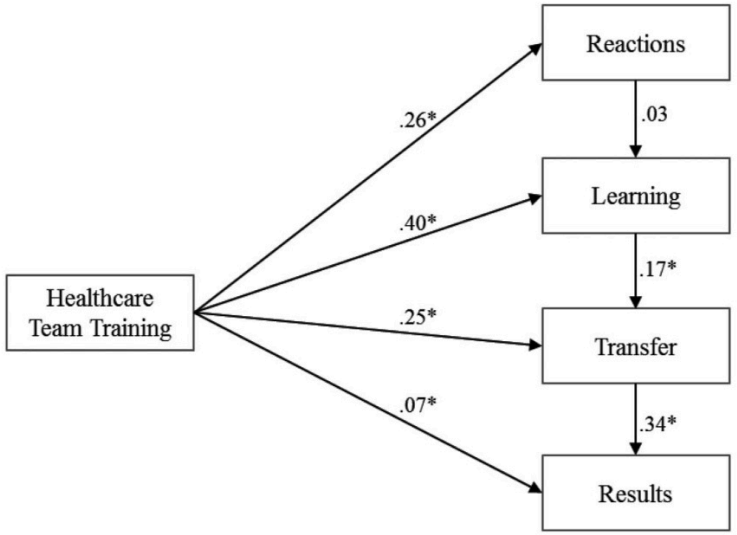


Figure 4. The sequential model of healthcare team training. Standardized estimates. * $p < .05$, $N = 1{,}034$, $\chi^2(3\ df)$: 16.18, CFI = .98, RMSEA = .07, SRMR = .03, TLI = .93.

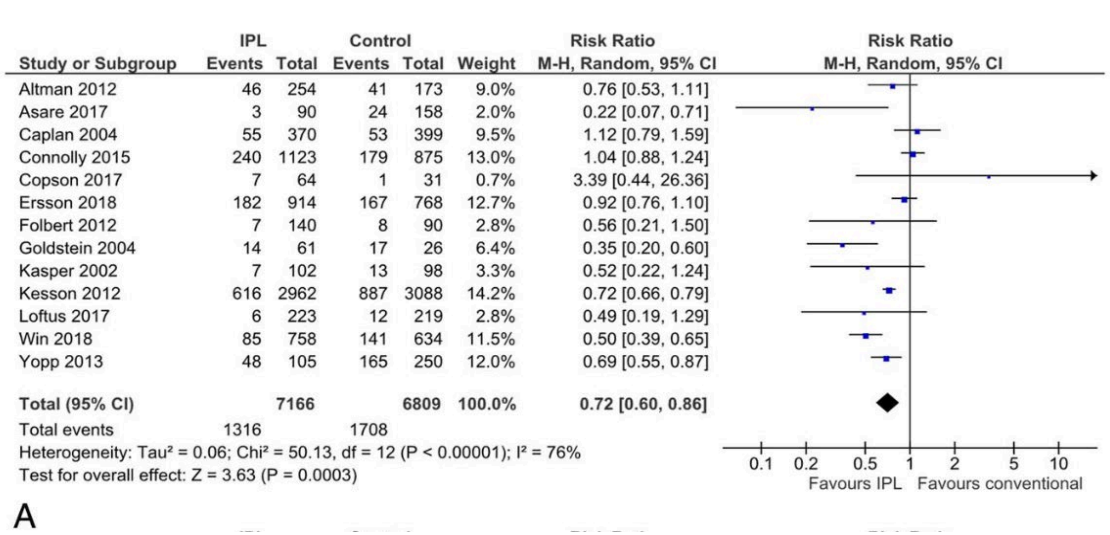
Systematic review of mixed-methods studies reporting quantitative outcomes suitable for risk ratio meta-analysis
15,248 screened, Jan 2000 and August 2022, 20 studies from 12 countries were included

IPL initiatives involving 2 or more disciplines
Conventional care **vs.** interventional group (i.e. initiatives to promote IPL in MD teams)
Reported patient mortality or other treatment-related events (i.e. longer hospital stay, adverse events, failure to achieve desired therapeutic outcome)

13 studies reporting mortality outcomes

7166 patients IPL vs. 6809 pts control

28% (95% CI, 40%-14%, p < 0.0003) less risk of dying



Study or Subgroup	IPL Events	IPL Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Altman 2012	46	254	41	173	9.0%	0.76 [0.53, 1.11]
Asare 2017	3	90	24	158	2.0%	0.22 [0.07, 0.71]
Caplan 2004	55	370	53	399	9.5%	1.12 [0.79, 1.59]
Connolly 2015	240	1123	179	875	13.0%	1.04 [0.88, 1.24]
Copson 2017	7	64	1	31	0.7%	3.39 [0.44, 26.36]
Ersson 2018	182	914	167	768	12.7%	0.92 [0.76, 1.10]
Folbert 2012	7	140	8	90	2.8%	0.56 [0.21, 1.50]
Goldstein 2004	14	61	17	26	6.4%	0.35 [0.20, 0.60]
Kasper 2002	7	102	13	98	3.3%	0.52 [0.22, 1.24]
Kesson 2012	616	2962	887	3088	14.2%	0.72 [0.66, 0.79]
Loftus 2017	6	223	12	219	2.8%	0.49 [0.19, 1.29]
Win 2018	85	758	141	634	11.5%	0.50 [0.39, 0.65]
Yopp 2013	48	105	165	250	12.0%	0.69 [0.55, 0.87]
Total (95% CI)		**7166**		**6809**	**100.0%**	**0.72 [0.60, 0.86]**
Total events	1316		1708			

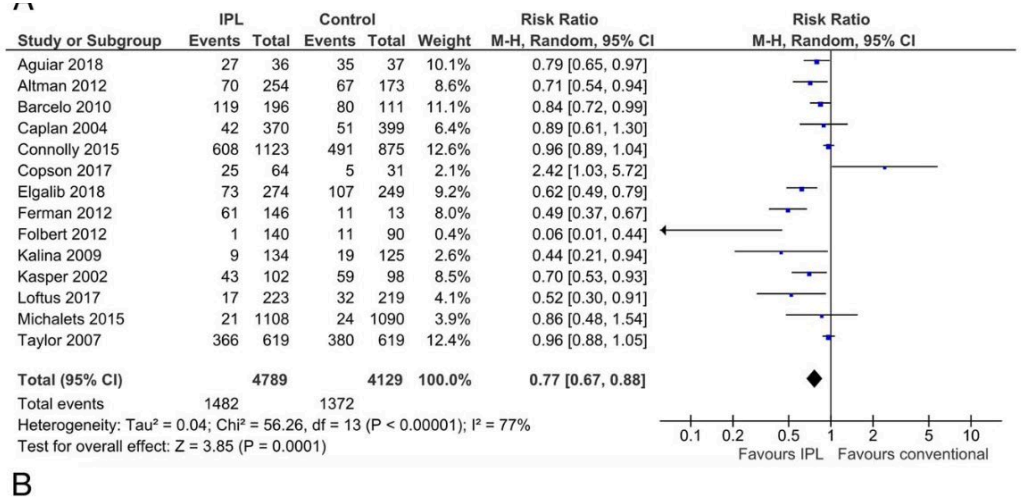
Heterogeneity: Tau² = 0.06; Chi² = 50.13, df = 12 (P < 0.00001); I² = 76%
Test for overall effect: Z = 3.63 (P = 0.0003)

A

14 studies reporting other adverse outcomes

4789 IPL vs. 4129 pts control

23% (95% CI, 33%-12%, p < 0.0001) less risk of adv outcomes



Study or Subgroup	IPL Events	IPL Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Aguiar 2018	27	36	35	37	10.1%	0.79 [0.65, 0.97]
Altman 2012	70	254	67	173	8.6%	0.71 [0.54, 0.94]
Barcelo 2010	119	196	80	111	11.1%	0.84 [0.72, 0.99]
Caplan 2004	42	370	51	399	6.4%	0.89 [0.61, 1.30]
Connolly 2015	608	1123	491	875	12.6%	0.96 [0.89, 1.04]
Copson 2017	25	64	5	31	2.1%	2.42 [1.03, 5.72]
Elgalib 2018	73	274	107	249	9.2%	0.62 [0.49, 0.79]
Ferman 2012	61	146	11	13	8.0%	0.49 [0.37, 0.67]
Folbert 2012	1	140	11	90	0.4%	0.06 [0.01, 0.44]
Kalina 2009	9	134	19	125	2.6%	0.44 [0.21, 0.94]
Kasper 2002	43	102	59	98	8.5%	0.70 [0.53, 0.93]
Loftus 2017	17	223	32	219	4.1%	0.52 [0.30, 0.91]
Michalets 2015	21	1108	24	1090	3.9%	0.86 [0.48, 1.54]
Taylor 2007	366	619	380	619	12.4%	0.96 [0.88, 1.05]
Total (95% CI)		**4789**		**4129**	**100.0%**	**0.77 [0.67, 0.88]**
Total events	1482		1372			

Heterogeneity: Tau² = 0.04; Chi² = 56.26, df = 13 (P < 0.00001); I² = 77%
Test for overall effect: Z = 3.85 (P = 0.0001)

B

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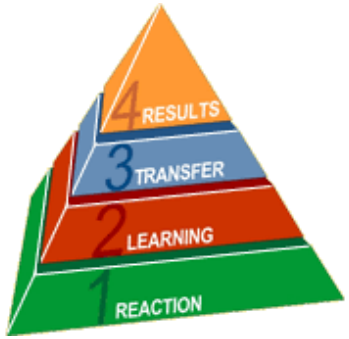


SBTT involving anaesthesiology staff

- Knowledge and confidence scores increase after MD obstetric emergencies (Lutgendorf 2017) and hospital-wide MD airway management training (Mark 2015, Leeper 2019)

- SBTT involving anaesthesia staff increases awareness of teamwork and non-technical skills and improves communication and decision-making through authentic team focused training scenarios (Finstad 2023)

- Cardio-pulmonary arrest mock code with anaesthesia participation improves paediatric survival rates and remain sustainable over next 3 years (Andreatta 2011)

In Situ SBTT

Similar individual and team learning experiences in situ vs. offsite (Crofts, 2007; Eilis, 2008; Sørensen, 2015; Cauto, 2015)

Positive organizational impact

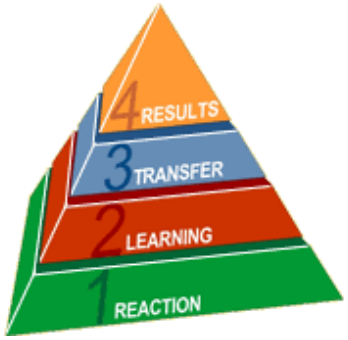
Testing equipment, systems and procedures (Kobayashi, 2013)

Testing physical environments (Kobayashi , 2006; Bender, 2011; Geis, 2011)

Identifying organizational, technology and equipment deficiencies (Riley, 2010; Patterson, 2013; Sørensen, 2015; Auerback, 2015)

Pros and cons (Sørensen, 2017, Martin, 2020)

Less travel time
Less cost
Ideas for change
Increases team identity
Promotes recruitment
Less time for debrief
Less trained faculty
Less access to technical support
Service pressure



In situ SBTT - Outcomes

Increased self-assessed confidence and readiness for paediatric resuscitation in ED (van Schaik SM, 2011; Garden AL, 2010) and paediatric primary care (Abulebda , 2018; Kalidindi S, 2018)

Better understanding of roles and improvement in team communication in paeds (Garden AL, 2010), ED (Patterson MD, 2013) and obs setting (Lutgendorf MA, 2017)

Earlier recognition of deteriorating paediatric patient and escalation (Thailen U, 2013), increased incidents reporting and improve response rate in unexpected cardiac arrest (Wang CJ, 2019) and mental setting (Lavelle M, 2017)

Reduction in unexpected cardiac arrest rates (Wang CJ, 2019)

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Key points

- **Single speciality SBET** provides a strong foundation for acquiring the necessary skill sets needed for working in healthcare teams and forming therefore the basis for interprofessional clinical practice

- **Inter-speciality SBET** enhances mutual understating of roles and challenges among peers, and it aligns different specialities around a common commitment to patient safety

- **Interprofessional SBET** is widely regarded as the gold standard for team-based learning, collaborative clinical practice and enhanced patient outcomes

A team of experts is a collection of stars!

An expert team is an all-star band !

Thank you for listening !

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