Competency Profile

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Introduction

The field of surgery is constantly developing. Medical professionals and their organisations strive to improve treatment options, thereby decreasing serious adverse events and increasing the quality of life for patients. This is especially the case in patients with rare diseases.

Although new surgical techniques for rare diseases are being developed in centres of expertise, dissemination of these techniques to other centres throughout Europe (and the rest of the world) is lacking.[1,2]

This TEACHER project focuses on the rare disease **Esophageal Atresia** (EA) and tracheal malformations in newborns, and aims to disseminate knowledge and technical skills.

The majority of the literature on EA focusses on outcomes of the different practised treatments.[3,4] Publications on new surgical techniques or quality standards are, however, limited.[5]

The TEACHER project aims to build a large strategic network of medical centres, through an educational programme, in which innovative techniques, knowledge and skills can be shared to benefit patients and their families. The TEACHER partnership consists of four medical centres from Italy, Sweden, the United Kingdom and The Netherlands, and two Dutch partners. These are Ospedale Pediatrico Bambino Gesù (Italy), University College London (England), Karolinska UniversitetsSjukhus (Sweden) and University Medical Center Utrecht (The Netherlands). The medical centres have expertise in the field of EA and tracheal malformations. The two partners, Elevate Academy and Incision, have expertise in online education.

The three main objectives of the TEACHER programme have been formulated as:

1. Defining a competency profile for paediatric surgeons who treat paediatric surgical EA and tracheal malformations

2. Developing an online training programme for junior paediatric surgeons
3. Developing a blended teach-the-teacher programme for senior paediatric surgeons.

The competency profile is a framework for the further design and development of the training programme. This document contains some background information, a rationale on the competency profile, the competency framework, and a summary of the competency profile.

Background information

As mentioned above, there is a need for quality standards. This was also concluded during a consensus meeting organised by the European Reference Network for Rare Inherited and Congenital (digestive and gastrointestinal) Anomalies (ERNICA). ERNICA has developed guidelines with recommendations on the management of patients with EA.[5]

EA requires multidisciplinary treatment pre-, peri- and postoperatively. The multidisciplinary team (MDT) consists of a paediatric surgeon, a paediatrician, a paediatric pulmonologist, a paediatric otorhinolaryngologist, a paediatric gastroenterologist, a neonatologist, a clinical geneticist, a dietician, a speech and language therapist, a physiotherapist, a psychologist, a social worker and, other specialists, depending on whether other congenital abnormalities are found. The procedure can take place in a paediatric surgical centre equipped with thoracoscopic instruments, and equipment for brain monitoring.[6,7,8]

The competency profile describes the technical and personal competencies needed for a paediatric surgeon who treats EA. It involves pre-operative, operative and post-operative care. The development of this competency profile is the first step to a framework for the training programme.

The Competency Profile

Development and rationale

The competences in the profile were partly based on the comprehensive paediatric surgery competencies, developed by The Royal College of Physicians and Surgeons of Canada (2021). The Royal College used the CanMEDS roles as a foundation for the competences. CanMEDS is a competency framework that describes the skills and qualities physicians require to meet the healthcare needs of the patient. There are seven CanMEDS roles. These include the medical expert, the communicator, the collaborator, the leader, the health advocate, the scholar and the professional (table 1).

Work sessions were planned between the different partners from Italy, England, Sweden, and The Netherlands, to comprise a list of competences. Then, questionnaires were sent to all partners concerning treatment of EA in medical expertise centres (see p. 7). Subsequently, the framework was incorporated to fit the competency profile of a paediatric surgeon on surgical EA and tracheal malformations, in cooperation with the University Medical Center Utrecht.

Table 1. Description of the different CanMEDS roles by the Royal College

CanMEDS role	Description
Medical expert	Medical expert is the central role in the framework. It defines the clinical scope of practice of the surgeon.
Communicator	As a communicator, a surgeon forms a relationship with patients and their families and shares information with them for effective health care.
Collaborator	As a collaborator, a surgeon collaborates effectively with other healthcare professionals to optim ise health care.
Leader	As a leader, a surgeon takes responsibility for patient care. A surgeon also works with others to contribute to a vision of high -quality healthcare.
Health advocate	As a health advocate, a surgeon works with those he serves to understand the needs and perhaps speak on behalf of others when needed.

Scholar	As a scholar, a surgeon tries to learn continuously, teaches others, evaluates evidence and contributes to scholarship.
Professional	As a professional, a surgeon is committed to the well -being and health of patients.

Adapted CanMEDS roles

The six CanMEDS roles that apply to the competences of a paediatric surgeon treating Esophageal Atresia (EA) and tracheal malformations in newborns are described below (table 2).

Table 2. Adapted CanMEDS roles for paediatric surgeon treating EA

CanMEDS role	Description
Medical expert	Medical expert is the central role in the framework. It defines the clinical scope of practice of the medical specialist (i.e. paediatric surgeon).
Communicator	A surgeon forms a relationship with patients and their families and shares information with them for effective health care.
Collaborator	A surgeon collaborates effectively with other healthcare professionals to optimise health care.
Leader	A surgeon takes responsibility for patient care. A surgeon also works with others to contribute to a vision of high-quality healthcare.
Scholar	A surgeon tries to gain, teach, and disseminate evidence-based medicine and knowledge.
Professional	A surgeon is committed to applying best practices and adheres to

	a high ethical standard

Questionnaires

The questionnaire seen below was sent to all medical centres, to define what treatment of EA looks like in a medical expertise centre.

Medical expertise questionnaire:

- Pre-operative:
  - How many cases of EA do you treat per year?
  - Who needs to be part of the MDT?
- Peri-operative:
  - Brain monitoring: yes or no?
  - Conversion: when?
  - Other remarks?
- Post-operative:
  - Follow up with MDT: who and when?
  - What kind of complications from treatment do you see?

During multiplier events, we will ask junior surgeons from other surgical centres to fill in this questionnaire, to establish how and if treatment of EA is executed in other centres.

Competency Profile

For Esophageal Atresia and Tracheal Malformations

Medical expert	
With regard to this specific procedure the Paediatric Surgeon is able to:	
1. Practise medicine within their defined scope of practice and expertise of EA treatment	1.1. Demonstrate a commitment to high-quality care of their patients 1.2. Apply knowledge of the clinical and biomedical sciences relevant to surgery of esophageal atresia 1.2.1. Anatomy, physiology, embryology, and pathology of the following: 1.2.1.1. Head and neck - Branchial arches and clefts and their remnants - Salivary glands - Lymph nodes - Thyroid gland - Parathyroid glands - Blood vessels and lymphatics 1.2.1.2. Thorax - Major airways - Lungs - Pleura - Chest wall and diaphragm - Mediastinum 1.2.1.3. Gastrointestinal (GI) tract

	- Esophagus - Stomach - Duodenum - Small bowel - Anorectum 1.2.1.4. Genitourinary and gynecologic systems - Kidneys and ureters - Bladder 1.2.1.6. Skin and soft tissue 1.2.1.7. Musculoskeletal system 1.2.2. Principles of the assessment, investigation, and management of conditions affecting the following: 1.2.2.1. Head and neck 1.2.2.2. Thorax 1.2.2.3. GI tract 1.2.2.4. Genitourinary system 1.2.2.5. Musculoskeletal system 1.2.3. Principles of nutritional assessment and support 1.2.3.1. Normal nutritional requirements, including calories, carbohydrate, fat, protein, minerals, vitamins, and trace elements 1.2.3.2. Nutritional assessment 1.2.3.3. Enteral and parenteral nutrition 1.2.3.4. Disorders of nutrition, including short bowel syndrome and refeeding syndrome 1.2.4. Principles of antenatal and neonatal care 1.2.4.1. Antenatally diagnosed conditions relevant to esophageal atresia 1.2.4.2. Normal newborn physiology and postnatal adaptations, including:

	- Thermoregulation - Cardiorespiratory, hepatic, and renal function - Metabolic and endocrine control, including glucose and electrolytes 1.2.4.3. Neonatal host defenses and infections 1.2.4.4. Pathophysiologic changes in newborns, including premature, small-for-gestational-age, and large-for-gestational-age neonates 1.2.5. Principles of perioperative and critical care 1.2.5.1. Principles of airway management, including surgical airway 1.2.5.2. Principles of mechanical ventilation 1.2.5.3. Principles of hemodynamic and respiratory monitoring 1.2.5.4. Indications, techniques, and complications of central venous access and arterial access 1.2.5.5. Cardiopulmonary support, including extracorporeal life support (ECLS) indications, contraindications, and complications and techniques of cannulation and monitoring 1.2.5.6. Fluid and electrolyte management: - Maintenance requirements - Management of dehydration - Principles of third space loss - Physiology and pathophysiology of acid-base equilibrium - Correction of perioperative electrolyte disturbances 1.2.5.7. Thermoregulation

	- Physiologic effects and management of hypothermia and hyperthermia 1.2.5.8. Shock - Clinical features and management of different types of shock, including hypovolemic, cardiogenic, distributive, and neurogenic - Principles of hemodynamic monitoring - Resuscitation, including use of fluid resuscitation, antibiotics, and inotropic agents 1.2.5.9. Cardiac - Congenital heart disease and transitional circulation, and their effects on other organ systems 1.2.5.10 Pulmonary - Lung function and volumes relevant to the patient's age and development - Invasive and non-invasive ventilation techniques - Etiology, clinical features, and management of - Acute respiratory distress syndrome (ARDS) 1.2.5.11. Anesthesia - Pharmacology and pharmacokinetics of commonly used anesthetic and analgesic agents - Management of post-operative pain, including responsible use of opioids

	1.2.5.12. Transfusion therapy and coagulation - Principles of massive transfusion 1.3. Perform appropriately timed clinical assessments with recommendations that are presented in an organised manner 1.4. Carry out professional duties in the face of multiple competing demands 1.5. Recognize and respond to the complexity, uncertainty, and ambiguity inherent in Paediatric Surgery practice
2. Perform a patient-centred clinical assessment and establish a management plan	2.1. Prioritise issues to be addressed in a patient encounter 2.1.1. Diagnose and manage life-threatening emergencies 2.1.2. Apply the principles of basic life support to establish and respond to priorities of resuscitation 2.2. Obtain a medical history, perform a physical exam, select appropriate investigations, and interpret their results for the purpose of diagnosis and management, disease prevention, and health promotion 2.3 Determine the indications for, and benefits and risks of surgical intervention 2.4. Establish goals of care in collaboration with patients and their families, treating symptoms, achieving cure, improving function 2.4.1. Recognize that operative treatment may involve procedures beyond one's skill set, and arrange transfer to an appropriate surgeon as necessary 2.5. Peri- and postoperative care 2.5.1. Develop plans for perioperative care 2.5.2. Provide post-operative management on the

	inpatient ward 2.5.3.1. Provide optimal post-operative analgesia 2.5.3.2. Provide plans for post-operative management of complications, both acute and subacute (in collaboration with other healthcare professionals) 2.5.4. Provide follow-up care, including surveillance (multidisciplinary follow up plan) 2.5.5. Develop plans for the transition of adolescents to the adult care setting
3. Plan and perform EA procedures and therapies for the purpose of assessment and/or management	3.1. Determine the most appropriate procedures or therapies 3.1.1. Select an open or minimally invasive surgery approach 3.2. Obtain and document informed consent, explaining the risks and benefits of, and the rationale for, a proposed procedure or therapy 3.2.1. Apply the concepts of consent and assent when engaging children in the process of informed consent 3.2.2. Recognize and respond to challenges arising in obtaining consent in emergency situations 3.3. Perform procedures in a skilful and safe manner, adapting to unanticipated findings or changing clinical circumstances 3.4. Required expertise for the following interventions Endoscopy (have a skilled gastroenterologist or otolaryngologist in hospital available) 3.4.1. Direct laryngoscopy 3.4.2. Laryngoscopy and bronchoscopy: flexible and rigid

	3.4.3. Upper GI endoscopy: flexible and rigid 3.5. Required expertise in case of minimally invasive surgery (MIS) 3.5.1. Patient positioning to optimise patient safety and to facilitate access during MIS procedures 3.5.2. Safe access to the peritoneal and thoracic cavities using open and closed techniques 3.5.3. Port site selection, placement, and closure 3.5.4. Safe and appropriate use of minimally invasive surgical instruments 3.5.5. Laparoscopic/thoracoscopic placement of sutures 3.6. Required on indication: Enteral feeding access, both gastric and postpyloric 3.7. Managing postoperative sequelae 3.7.1.Esophagus (Barrett esophagus, Gastroesophageal (GE) reflux, Stenosis/Stricture, Dysphagia/swallowing disorders 3.7.2. Tracheomalacia 3.7.3. Of other VACTERL-associated anomalies
4. Establish plans for ongoing care and, when appropriate, timely consultation	4.1. Implement a patient-centred care plan that supports ongoing care, follow-up on investigations, response to treatment, and further consultation 4.1.1. Assess the family's ability to access services in the health and social systems, and address needs for support; Develop and implement follow-up plans, considering geographic and economic factors 4.1.2. Determine the need for and timing of referral to another health care professional

5. Actively contribute, as an individual and as a member of a team providing care, to the continuous improvement of healthcare quality and patient safety	5.1. Recognize and respond to harm from health care delivery, including patient safety incidents 5.2. Adopt strategies that promote patient safety and address human and system factors 5.2.1. Participate in or lead pre-operative safety checklists

Communicator	
With regard to this specific procedure the Paediatric Surgeon is able to:	
1. Establish professional therapeutic relationships with patients and their families	1.1. Communicate using a patient-centred approach that encourages patient and family trust and autonomy and is characterised by empathy, respect, and compassion 1.2. Optimise the physical environment for patient and family comfort, dignity, privacy, engagement, and safety 1.3. Recognize when the perspectives, values, or biases of patients, patients' families, physicians, or other health care professionals may have an impact on the quality of care, and modify the approach to the

	patient accordingly 1.4. Manage disagreements and emotionally charged conversations
2. Elicit and synthesise accurate and relevant information, incorporating the perspectives of patients and their families	2.1. Use patient centred interviewing skills to effectively gather relevant biomedical and psychosocial information 2.2. Provide a clear structure for and manage the flow of an entire patient encounter 2.3. Seek and synthesise relevant information from other sources, including the patient's family, with the patient's consent
3. Share health care information and plans with patients and their families	3.1. Share information and explanations that are clear, accurate, and timely, while assessing for patient and family understanding 3.1.1. Use language and images that facilitate understanding and decision-making 3.2. Disclose harmful patient safety incidents to patients and their families
4. Engage patients and their families in developing plans that reflect the patient's health care needs and goals	4.1. Facilitate discussions with patients and their families in a way that is respectful, non-judgmental, and culturally safe 4.2. Assist patients and their families to identify, access, and make use of information and communication technologies to support their care and manage their health 4.3. Use communication skills and strategies that help patients and their families make informed decisions regarding their health

5. Document and share written and electronic information about the medical encounter to optimise clinical decision-making, patient safety, confidentiality, and privacy	5.1. Document clinical encounters in an accurate, complete, timely, and accessible manner, in compliance with regulatory and legal requirements 5.2. Communicate effectively using a written health record, electronic medical record, or other digital technology 5.3. Share information with patients, families, and others in a manner that enhances understanding and that respects patient privacy and confidentiality

Collaborator	
With regard to this specific procedure the Paediatric Surgeon is able to:	
1. Work effectively with physicians and other colleagues in the health care professions	1.1. Establish and maintain positive relationships with physicians and other colleagues in the health care professions to support relationship-centred collaborative care 1.2. Negotiate overlapping and shared responsibilities with physicians and other colleagues in the health care professions in episodic and ongoing care 1.2.1. Provide relevant information outlining the clinical assessment and treatment plans to family physicians, paediatricians, and other health care

	professionals to facilitate their participation in the care of the patient 1.2.2. Utilise interprofessional expertise and community resources 1.3. Engage in respectful shared decision-making with physicians and other colleagues in the health care professions 1.3.1. Engage with anesthesiologists regarding pre-operative patient assessment and optimization, and post-operative care, including pain management 1.3.2. Use clear audible communication with the Anesthesiologist and other team members in the operating room to optimise patient care" 1.3.3. Request and provide timely intra-operative consultations 1.3.4. Organise multidisciplinary patient meetings in the pre- and postoperative phase and during follow up
2. Work with physicians and other colleagues in the health care professions to promote understanding, manage differences, and resolve conflicts	2.1. Implement strategies to promote understanding, manage differences, and resolve conflict in a manner that supports a collaborative culture

3. Hand over the care of a patient to another health care professional to facilitate continuity of safe patient care	3.1. Determine when care should be transferred to another physician or health care professional 3.2. Demonstrate safe handover of care, using both oral and written communication, during a patient transition to a different health care professional, setting, or stage of care 3.2.1. Provide safe handover of care of the post-operative patient to the post-anesthetic care unit, the paediatric intensive care unit, and the neonatal intensive care unit 3.2.2. Facilitate transfer of care to a primary care physician or specialist, or from the paediatric to adult health care setting

Leader	
With regard to this specific procedure the Paediatric Surgeon is able to:	
1. Contribute to the improvement of health care delivery in teams, organisations, and systems	1.1. Active participation in operating room safety procedures 1.2. Participate in reviews of operative complications and other aspects of quality improvement 1.3. Analyse patient safety incidents to enhance systems of care 1.4. Evaluate health data to improve the quality of

	patient care and optimise patient safety
2. Engage in the stewardship of health care resources	2.1. Allocate health care resources for optimal patient care 2.2. Apply evidence and management processes to achieve cost-appropriate care
3. Demonstrate leadership in health care systems	3.1. Demonstrate leadership skills to enhance health care 3.2. Facilitate change in health care to enhance services and outcomes
4. Manage career planning, finances, and health human resources in personal practice(s)	4.1. Set priorities and manage time to integrate practice and personal life 4.2. Manage professional career 4.2.1. Apply leadership skills to optimise patient care in the operating room 4.2.2. Assume a leadership role in the management of complex cases 4.3. Implement processes to ensure personal practice improvement

Scholar	
With regard to this specific procedure the Paediatric Surgeon is able to:	

1. Engage in the continuous enhancement of their professional activities through ongoing learning	1.1. Identify opportunities for learning and improvement by regularly reflecting on and assessing their performance using various internal and external data sources 1.2. Engage in collaborative learning to continuously improve personal practice and contribute to collective improvements in practice
2. Teach students, residents, the public, and other health care professionals	2.1. Recognize the influence of role-modelling and the impact of the formal, informal, and hidden curriculum on learners 2.2. Promote a safe and respectful learning environment 2.3. Ensure patient safety is maintained when learners are involved 2.3.1. Provide appropriate graded responsibility to junior learners in the operating room to optimise educational opportunities without compromising patient care 2.4. Provide feedback to enhance learning and performance in an educationally appropriate manner
3. Integrate best available evidence into practice	3.1. Critically evaluate the integrity, reliability, and applicability of health-related research and literature 3.2. Integrate evidence into decision-making in their practice
4. Contribute to the creation and dissemination of knowledge and	4.1. Demonstrate an understanding of the scientific principles of research and scholarly inquiry and the role of research evidence in health care 4.2. Identify ethical principles for research and

practices applicable to health"	incorporate them into obtaining informed consent, considering potential harms and benefits, and vulnerable populations 4.3. Formulate research questions to address clinical issues and to increase knowledge on EA treatment 4.4. Summarise and communicate to professional and lay audiences, including patients and their families, the findings of relevant research and scholarly inquiry

Professional	
With regard to this specific procedure the Paediatric Surgeon is able to:	
1. Demonstrate a commitment to patients by applying best practices and adhering to high ethical standards	1.1. Exhibit appropriate professional behaviour in all aspects of practice 1.2. Demonstrate a commitment to excellence in all aspects of practice 1.3. Recognize and respond to ethical issues encountered in practice 1.4. Recognize and manage conflicts of interest 1.5. Exhibit professional behaviours in the use of technology-enabled communication 1.6 Understand and apply the process of implementing new surgical techniques and research

	results concerning treatment of EA
2. Demonstrate a commitment to society by recognizing and responding to societal expectations in health care	2.1. Demonstrate accountability to patients and society 2.2. Demonstrate a commitment to patient safety and quality improvement
3. Demonstrate a commitment to the profession by adhering to standards and participating in physician-led regulation	3.1. Fulfil and adhere to professional and ethical codes, standards of practice, and laws governing practice 3.2. Recognize and respond to unprofessional and unethical behaviours in physicians and other colleagues in the health care professions 3.3. Participate in peer assessment and standard setting
4. Demonstrate a commitment to physician health and well-being to foster optimal patient care	4.1. Exhibit self-awareness and manage influences on professional performance 4.1.1. Demonstrate self-awareness of professional and personal limitations 4.2. Promote a culture that recognizes, supports, and responds effectively to colleagues in need

Treatment of EA in medical expertise centres

Pre-operative

Number of cases treated per year	10-20 cases
Members needed in MDT	Neonatologist, otolaryngologist, paediatric surgeon, anaesthesiologist
Peri-operative	
Brain monitoring?	Yes
Conversion: when?	Most of the consortium don't have an exact time limit, it depends on the condition of the child and the progression of the surgical procedure. One centre, however, use a time limit of 2,5 hours of 45 minutes if the surgery doesn't progress or if there are cardiac comorbidities
Other remarks?	Possibility to use magnets for correction of long gap EA
Post-operative	
Follow-up	Routine multidisciplinary outpatient care* + neurodevelopmental evaluation program
Treatment of complications	Dilatation of stenosis, antireflux surgery, treatment of leakage of anastomosis (first conservatively), different treatment options of tracheomalacia, different treatment options for recurrent fistula,

*postoperatively the MDT also includes a paediatrician, pulmonologist, speech and language therapist, physiotherapist, dietitian, psychologist, cardiologist and gastroenterologist.

Summary competency profile

Medical expert

- Practice medicine within their defined scope of practice and expertise
    - Anatomy, physiology, embryology, and pathology
    - Principles of perioperative and critical care: Physiology and pathophysiology (e.g. bloodgasanalysis)
- Perform a patient-centred clinical assessment and establish a management plan
    - Plan and manage peri- and postoperative care
        - Select an open or minimally invasive surgery approach
    - Obtain and document informed consent
        - Expertise bronchoscopy and Upper GI endoscopy
    - Expertise is required for minimally invasive surgery (MIS)
    - Managing postoperative sequelae
- Establish plans for ongoing care and, when appropriate, timely consultation

Communicator

- Establish professional therapeutic relationships with patients and their families using a patient-centred approach
- Share relevant information
- Document clinical encounters in an accurate, complete, timely, and accessible manner, in compliance with regulatory and legal requirements

Collaborator

- Work effectively with physicians and other colleagues in the health care professions in the multidisciplinary setting

Leader

- Contribute to the improvement of health care

- Manage career planning, finances, and health human resources in personal practice(s)

Scholar

- Study, teach, and integrate best available evidence

Professional

- Demonstrate a commitment to patients by applying best practices and adhering to high ethical standards
- Understand and apply the process of implementing new surgical techniques and research results concerning treatment of EA

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