New curricula

Curriculum standards

Advanced Training in Nephrology (Adult Internal Medicine and Paediatrics & Child Health)

RACP
Specialists. Together

About this document

This document outlines the curriculum standards for Advanced Training in Nephrology for trainees and supervisors.

The curriculum standards should be used in conjunction with the Advanced Training in Nephrology learning, teaching, and assessment programs.

For more information or to provide feedback contact curriculum@racp.edu.au.

Contents

Program overview

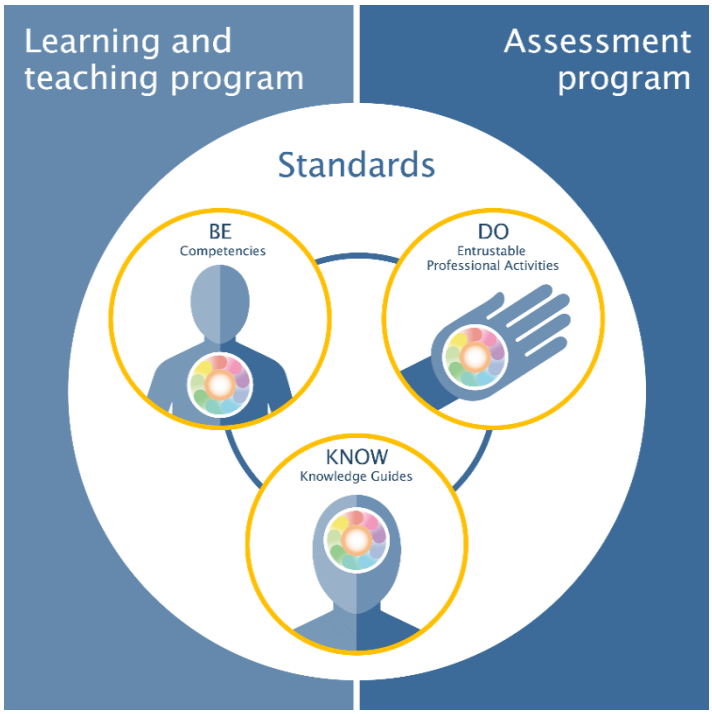
Purpose of Advanced Training

The RACP offers Advanced Training in 33 diverse medical specialties as part of Division, Chapter, or Faculty training programs.

The purpose of Advanced Training is to develop a workforce of physicians who:

- have received breadth and depth of focused specialist training, and experience with a wide variety of health problems and contexts
- are prepared for and committed to independent expert practice, lifelong learning, and continuous improvement
- provide safe, quality health care that meets the needs of the communities of Australia and New Zealand.

Advanced Training curricula standards



The **RACP curriculum model** is made up of curricula standards supported by learning, teaching, and assessment programs.

Learning and teaching programs outline the strategies and methods to learn and teach curricula standards, including required and recommended learning activities.

Assessment programs outline the planned use of assessment methods to provide an overall picture of trainees' competence over time.

The **curricula standards** outline the educational objectives of the training program and the standard against which trainees' abilities are measured.

- **Competencies** outline the expected professional behaviours, values, and practices of trainees in 10 domains of professional practice.

- **Entrustable Professional Activities** (EPAs) outline the essential work tasks trainees need to be able to perform in the workplace.

- **Knowledge guides** outline the expected baseline knowledge of trainees.

Professional Practice Framework

The Professional Practice Framework describes 10 domains of practice for all physicians.

Learning, teaching, and assessment (LTA) structure

The learning, teaching and assessment structure defines the framework for delivery and trainee achievement of the curriculum standards in the Advanced Training program.

Advanced Training is structured in three phases. These phases establish clear checkpoints for trainee progression and completion.

1	**Specialty foundation**	• Orient trainees and confirm their readiness to progress in the Advanced Training program.
2	**Specialty consolidation**	• Continue trainees' professional development in the specialty and support progress towards the learning goals.
3	**Transition to Fellowship**	• Confirm trainees' achievement of the curriculum standards, completion of Advanced Training, and admission to Fellowship. • Support trainees' transition to unsupervised practice.

Figure 1: Advanced Training Learning, Teaching, and Assessment structure

- An **entry decision** is made before entry into the program.
- **Progress decisions**, based on competence, are made at the end of the specialty foundation and specialty consolidation phases of training.
- A **completion decision**, based on competence, is made at the end of the training program, resulting in eligibility for admission to Fellowship.

Advanced Training is a **hybrid time- and competency-based training program**. There is a minimum time requirement of full-time equivalent experience, and progression and completion decisions are based on evidence of trainees' competence.

Nephrology specialty overview

Nephrologists are experts in the care of patients with kidney disease and disorders of fluid and electrolyte metabolism. Nephrology encompasses a wide range of clinical treatments for acute kidney injury, chronic kidney disease, kidney failure, hypertension, bone and mineral metabolism, anaemia, and maintenance of kidney graft health.

Nephrologists provide clinical care to patients with kidney disease, often on a long-term basis, including the below.

- **Managing kidney diseases and conditions**. This includes the diagnosis and ongoing management of patients with acute and chronic kidney disorders.
- **Providing treatment options to improve kidney function.** Nephrologists manage the dialysis and other specialised extracorporeal kidney replacement therapies and transplantation.
- **Providing long term care to patients with kidney disease**. An important component of practice in nephrology is the continuity and quality of care provided, particularly providing kidney-supportive care for patients with kidney failure.
- **Assessing and managing patients undergoing a kidney transplantation.** Nephrologists are involved with assessing patient suitability for a transplant, including evaluation of donor kidneys and managing the patient pre- and post-transplantation.
- **Recognising the impact of chronic kidney disease.** Chronic kidney disease has a large psychosocial and financial impact on individuals and family groups.

Nephrologists provide leadership and person-centred care with a focus on communication and research, including the below.

- **Using a multidisciplinary team-based approach** to the assessment, management, and care of patients. Nephrologists provide all treatment-associated care to patients in collaboration with other health professionals, including training and contribution to ongoing patient care through primary care/case management.
- **Recognising the importance of independent research** and ongoing education and training, including skills in the development of independent research projects, to further the body of knowledge of kidney disease and its management. Nephrologists support kidney research across the full spectrum of basic science, clinical, health services, and population health research.
- **Education and advocacy for patients and other physicians** to promote high-quality care for all people with, or at risk of, kidney disease and their families to ensure the highest professional standards in the practice of nephrology.

Curriculum standards

Competencies

Competencies outline the expected professional behaviours, values and practices that trainees need to achieve by the end of training.

Competencies are grouped by the 10 domains of the professional practice framework.

Competencies will be common across all or most training programs.

Medical expertise

Professional standard. Physicians apply knowledge and skills informed by best available current evidence in the delivery of high-quality, safe practice to facilitate agreed health outcomes for individual patients and populations.

Knowledge. Apply knowledge of the scientific basis of health and disease to the diagnosis and management of patients.

Synthesis. Gather relevant data via age- and context-appropriate means to develop reasonable differential diagnoses, recognising and considering interactions and impacts of comorbidities.

Diagnosis and management. Develop diagnostic and management plans that integrate an understanding of individual patient circumstances, including psychosocial factors and specific vulnerabilities, epidemiology, and population health factors in partnership with patients, families, or carers[1] and in collaboration with the health care team.

[1] References to patients in the remainder of this document may include their families and/or carers.

Communication

Professional standard. Physicians collate information, and share this information clearly, accurately, respectfully, responsibly, empathetically and in a manner that is understandable.

Physicians share information responsibly with patients, families, carers, colleagues, community groups, the public, and other stakeholders to facilitate optimal health outcomes.

Effective communication. Use a range of effective and appropriate verbal, non-verbal, and written communication techniques, including active listening.

Communication with patients, families, and carers. Use collaborative, effective, and empathetic communication with patients, families, and carers.

Communication with professionals and professional bodies. Use collaborative, respectful, and empathetic clinical communication with colleagues, other health professionals, professional bodies, and agencies.

Written communication. Document and share information about patients to optimise patient care and safety.

Privacy and confidentiality. Maintain appropriate privacy and confidentiality, and share information responsibly.

Quality and safety

Professional standard. Physicians practice in a safe, high-quality manner within the limits of their expertise. Physicians regularly review and evaluate their own practice alongside peers and best practice standards and conduct continuous improvement activities.

Patient safety. Demonstrate a safety focus and continuous improvement approach to own practice and health systems.

Harm prevention and management. Identify and report risks, adverse events, and errors to improve healthcare systems.

Quality improvement. Participate in quality improvement activities to improve quality of care and safety of the work environment.

Patient engagement. Enable patients to contribute to the safety of their care.

Teaching and learning

Professional standard. Physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and evaluating evidence. Physicians foster the learning of others in their profession through a commitment to mentoring, supervising, and teaching.[2]

Lifelong learning. Undertake effective self-education and continuing professional development.
Self-evaluation. Evaluate and reflect on gaps in own knowledge and skills to inform self-directed learning.
Supervision. Provide supervision for junior colleagues and/or team members.
Teaching. Apply appropriate educational techniques to facilitate the learning of colleagues and other health professionals.
Patient education. Apply appropriate educational techniques to promote understanding of health and disease amongst patients and populations.

Research

Professional standard. Physicians support creation, dissemination and translation of knowledge and practices applicable to health. They do this by engaging with and critically appraising research and applying it in policy and practice to improve the health outcomes of patients and populations.

Evidence-based practice. Critically analyse relevant literature and refer to evidence-based clinical guidelines and apply these in daily practice.
Research. Apply research methodology to add to the body of medical knowledge and improve practice and health outcomes.

[2] Adapted from Richardson D, Oswald A, Chan M-K, Lang ES, Harvey BJ. Scholar. In: Frank JR, Snell L, Sherbino J, editors. The Draft CanMEDS 2015 Physician Competency Framework – Series IV. Ottawa: The Royal College of Physicians and Surgeons of Canada; 2015 March.

Cultural safety

Professional standard. Physicians engage in iterative and critical self-reflection of their own cultural identity, power, biases, prejudices, and practising behaviours. Together with the requirement of understanding the cultural rights of the community they serve, this brings awareness and accountability for the impact of the physician's own culture on decision-making and healthcare delivery. It also allows for an adaptive practice where power is shared between patients, family, whānau and/or community and the physician, to improve health outcomes.

Physicians recognise the patient and population's rights for culturally safe care, including being an ally for patient, family, whānau and/or community autonomy and agency over their decision-making. This shift in the physician's perspective fosters collaborative and engaged therapeutic relationships, allows for strength-based (or mana-enhanced) decisions, and sharing of power with the recipient of the care, optimising health care outcomes.

Physicians critically analyse their environment to understand how colonialism, systemic racism, social determinants of health and other sources of inequity have and continue to underpin the healthcare context. Consequently, physicians then can recognise their interfacing with, and contribution to, the environment in which they work to advocate for safe, more equitable and decolonised services and create an inclusive and safe workplace for all colleagues and team members of all cultural backgrounds.[3]

This is a placeholder for the competencies in the cultural safety domain.

These competencies will be included at a later date.

[3] The RACP has adopted the Medical Council of New Zealand's definition of cultural safety (below):

Cultural safety can be defined as:

- the need for doctors to examine themselves and the potential impact of their own culture on clinical interactions and healthcare service delivery
- the commitment by individual doctors to acknowledge and address any of their own biases, attitudes, assumptions, stereotypes, prejudices, structures, and characteristics that may affect the quality of care provided
- the awareness that cultural safety encompasses a critical consciousness where healthcare professionals and healthcare organisations engage in ongoing self-reflection and self-awareness and hold themselves accountable for providing culturally safe care, as defined by the patient and their communities.

Curtis et al. "Why cultural safety rather than cultural competency is required to achieve health equity". International Journal for Equity in Health (2019) 18:174

Ethics and professional behaviour

Professional standard. Physicians' practice is founded upon ethics, and physicians always treat patients and their families in a caring and respectful manner. Physicians demonstrate their commitment and accountability to the health and wellbeing of individual patients, communities, populations and society through ethical practice.

Physicians demonstrate high standards of personal behaviour.

Beliefs and attitudes. Reflect critically on personal beliefs and attitudes, including how these may impact on patients' care.
Honesty and openness. Act honestly, including reporting accurately and acknowledging their own errors.
Patient welfare. Prioritise patients' welfare and community benefit above self-interest.
Accountability. Be personally and socially accountable.
Personal limits. Practise within their own limits and according to ethical and professional guidelines.
Self-care. Implement strategies to maintain personal health and wellbeing.
Respect for peers. Recognise and respect the personal and professional integrity, roles, and contribution of peers.
Interaction with professionals. Interact equitably, collaboratively, and respectfully with other health professionals.
Respect and sensitivity. Respect patients, maintain appropriate relationships, and behave equitably.
Privacy and confidentiality. Protect and uphold patients' rights to privacy and confidentiality.
Compassion and empathy. Demonstrate a caring attitude towards patients and endeavour to understand patients' values and beliefs.
Health needs. Understand and address patients', families', carers', and colleagues' physical and emotional health needs.
Medical and health ethics and law. Practise according to current community and professional ethical standards and legal requirements.

Judgement and decision making

Professional standard. Physicians collect and interpret information, and evaluate and synthesise evidence, to make the best possible decisions in their practice. Physicians negotiate, implement, and review their decisions and recommendations with patients, their families and carers, and other healthcare professionals.

Diagnostic reasoning. Apply sound diagnostic reasoning to clinical problems to make logical and safe clinical decisions.

Resource allocation. Apply judicious and cost-effective use of health resources to their practice.

Task delegation. Apply good judgement and decision making to the delegation of tasks.

Limits of practice. Recognise their own limitations and consult others when required.

Shared decision-making. Contribute effectively to team-based decision-making processes.

Leadership, management, and teamwork

Professional standard. Physicians recognise, respect, and aim to develop the skills of others, and engage collaboratively to achieve optimal outcomes for patients and populations.

Physicians contribute to and make decisions about policy, protocols, and resource allocation at personal, professional, organisational, and societal levels.

Physicians work effectively in diverse multidisciplinary teams and promote a safe, productive, and respectful work environment that is free from discrimination, bullying, and harassment.

Managing others. Lead teams, including setting directions, resolving conflicts, and managing individuals.

Wellbeing. Consider and work to ensure the health and safety of colleagues and other health professionals.

Leadership. Act as a role model and leader in professional practice.

Teamwork. Negotiate responsibilities within the health care team and function as an effective team member.

Health policy, systems, and advocacy

Professional standard. Physicians apply their knowledge of the nature and attributes of local, national, and global health systems to their own practices. They identify, evaluate, and influence health determinants through local, national, and international policy.

Physicians deliver and advocate for the best health outcomes for all patients and populations.

Health needs. Respond to the health needs of the local community and the broader health needs of the people of Australia and New Zealand.
Prevention and promotion. Incorporate disease prevention, health promotion, and health surveillance into interactions with individual patients and their social support networks.
Equity and access. Work with patients and social support networks to address determinants of health that affect them and their access to needed health services or resources.
Stakeholder engagement. Involve communities and patient groups in decisions that affect them to identify priority problems and solutions.
Advocacy. Advocate for prevention, promotion, equity, and access to support patient and population health needs within and outside the clinical environment.
Resource allocation. Understand the factors influencing resource allocation, promote efficiencies, and advocate to reduce inequities.

Entrustable Professional Activities

Entrustable Professional Activities (EPAs) outline the essential work tasks trainees need to be able to perform in the workplace without supervision by the end of training.

#	Theme		Title
1	Team leadership		Lead a team of health professionals
2	Supervision and teaching		Supervise and teach professional colleagues
3	Quality improvement		Identify and address failures in health care delivery
4	Clinical assessment and management		Clinically assess and manage the ongoing care of patients
5	Management of transitions in care		Manage the transition of patient care between health professionals, providers, and contexts
6	Acute kidney injury		Assess and manage patients with acute kidney injury
7	Longitudinal care		Manage and coordinate the longitudinal care of patients with chronic illness, disability and/or long-term health issues
8	Communication with patients		Discuss diagnoses and management plans with patients
9	Prescribing		Prescribe therapies tailored to patients' needs and conditions
10	Procedures		Plan, prepare for, perform, and provide aftercare for important practical procedures
11	Clinic management		Manage an outpatient clinic
12	Comprehensive conservative care		Manage the care of patients with kidney failure
13	Transplantation		Assess and manage kidney transplants
14	Dialysis	AIM	Prescribe and manage dialysis for patients with kidney failure
		PCH	Prescribe and manage dialysis for paediatric and neonatal patients with kidney failure

AIM: Adult internal medicine
PCH: Paediatrics & child health

EPA 1: Team leadership

Theme	Team leadership	NP-EPA-01
Title	**Lead a team of health professionals**	
Description	This activity requires the ability to: • prioritise workload • manage multiple concurrent tasks • articulate individual responsibilities, expertise, and accountability of team members • understand the range of team members' skills, expertise, and roles • acquire and apply leadership techniques in daily practice • collaborate with and motivate team members • encourage and adopt insights from team members • act as a role model.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision The trainee will:	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity The trainee may:
Medical expertise	• synthesise information from other disciplines to develop an optimal, goal-centred plan for the patient[4] • use evidence-based care to meet the needs of patients or populations • assess and effectively manage clinical risk in various scenarios • demonstrate clinical competence and skills by effectively supporting team members	• demonstrate adequate knowledge of health care issues by interpreting complex information • assess the spectrum of problems to be addressed • apply medical knowledge to assess the impact and clinical outcomes of management decisions • provide coordinated and quality health care for populations or patients as a member of a multidisciplinary team
Communication	• provide support and motivate patients or populations and health professionals through effective communication • demonstrate a transparent, consultative style by engaging patients, families, carers, relevant professionals and/or the public in shared decision making • demonstrate rapport with people at all levels by tailoring messages to different stakeholders • work with patients, families and/or carers and other health professionals to resolve conflict	• communicate adequately with colleagues • communicate adequately with patients and families or carers and/or the public • respect the roles of team members

[4] References to patients in the remainder of this document may include their families and/or carers.

	that may arise when planning and aligning goals	
Quality and safety	• identify opportunities to improve care by participating in surveillance and monitoring of adverse events and near misses • identify activities within systems to reduce errors, improve patient and population safety, and implement cost-effective change • place safety and quality of care first in all decision making	• participate in audits and other activities that affect the quality and safety of patients' care • participate in multidisciplinary collaboration to provide effective health services and operational change • use information resources and electronic medical record technology where available
Teaching and learning	• regularly self-evaluate personal professional practice and implement changes based on the results • actively seek feedback from supervisors and colleagues on their own performance • identify personal gaps in skills and knowledge, and engage in self-directed learning • maintain current knowledge of new technologies, health care priorities and changes of patients' expectations • teach competently by imparting professional knowledge • manage and monitor learner progress, providing regular assessment and feedback	• accept feedback constructively, and change behaviour in response • recognise the limits of their personal expertise and involve other health professionals as needed • demonstrate basic skills in facilitating colleagues' learning
Research	• ensure that any protocol for human research is approved by a human research ethics committee, in accordance with the national statement on ethical conduct in human research	• understand that patient participation in research is voluntary and based on an appropriate understanding about the purpose, methods, demands, risks, and potential benefits of the research
Cultural safety	• demonstrate culturally competent relationships with professional colleagues and patients • demonstrate respect for diversity and difference • take steps to minimise unconscious bias, including the impact of gender, religion, cultural beliefs, and socioeconomic background on decision making	• demonstrate awareness of cultural diversity and unconscious bias • work effectively and respectfully with people from different cultural backgrounds
Ethics and professional behaviour	• promote a team culture of shared accountability for decisions and outcomes • encourage open discussion of ethical and clinical concerns	• support ethical principles in clinical decision making • maintain standards of medical practice by recognising the health interests of patients or populations as primary responsibilities

	• respect differences of multidisciplinary team members • understand the ethics of resource allocation by aligning optimal patients and organisational care • effectively consult with stakeholders, achieving a balance of alternative views • acknowledge personal conflicts of interest and unconscious bias • act collaboratively to resolve behavioural incidents and conflicts such as harassment and bullying	• respect the roles and expertise of other health professionals • work effectively as a member of a team • promote team values of honesty, discipline, and commitment to continuous improvement • demonstrate an understanding of the negative impact of workplace conflict
Judgement and decision making	• evaluate health services and clarify expectations to support systematic, transparent decision making • make decisions when faced with multiple and conflicting perspectives • ensure medical input into organisational decision making • adopt a systematic approach to analysing information from a variety of specialties to make decisions that benefit health care delivery	• monitor services and provide appropriate advice • review new health care interventions and resources • interpret appropriate data and evidence for decision making
Leadership, management, and teamwork	• combine team members' skills and expertise in delivering patient care and/or population advice • develop and lead effective multidisciplinary teams by developing and implementing strategies to motivate others • build effective relationships with multidisciplinary team members to achieve optimal outcomes • ensure all members of the team are accountable for their individual practice	• understand the range of personal and other team members' skills, expertise and roles • acknowledge and respect the contribution of all health professionals involved in patient care • participate effectively and appropriately in multidisciplinary teams • seek out and respect the perspectives of multidisciplinary team members when making decisions
Health policy, systems, and advocacy	• engage in appropriate consultation with stakeholders on the delivery of health care • advocate for resources and support for healthcare teams to achieve organisational priorities • influence the development of organisational policies and procedures to optimise health outcomes • identify the determinants of health of the population, and mitigate barriers to access to care • remove self-interest from solutions to health advocacy issues	• communicate with stakeholders within the organisation about health care delivery • understand methods used to allocate resources to provide high-quality care • promote the development and use of organisational policies and procedures

EPA 2: Supervision and teaching

Theme	Supervision and teaching	NP-EPA-02
Title	**Supervise and teach professional colleagues**	
Description	This activity requires the ability to: • provide work-based teaching in a variety of settings • teach professional skills • create a safe and supportive learning environment • plan, deliver and provide work-based assessments • encourage learners to be self-directed and identify learning experiences • supervise learners in day-to-day work, and provide feedback • support learners to prepare for assessments.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• combine high-quality care with high-quality teaching • explain the rationale underpinning a structured approach to decision making • consider the patient-centric view during consultations • consider the population health effect when giving advice • encourage the learner to consider the rationale and appropriateness of investigation and management options	• teach learners using basic knowledge and skills
Communication	• listen and convey information clearly and considerately • establish rapport and demonstrate respect for junior colleagues, medical students, and other health professionals • communicate effectively when teaching, assessing and appraising learners • actively encourage a collaborative and safe learning environment with learners and other health professionals • encourage learners to tailor communication as appropriate for different patients[5], such as	• observe learners to reduce risks and improve health outcomes

[5] References to patients in the remainder of this document may include their families and/or carers.

	younger or older people, and/or different populations • support learners to deliver clear, concise, and relevant information in both verbal and written communication	
Quality and safety	• support learners to deliver quality care while maintaining their own wellbeing • apply lessons learned about patient safety by identifying and discussing risks with learners • assess learners' competence and provide timely feedback to minimise risks to care • maintain the safety of patients and organisations involved with education, and appropriately identify and action concerns	• observe learners to reduce risks and improve health outcomes
Teaching and learning	• demonstrate knowledge of the principles, processes, and skills of supervision • provide direct guidance to learners in day-to-day work • work with learners to identify professional development and learning opportunities based on their individual learning needs • offer feedback and role modelling • participate in teaching and supervising professional development activities • encourage self-directed learning and assessment • develop a consistent and fair approach to assessing learners • tailor feedback and assessment to learners' goals • seek feedback and reflect on own teaching by developing goals and strategies to improve • establish and maintain effective mentoring through open dialogue • support learners to identify and attend formal and informal learning opportunities • recognise the limits of personal expertise, and involve others appropriately	• demonstrate basic skills in the supervision of learners • not tailor learning, assessment, and feedback to individual learners • not match teaching and learning objectives clearly to outcomes • not encourage learners to be self-directed
Research	• encourage and guide learners to seek out relevant research to support practice • clarify junior colleagues' research projects' goals and requirements, providing feedback regarding the	• guide learners with respect to the choice of research projects • ensure that the research projects planned are feasible and of suitable standards

	merits or challenges of proposed research • monitor the progress of learners' research projects regularly, and may review research projects prior to submission • support learners to find forums to present their research projects	
Cultural safety	• role model a culturally appropriate approach to teaching • encourage learners to seek out opportunities to develop and improve their own cultural competence • encourage learners to consider culturally appropriate care of Aboriginal and Torres Strait Islander and Māori peoples into patients' management • consider cultural, ethical, and religious values and beliefs in teaching and learning	• function effectively and respectfully when working with and teaching with people from different cultural backgrounds
Ethics and professional behaviour	• apply principles of ethical practice to teaching scenarios • act as a role model to promote professional responsibility and ethics among learners • respond appropriately to learners seeking professional guidance	• demonstrate professional values including commitment to high-quality clinical standards, compassion, empathy, and respect • provide learners with feedback to improve their experiences
Judgement and decision making	• prioritise workloads and manage learners with different levels of professional knowledge or experience • link theory and practice when explaining professional decisions • promote joint problem solving • support a learning environment that allows for independent decision making • use sound and evidence-based judgment during assessments and when giving feedback to learners • escalate concerns about learners appropriately	• provide general advice and support to learners • use health data logically and effectively to investigate difficult diagnostic problems
Leadership, management, and teamwork	• maintain effective performance and continuing professional development for both self and leaners • maintain professional, clinical, research and/or administrative responsibilities while teaching • help to shape organisational culture to prioritise quality and work safety through openness,	• demonstrate the principles and practice of professionalism and leadership in health care • participate in mentor programs, career advice, and general counselling

	honesty, shared learning, and continued improvement • create an inclusive environment in which the learner feels part of the team	
Health policy, systems, and advocacy	• advocate for suitable resources to provide quality supervision and maintain training standards • explain the value of health data in the care of patients or populations • support innovation in teaching and training	• may not integrate public health principals into teaching and practice

EPA 3: Quality improvement

Theme	Quality improvement	NP-EPA-03
Title	**Identify and address failures in health care delivery**	
Description	This activity requires the ability to: • identify and report actual and potential (near miss) errors • conduct and evaluate system improvement activities • adhere to best practice guidelines • audit clinical guidelines and outcomes • contribute to the development of policies and protocols designed to protect patients and enhance health care • monitor one's own practice and develop individual improvement plans.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• identify opportunities for improvement in delivering appropriate care and population health outcomes • evaluate environmental and lifestyle health risks, and advocate for healthy lifestyle choices • use standardised protocols to adhere to best practice and prevent the occurrence of wrong-site, wrong-patient procedures • regularly monitor personal professional performance	• contribute to processes on identified opportunities for improvement • recognise the importance of prevention and early detection in clinical practice • use local guidelines to assist patient[6] care decision making
Communication	• support patients to have access to, and use, high-quality, easy-to understand information about health care • collaborate with patients, families, and/or carers to develop goals of care • support patients to share decision making about their own health care, to the extent they choose • assist patients' access to their health information, as well as complaint and feedback systems • discuss with patients any safety and quality concerns they have relating to their care	• demonstrate awareness of the evidence for consumer engagement and its contribution to quality improvement in health care • apply knowledge of how health literacy might affect the way patients or populations gain access to, understand, and use health information

[6] References to patients in the remainder of this document may include their families and/or carers.

	• implement the organisation's open disclosure policy	
Quality and safety	• demonstrate safety skills including infection control, adverse event reporting, and effective clinical handover • participate in organisational quality and safety activities, such as morbidity and mortality reviews, and clinical incident reviews • participate in systems for surveillance and monitoring of clinical quality indicators, particularly key performance indicators, as well as adverse events and near misses, including reporting such events • ensure that identified opportunities for improvement are raised and reported appropriately • use data from clinical audits and patient-reported experience measures (PREMs), patient-reported outcome measures (PROMs), and clinical outcomes, and learn from incidents and complaints to improve health care	• demonstrate understanding of a system approach to improving the quality and safety of health care
Teaching and learning	• translate quality improvement approaches and methods into practice • participate in professional training in quality and safety to ensure a contemporary approach to safety system strategies • supervise and manage the performance of junior colleagues in the delivery of safe, high-quality care	• work within organisational quality and safety systems for the delivery of clinical care • use opportunities to learn about safety and quality theory and systems
Research	• ensure that any protocol for human research is approved by a human research ethics committee, in accordance with the national statement on ethical conduct in human research • complete training in Good Clinical Practice (GCP) prior to undertaking any clinical research	• understand that patient participation in research is voluntary and based on an appropriate understanding about the purpose, methods, demands, risks, and potential benefits of the research
Cultural safety	• undertake professional development opportunities that address the impact of cultural bias on health outcomes	• communicate effectively with patients from culturally and linguistically diverse backgrounds
Ethics and professional behaviour	• align improvement goals with the priorities of the organisation • contribute to developing an organisational culture that enables	• comply with professional regulatory requirements and codes of conduct

	and prioritises patients' safety and quality	
Judgement and decision making	• use decision-making support tools such as guidelines, protocols, pathways, and reminders • analyse and evaluate current care processes to improve health care	• access information and advice from other healthcare practitioners to identify, evaluate, and improve patients' care management
Leadership, management, and teamwork	• formulate and implement quality improvement strategies as a collaborative effort involving all key health professionals • support multidisciplinary team activities to lower patients' risk of harm, and promote multidisciplinary programs of education • actively involve clinical pharmacists in the medication use process	• demonstrate attitudes of respect and cooperation among members of different professional teams • partner with clinicians and managers to ensure that patients receive appropriate care and information on their care
Health policy, systems, and advocacy	• use a risk management framework to assess and address risks identified in the organisation • participate in all aspects of the development, implementation, evaluation, and monitoring of governance processes • participate regularly in multidisciplinary meetings where quality and safety issues are standing agenda items • encourage the development of innovative ideas and projects for improving care • measure, analyse, and report a set of specialty-specific process of care and outcome clinical indicators, as well as a set of generic safety indicators • take part in the design and implementation of the organisational systems for: » defining the scope of clinical practice » performance monitoring and management » clinical, and safety and quality education and training	• maintain a dialogue with service managers about issues that affect patients' care • contribute to relevant organisational policies and procedures • help shape an organisational culture that prioritises safety and quality through openness, honesty, learning, and quality improvement

EPA 4: Clinical assessment and management

Theme	Clinical assessment and management	NP-EPA-04
Title	**Clinically assess and manage the ongoing care of patients**	
Description	This activity requires the ability to: • identify and access sources of relevant information about patients • obtain patients' histories • examine patients • synthesise findings to develop provisional and differential diagnoses • discuss findings with patients[7], families and/or carers • generate a management plan • present findings to other health professionals • identify and manage complications arising from medication or comorbidities.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• elicit an accurate, organised and problem-focused history considering physical and psychosocial risk factors, and anticipating future needs • perform a full physical examination to establish the nature and extent of problems • synthesise and interpret findings from the history and examination to devise the most likely provisional diagnoses via reasonable differential diagnoses • recognise the risk of complications from nephrotoxic medications and inappropriate drug dosing in patients with chronic kidney disease (CKD) • identify complications such as anaemia, hypervolemia, and electrolyte imbalances, along with comorbid conditions such as diabetes, hypertension, and heart disease, which increase risk of adverse events • develop management plans based on relevant guidelines, considering the balance of benefit and harm by taking patients' personal circumstances into account, and modifying medications, including	• identify clinical emergencies and prioritise care • take patient-centred histories, considering psychosocial factors • perform accurate physical examinations • recognise and correctly interpret abnormal findings • synthesise pertinent information to direct the clinical encounter and diagnostic categories • develop appropriate management plans • recognise the effects of kidney disease on fertility, sexual function, pregnancy, and outcomes • perform clinical assessments that address all relevant issues • identify indications for investigating for secondary hypertension • identify patients who require a kidney biopsy

[7] References to patients in the remainder of this document may include their families and/or carers.

	immunosuppressive drugs, appropriately during pregnancy or for women planning pregnancy • identify patients with secondary hypertension who are suitable for specific and targeted treatments • recognise and counsel patients about the limitations of interventions • identify patients at high risk of acute kidney injury • differentiate acute kidney injury from chronic kidney disease (CKD) • recognise when a kidney biopsy is required	
Communication	• communicate openly, listen, and take patients' concerns seriously, giving them adequate opportunity to ask questions and explain their goals of care • provide balanced information to patients, family and/or carers to enable them to make a fully informed decision from various diagnostic, therapeutic, and management options • communicate clearly, effectively, respectfully, and promptly with other health professionals involved in patients' care • discuss sensitively the risk and implications of pregnancy to patients and their partner/family to enable the patient to make an informed choice • negotiate patient lifestyle measures and a suitable anti-hypertensive drug regimen	• anticipate, read, and respond to verbal and nonspeaking cues • demonstrate active listening skills and communicate patients' conditions to colleagues, including senior clinicians • document clinical encounters to convey clinical reasoning and the rationale for decisions • counsel patients with kidney disease who are on dialysis or with a kidney transplant about the risks and implications of pregnancy, and act to minimise the risks to mother and fetus in accordance with the mother's informed choice
Quality and safety	• demonstrate safety skills including infection control, adverse event reporting and effective clinical handover • recognise and effectively deal with aggressive and violent patient behaviours through appropriate training • obtain informed consent before undertaking any investigation or providing treatment, except in an emergency • ensure that patients are informed of the material risks associated with any part of the proposed management plans	• perform hand hygiene and follow infection control precautions at appropriate moments • take precaution against assaults from confused or agitated patients, and ensure appropriate care of patients • document history and physical examination findings, and synthesise with clarity and completeness

Teaching and learning	• set defined objectives for clinical teaching encounters, and solicit feedback on mutually agreed goals • regularly reflect upon and self-evaluate professional development • obtain informed consent before involving patients in teaching activities • turn clinical activities into an opportunity to teach, appropriate to the setting	• set some goals and objectives for self-learning • self-reflect infrequently • deliver teaching considering learners' level of training
Research	• search for, find, compile, analyse, interpret, and evaluate information relevant to the research subject • refer to current best practice guidelines	• refer to guidelines and medical literature to assist in clinical assessments when required • demonstrate an understanding of the limitations of the evidence and the challenges of applying research in daily practice
Cultural safety	• acknowledge patients' beliefs and values and how these might impact on health • demonstrate effective and culturally competent communication and care for Aboriginal and Torres Strait Islander and Māori peoples, and members of other cultural groups • use a professional interpreter, a health advocate or a family or community member to assist in communication with patients • use plain language patient education materials, and be culturally and linguistically sensitive	• display respect for patients' cultures, and attentiveness to social determinants of health • display an understanding of at least the most prevalent cultures in society, and an appreciation of their sensitivities • appropriately access interpretive or culturally focused services
Ethics and professional behaviour	• demonstrate professional values including compassion, empathy, respect for diversity, integrity, honesty, and partnership to all patients • hold information about patients in confidence, unless the release of information is required by law or public interest • assess patients' capacities for decision making, and involve a substitute decision maker appropriately	• demonstrate professional conduct, honesty, and integrity • consider patients' capacities for decision making • identify patients' preferences regarding management and the role of families in decision making • not advance personal interest or professional agendas at the expense of patient or social welfare
Judgement and decision making	• apply knowledge and experience to identify patients' problems • use logical, rational decisions and act to achieve positive outcomes for patients	• demonstrate clinical reasoning by gathering focused information relevant to patients' care • recognise personal limitations and seek help in an appropriate way when required

	• use a holistic approach to health considering comorbidity, uncertainty, and risk • use the best available evidence for the most effective therapies and interventions to ensure quality care	
Leadership, management, and teamwork	• work effectively as a member of multidisciplinary teams to achieve the best health outcomes for patients • demonstrate awareness of colleagues in difficulty and work within the appropriate structural systems to support them while maintaining patient safety	• share relevant information about the patient and their case with members of the healthcare team
Health policy, systems, and advocacy	• participate in health promotion, disease prevention and control, screening, and reporting of notifiable diseases • aim to achieve optimal, cost-effective patient care to allow maximum benefit from the available resources	• identify and navigate components of the healthcare system relevant to patients' care • identify and access relevant community resources to support patient care

EPA 5: Management of transitions in care

Theme	Management of transitions in care NP-EPA-05	
Title	**Manage the transition of patient care between health professionals, providers, and contexts**	
Description	This activity requires the ability to: • manage a transition of patient care to ensure the optimal continuation of care between providers • identify the appropriate health care providers and other stakeholders with whom to share patient information • exchange pertinent, contextually appropriate, and relevant patient information • perform this activity in multiple settings appropriate to the speciality, including inpatient, ambulatory, and critical care settings.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• facilitate an optimal transition of care for patients • identify and manage key risks for patients during the transition • anticipate possible changes in patients' conditions, and provide recommendations on how to manage them	• understand the details of patients' conditions, illness severity, and potential emerging issues, with appropriate actions • provide accurate summaries of patients' information, with accurate identification of problems or issues
Communication	• write relevant and detailed medical record entries, including clinical assessment and management plans • write comprehensive and accurate summaries of care including discharge summaries, clinic letters and transfer documentation • initiate and maintain verbal communication with other health professionals, when required • communicate with patients[8], families and/or carers about transition of care, and engage and support these parties in decision making	• communicate clearly with clinicians and other caregivers • use standardised verbal and written templates to improve the reliability of information transfer and prevent errors and omissions • communicate accurately and in a timely manner to ensure an effective transition between settings, as well as continuity and quality of care
Quality and safety	• identify patients at risk of a poor transition of care, mitigating this risk	• ensure that handover is complete, or work to mitigate risks if the handover was incomplete

[8] References to patients in the remainder of this document may include their families and/or carers.

	• use electronic tools, where available, to securely store and transfer patient information • use consent processes, including written consent if required, for the release and exchange of information • demonstrate understanding of the medicolegal context of written communications	• ensure all outstanding results or procedures are followed up by receiving units and clinicians • keep patients' information secure, and adhere to relevant legislation regarding personal information and privacy
Teaching and learning	• integrate clinical education in handover sessions and other transition of care meetings • tailor clinical education to the level of the professional parties involved	• take opportunities to teach junior colleagues during handover as necessary
Cultural safety	• communicate with careful consideration to health literacy, language barriers, and culture about patients' preferences and whether they are realistic and possible, and respect patient choices • recognise the timing, location, privacy, and appropriateness of sharing information with patients and their families and/or carers	• include relevant information regarding patients' cultural or ethnic background in the handover, and whether an interpreter is required
Ethics and professional behaviour	• disclose and share only contextually appropriate medical and personal information • demonstrate understanding of the clinical, ethical, and legal rationale for information disclosure • share information about patients' health care in a manner consistent with privacy law and professional guidelines on confidentiality • demonstrate understanding of the additional complexity related to some types of information, such as genetic information or blood-borne virus status, and seek appropriate advice about disclosure of such information • interact in a collegiate and collaborative way with professional colleagues during transitions of care	• maintain respect for patients and families and/or carers, and other health professionals, including respecting privacy and confidentiality
Judgement and decision making	• ensure patients' care is in the most appropriate facility, setting, or provider	• use a structured approach to consider and prioritise patients' issues • recognise personal limitations, and seek help in an appropriate way when required
Leadership, management, and teamwork	• share the workload of transitions of care appropriately, including delegation	• recognise factors that impact on the transfer of care, and help subsequent health professionals

	• demonstrate understanding of the medical governance of patient care and the differing roles of team members • show respect for the roles and expertise of other health professionals, and work effectively as a member of professional teams • ensure that multidisciplinary teams provide the opportunity for patients' engagement and participation when appropriate	to understand the issues to continue care • work to overcome the potential barriers to continuity of care, and appreciate the role of handover in overcoming these barriers
Health policy, systems, and advocacy	• contribute to processes for managing risks and identifying strategies for improvement in transition of care • engage in organisational processes to improve transitions of care, such as formal surveys or follow-up phone calls after hospital discharge	• factor transport issues and costs to patients into arrangements for transferring patients to other settings

EPA 6: Acute kidney injury

Theme	Acute kidney injury	NP-EPA-06
Title	**Assess and manage patients with acute kidney injury**	
Description	This activity requires the ability to: • diagnose and stage the severity of acute kidney injury • investigate the cause of the acute kidney injury, with specific attention to reversible causes • monitor and manage changes in pH, electrolytes, uraemic solutes and toxins, and water balance • recognise the indications for kidney replacement therapy • prescribe management strategies to support kidney recovery and prevent further injury • describe the basic principles of prescribing continuous or intermittent kidney replacement therapy for acute kidney injury • plan for adverse long-term sequelae of acute kidney injury and ongoing surveillance management.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision The trainee will:	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity The trainee may:
Medical expertise	• identify acute kidney injury using age-appropriate Kidney Disease Improving Global Outcomes (KDIGO) criteria, such as adult, paediatric, or neonatal criteria • recognise immediate life-threatening conditions, and deteriorating and critically unwell patients, and respond appropriately • select investigations that identify or exclude critical patients' issues • systematically identify causes of acute deterioration in health status and levels of physical and cognitive functioning • proactively manage timely escalation or transitions of care • develop plans of multidisciplinary treatment, rehabilitation, and secondary prevention following acute events • provide clear and effective discharge summaries with recommendations for ongoing care • optimise medical management and acute kidney injury risk before, during, and after operations	• identify acute deteriorations in kidney function • recognise seriously unwell patients requiring immediate care • understand general medical principles of caring for patients with undifferentiated and undiagnosed conditions • identify potential causes of current deterioration, and comply with escalation protocols • facilitate initial tests to assist in the diagnosis and development of management plans for immediate treatment • document information to outline the rationale for clinical decisions and action plans • assess perioperative and periprocedural patients • outline the pathophysiology of acute kidney injury in different clinical scenarios • ascertain volume status and order fluids to optimise volume status and/or kidney recovery

	• prevent or manage complications and long-term implications of kidney disease • identify indications, timing, and suitable modality for initiation of kidney replacement • recognise the indications for kidney biopsy • recognise the risks of long-term sequelae of acute kidney injury and ensure appropriate review as clinically indicated	
Communication	• communicate clearly with other team members, and coordinate efforts of multidisciplinary teams • use closed loop, clear communication with the healthcare team • facilitate early communication with patients[9], families and/or carers, and healthcare team members to allow for shared decision making • negotiate realistic treatment goals, and determine and explain the expected prognosis and outcomes • employ communication strategies appropriate for younger patients or those with cognitive difficulties • explain the situation to patients in a sensitive and supportive manner, avoiding jargon and confirming their understanding • determine the level of health literacy of individual patients and level of understanding of agreed care decisions	• demonstrate communication skills to sufficiently support the function of multidisciplinary teams • determine patients' understanding of their diseases and what they perceive as the most desirable goals of care
Quality and safety	• use clinical information technology systems for conducting retrospective and prospective clinical audits of the incidence and outcomes of acute kidney injury • evaluate and explain the benefits and risks of kidney replacement therapy based on individual patients' circumstances • analyse adverse incidents and sentinel events to identify system failures and contributing factors • identify evidence-based practice gaps using clinical indicators, and implement changes to improve patient outcomes • coordinate and encourage innovation, and objectively	• evaluate the quality of processes through well designed audits • recognise the risks and benefits of kidney replacement therapy • raise appropriate issues for review at morbidity and mortality meetings • evaluate the quality and safety processes implemented within the workplace, and identify gaps in their structure

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	evaluate improvement initiatives for outcomes and sustainability	
Teaching and learning	• demonstrate effective supervision skills and teaching methods adapted to the training's context • encourage questioning among junior colleagues and students in response to unanswered clinical questions • seek guidance and feedback from health care teams to reflect on the encounter and to improve future patients' care	• mentor and train others to enhance team effectiveness • provide constructive feedback to junior colleagues to contribute to improvements in individuals' skills • coordinate and supervise junior colleagues from the emergency department and wards
Research	• select studies based on optimal trial design, freedom from bias, and precision of measurement • evaluate the value of treatments in terms of relative and absolute benefits, cost, potential patient harm, and feasibility • evaluate the applicability of results of clinical studies to the circumstances of individual patients, especially those with multiple comorbidities • specify research evidence to the needs of individual patients	• demonstrate efficient searching of literature databases to retrieve evidence • use information from credible sources to aid in decision making • refer to evidence-based clinical guidelines and protocols on acutely unwell patients • demonstrate an understanding of the limitations of the evidence and the challenges of applying research in daily practice
Cultural safety	• negotiate care decisions in a culturally appropriate way by considering variation in family structures, cultures, religion, or belief systems • integrate culturally appropriate care of Aboriginal and Torres Strait Islander and Māori peoples into patients' management • consider cultural, ethical, and religious values and beliefs in leading multidisciplinary teams	• practise cultural competency appropriate for the community serviced • proactively identify barriers to access to health care
Ethics and professional behaviour	• develop management plans that are based on medical assessments of the clinical conditions and multidisciplinary assessments of functional capacity • advise patients of their rights to refuse medical therapy, including life-sustaining treatment • consider the consequences of delivering treatment that is deemed futile, directing to other care as appropriate • facilitate interactions within multidisciplinary teams respecting values, encouraging involvement, and engaging all participants in decision making	• communicate medical management plans as part of multidisciplinary plans • establish, where possible, patients' wishes and preferences about care • contribute to building a productive culture within teams

	• demonstrate critical reflection on personal beliefs and attitudes, including how these may affect patient care and healthcare policy	
Judgement and decision making	• recognise the need for escalation of care, and escalate to appropriate staff or service • integrate evidence related to questions of diagnosis, therapy, prognosis, risks, and causes into clinical decision making • reconcile conflicting advice from other specialties, applying judgement in making clinical decisions in the presence of uncertainty • use care pathways effectively, including identifying reasons for variations in care	• involve additional staff to assist in a timely fashion when required • recognise personal limitations, and seek help in an appropriate way when required
Leadership, management, and teamwork	• optimise team members' skills and expertise in delivering patient care • involve the multidisciplinary kidney team, including: » dietitians » intensivists » nurse practitioners, with roles such as CKD, supportive care, anaemia access, and transplant » pharmacists » psychologists » social workers • manage the transition of acute medical patients through their hospital journeys • lead a team by providing engagement while maintaining a focus on outcomes • manage and escalate open disclosure	• collaborate with and use other team members, based on their roles and skills • ensure appropriate multidisciplinary assessments and management • encourage an environment of openness and respect to lead effective teams
Health policy, systems, and advocacy	• allocate resources responsibly, balancing costs against outcomes • prioritise patients' care based on needs, considering available health care resources • collaborate with emergency medicine staff and other colleagues to develop policies and protocols for the investigation and management of common acute medical problems • recognise and apply local/national and international kidney guidelines including Caring for Australian and New Zealanders with Kidney Impairment (CARI) and KDIGO	• explain the systems for the escalation of care for deteriorating patients • explain the role of clinician leadership and advocacy in appraising and redesigning systems of care that lead to better patient outcomes

EPA 7: Longitudinal care

Theme	Longitudinal care	NP-EPA-07
Title	**Manage and coordinate the longitudinal care of patients with chronic illness, disability and/or long-term health issues**	
Description	This activity requires the ability to: • develop and revise management plans in consultation with patients[10] and their family and/or carers • manage chronic conditions, complications, disabilities, and comorbidities • recognise the specific issues in adolescent chronic kidney disease (CKD) at any stage, including late stage kidney failure • collaborate with other health care providers • ensure continuity of care • facilitate self-management and self-monitoring of patients, families and/or carers • engage with the broader health policy context.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• regularly assess and review care plans for patients with chronic conditions and disabilities based on anticipated future needs, short- and long-term clinical and quality of life goals • provide documentation on patients' presentation, management, and progress, including key points of diagnosis and decision making to inform coordination of care • ensure patients contribute to their needs assessments and care planning • prevent and slow kidney decline, treating complications of kidney failure, including preventing cardiovascular disease • identify treatment options that have the potential to accelerate loss of kidney function and increase the risk of kidney failure • identify and manage reversible kidney damage • manage non-kidney complications of CKD	• assess patients' knowledge, beliefs, concerns, and daily behaviours related to their chronic condition/disability and its management • contribute to medical record entries on the history, examination, and management plan as a member of multidisciplinary teams that are accurate and sufficient

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	• demonstrate awareness of, and screen for, psychosocial issues • manage pain	
Communication	• encourage patients', families and/or carers self-management through education to take greater responsibility for their care, and supporting problem solving • encourage patients' access to self-monitoring devices and assistive technologies • communicate with multidisciplinary team members, and involve patients in that dialogue • support patients' choices of therapy	• provide healthy lifestyle advice and information to patients on the importance of self-management • work in partnership with patients and motivate them to comply with agreed care plans
PCH	• assess growth and ensure appropriate management to aid growth in paediatric patients	
Quality and safety	• maintain up-to-date certification • use innovative models of chronic disease care, utilising telehealth and digitally integrated support services • review medicine use, and ensure patients understand safe medication administration to prevent errors • support patients' self-management by balancing between minimising risk and helping patients become more independent • participate in quality improvement processes examining issues impacting on patients' ability to undertake normal activities of daily living • conduct kidney biopsies based on current guidelines	• participate in continuous quality improvement processes and clinical audits on chronic disease management • identify activities that may improve patients' quality of life • obtain consent for kidney biopsies
Teaching and learning	• contribute to the development of clinical pathways for chronic diseases management based on current clinical guidelines • educate patients, families and/or carers to recognise and monitor symptoms, and undertake strategies to assist recovery or maintain stability • educate junior medical officers and staff about appropriate management of CKD	• use clinical practice guidelines for chronic diseases management
Research	• prepare reviews of literature on patients' encounters to present at journal club meetings	• search literature using Problem/Intervention/Comparison/ Outcome (PICO) format

	• search for and critically appraise evidence to resolve clinical areas of uncertainty	• recognise appropriate use of review articles
Cultural safety	• encourage patients from culturally and linguistically diverse backgrounds to join local networks to receive the support needed for long-term self-management	• provide culturally safe chronic disease management
Ethics and professional behaviour	• share information about patients' health care, consistent with privacy law and professional guidelines about confidentiality • use consent processes for the release and exchange of health information • assess patients' decision-making capacities, identifying and using alternative decision makers when needed • discuss advanced care planning with patients, families and/or carers	• share information between relevant service providers • acknowledge and respect the contribution of health professionals involved in patients' care
Judgement and decision making	• implement stepped care pathways in the management of chronic diseases and disabilities • recognise patients' needs in terms of both internal resources and external support on long-term health care journeys • consider patient context and available resources when investigating glomerulonephritis	• recognise personal limitations and seek help in an appropriate way when required • liaise with multidisciplinary kidney services and provide appropriate advice
Leadership, management, and teamwork	• involve the kidney multidisciplinary team, including: » dietitians » nurse practitioners/clinical nurse specialists, with roles such as CKD, supportive care, anaemia access, and transplant » pharmacists » psychologists » social workers • develop collaborative relationships with patients, families and/or carers, and a range of health professionals • coordinate whole-person care through involvement in all stages of patients' care journeys • manage and escalate open disclosure	• participate in multidisciplinary care for patients with chronic diseases and disabilities, including organisational and community care on a continuing basis appropriate to patient context • organise the day-to-day management of a haemodialysis unit
Health policy, systems, and advocacy	• use health screening for early intervention and chronic diseases management	• demonstrate awareness of government initiatives and services available for patients with chronic diseases and disabilities, and knowledge of how to access them

	• assess alternative models of healthcare delivery to patients with chronic diseases and disabilities • participate in government initiatives for chronic diseases management to reduce hospital admissions and to improve patients' quality of life • help patients access initiatives and services for patients with chronic diseases and disabilities • recognise and apply local/national and international kidney guidelines, such as CARI and KDIGO	• identify barriers to accessing good dialysis care in the health care and social services systems • document dialysis prescriptions as per local standards and ANZDATA

EPA 8: Communication with patients

Theme	Communication with patients	NP-EPA-08
Title	**Discuss diagnoses and management plans with patients**	
Description	This activity requires the ability to: • select a suitable context and include family and/or carers and other team members • adopt a patient-centred perspective, including adjusting for cognition and disability • select and use appropriate modalities and communication strategies • structure conversations intentionally • negotiate a mutually agreed management plan • verify patients'[11], families' and/or carers' understanding of conveyed information • develop and implement a plan for ensuring actions occur • ensure the conversation is documented.	

Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• anticipate and be able to correct any misunderstandings patients may have about their conditions and/or risk factors • inform patients of all aspects of their clinical management, including assessment and investigations, and give them adequate opportunity to question or refuse interventions and treatments • seek to understand the concerns and goals of patients, and to plan management in partnership with them • provide information to patients to enable them to make informed decisions about their diagnostic, therapeutic, and management options	• apply knowledge of the scientific basis of health and disease to the management of patients • demonstrate an understanding of the clinical problem being discussed • formulate management plans in partnership with patients

[11] References to patients in the remainder of this document may include their families and/or carers.

Communication		• use an appropriate communication strategy and modalities for communication, such as email, face-to-face, or phone calls • elicit patients' views, concerns, and preferences, promoting rapport • provide information to patients in plain language, avoiding jargon, acronyms, and complex medical terms, and using interpreters or translators where possible • encourage questions, and answer them thoroughly • ask patients to share their thoughts or to explain the management plan in their own words, to verify understanding • convey information considerately and sensitively to patients, seeking clarification if unsure of how best to proceed • treat children and young people respectfully, and listen to their views • recognise the role of family and/or carers and guardians and, when appropriate, encourage young patients to involve their family and/or carers or guardians in decisions about their care	• select appropriate modes of communication • engage patients in discussions, avoiding the use of jargon • check patients' understanding of information • adapt communication styles in response to patients' age, developmental level, and cognitive, physical, cultural, socioeconomic, and situational factors • collaborate with patient liaison officers as required
	PCH	• reconcile differing opinions from carers or family members	
Quality and safety		• discuss patients' conditions and available management options with them, including their potential benefits and harms • provide information to patients in a way they can understand before asking for their consent • consider young people's capacity for decision making and consent • recognise and take precautions in areas where patients may be vulnerable, such as issues of child protection, self-harm, or elder abuse • participate in processes to manage patients' complaints • openly discuss with patients, family and/or carers about any incident(s) that resulted in harm to that patient	• inform patients of the material risks associated with the proposed management plan • treat information about patients as confidential

Teaching and learning	• discuss the aetiology of diseases and explain the purpose, nature, and extent of the assessment to be conducted • obtain informed consent or other valid authority before involving patients in teaching • use language patients can understand when involving them in teaching	• respond appropriately to information sourced by patients, and to patients' knowledge regarding their condition
Research	• provide information to patients that is based on guidelines issued by the National Health and Medical Research Council and/or Health Research Council of New Zealand • provide information to patients in a way they can understand before asking for their consent to participate in research • obtain informed consent or other valid authority before involving patients in research	• refer to evidence-based clinical guidelines • demonstrate an understanding of the limitations of the evidence and the challenges of applying research in daily practice
Cultural safety	• demonstrate effective and culturally competent communication with Aboriginal and Torres Strait Islander and Māori peoples • effectively communicate with members of other cultural groups by meeting patients' specific language, cultural, and communication needs • use qualified language interpreters or cultural interpreters to help meet patients' communication needs when necessary • provide plain language, culturally appropriate written materials to patients when possible • respect patients' cultural views and develop management plans which incorporate these views where possible	• identify when to use interpreters • allow enough time for communication across linguistic and cultural barriers
Ethics and professional behaviour	• encourage and support patients to be well informed about their health and to use this information wisely when they are making decisions • encourage and support patients and, when relevant, their families and/or carers, in caring for themselves and managing their health • demonstrate respectful professional relationships with patients	• respect the preferences of patients • communicate appropriately, consistent with the context, and respect patients' needs and preferences • maximise patient autonomy and support their decision making • avoid sexual, intimate, and/or financial relationships with patients • demonstrate a caring attitude towards patients

	• prioritise honesty, patients' welfare, and community benefit above self interest • demonstrate a high standard of personal conduct, consistent with professional and community expectations • support patients' rights to seek second opinions	• respect patients, including protecting their rights to privacy and confidentiality • behave equitably towards all, irrespective of gender, age, culture, ethnicity, socioeconomic status, sexual preferences, beliefs, contribution to society, illness-related behaviours or the illness itself • use social media ethically and according to legal obligations to protect patients' confidentiality and privacy
Leadership, management, and teamwork	• communicate effectively with team members involved in patients' care, and with patients, families and/or carers • discuss medical assessments, treatment plans, and investigations with patients and primary care teams, working collaboratively with them • discuss patient care needs with healthcare team members to align them with the appropriate resources • facilitate an environment where all team members feel they can contribute, and their opinion is valued • communicate accurately and succinctly, and motivate others on the healthcare team	• answer questions from team members • summarise, clarify, and communicate responsibilities of healthcare team members • keep healthcare team members focused on patient outcomes
Health policy, systems, and advocacy	• help patients navigate the healthcare system by working in collaboration with other services, such as community health centres and consumer organisations	• communicate with and involve other health professionals as appropriate

EPA 9: Prescribing

Theme	Prescribing	NP-EPA-09
Title	**Prescribe therapies tailored to patients' needs and conditions**	
Description	This activity requires the ability to: • take and interpret medication histories • select appropriate medicines based on an understanding of pharmacology, taking into consideration patients' age, ideal body weight, kidney function, comorbidities, potential drug interactions, risks, and benefits • prescribe and adjust routine dialysis orders • communicate with patients[12], families and/or carers about the benefits and risks of proposed therapies • provide instruction on medication administration effects and side effects • monitor medicines for efficacy and safety • review medicines and interactions, and cease where appropriate • collaboration with pharmacists.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• identify the patients' disorders requiring pharmacotherapy • consider nonpharmacologic therapies • consider age, chronic disease status, lifestyle factors, allergies, potential drug interactions, and patient preference prior to prescribing a new medication • plan for follow-up and monitoring • prescribe dosing for reduced glomerular filtration rate, peritoneal dialysis, and haemodialysis • prescribe therapeutic adjustments based on adherence, using a patient-centred approach to prescribing, tailored to patients' biopsychosocial needs	• be aware of potential side effects and practical prescription points, such as medication compatibility and monitoring in response to therapies • appropriately, safely, and accurately select medicines for common conditions • demonstrate understanding of the rationale, risks and benefits, side effects, contraindications, dosage, and drug interactions • identify and manage adverse events
Communication	• discuss and evaluate the risk and benefits of treatment options, making decisions in partnership with patients • provide clear and legible prescriptions in plain language,	• discuss and explain the rationale for treatment options with patients and families and/or carers • explain the benefits and burdens of therapies, considering patients' individual circumstances

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	and include specific indications for the anticipated duration of therapy • educate patients about the intended use, expected outcomes, and potential side effects for each prescribed medication, addressing the common and rare but serious side effects at the time of prescribing to improve patients' adherence to pharmacotherapy • describe, using patient-appropriate language, how the medication should and should not be administered, including any important relationships to food, time of day, and other medicines being taken • ensure patients' understanding by repeating back pertinent information, such as when to return for monitoring and whether therapy continues after this single prescription • identify patients' concerns and expectations, and explain how medicines might affect their everyday lives	• provide clearly legible scripts or charts using generic names of the required medication in full, including mg/kg/dose information and all legally required information • seek further advice from experienced clinicians or pharmacists when appropriate
Quality and safety	• review medicines regularly to reduce non-adherence, monitoring treatment effectiveness, possible side effects, and drug interactions, ceasing unnecessary medicines • use electronic prescribing tools where available, and access electronic drug references to prevent errors caused by drug interactions and poor handwriting • prescribe new medicines when they have been demonstrated to be safer or more effective at improving patient-oriented outcomes than existing medicines • participate in clinical audits to improve prescribing behaviour, including an approach to polypharmacy and prescribing cascade • report suspected adverse events to the Advisory Committee on Medicines and record it in patients' medical records appropriately	• check medication doses before prescribing • monitor side effects of medicines prescribed • identify medication errors and institute appropriate measures • use electronic prescribing systems safely where applicable • rationalise medicines to avoid polypharmacy
Teaching and learning	• use continuously updated software for computers and electronic prescribing programs • ensure patients understand management plans, including adherence issues	• undertake continuing professional development to maintain currency with prescribing guidelines • reflect on prescribing and seek feedback from a supervisor

	• use appropriate guidelines and evidence-based medicine resources to maintain a working knowledge of current medicines, keeping up to date on new medicines	
Research	• critically appraise research material to ensure that any new medicine improves patient-oriented outcomes more than older medicines, and not just more than placebo • use sources of independent information about medicines that provide accurate summaries of available evidence on new medicines	• make therapeutic decisions according to the best evidence • recognise where evidence is limited, compromised, or subject to bias or conflict of interest
Cultural safety	• demonstrate effective understanding and explore patients' understanding of and preferences for pharmacological and nonpharmacological management • offer patients effective choices based on their expectations of treatment, health beliefs, and cost • interpret and explain information to patients at the appropriate level of their health literacy • anticipate queries to help enhance the likelihood of medicines being taken as advised • ensure appropriate information is available at all steps of the medicine management pathway	• appreciate patients' cultural and religious backgrounds, attitudes, and beliefs, and how these might influence the acceptability of pharmacological and nonpharmacological management approaches
Ethics and professional behaviour	• provide information to patients about: » what the medicine is for » what it does » potential side effects » how to take it » when it should be stopped • make prescribing decisions based on good safety data when the benefits outweigh the risks involved • demonstrate understanding of the ethical implications of pharmaceutical industry marketing and funded research	• consider the efficacy of medicines in treating illnesses, including the relative merits of different pharmacological and nonpharmacological treatments • follow regulatory and legal requirements and limitations regarding prescribing • follow organisational policies on pharmaceutical representative visits and drug marketing
Judgement and decision making	• use a systematic approach to select treatment options • use medicines safely and effectively to get the best possible results	• consider the following factors for all medicines: » contraindications » cost to patients, families, and the community » funding and regulatory considerations

	• choose suitable medicines only if medicines are considered necessary and benefit patients • prescribe medicines appropriately to patients' clinical needs, in doses that meet their individual requirements, for a sufficient length of time, with the lowest cost to them • evaluate new medicines in relation to their possible efficacy and safety profile for individual patients	» generic versus brand medicines » interactions » risk-benefit analysis • recognise personal limitations and seek help in an appropriate way when required
Leadership, management, and teamwork	• interact with medical, pharmacy, and nursing staff to ensure safe and effective medicine use	• work collaboratively with pharmacists • participate in medication safety and morbidity and mortality meetings
Health policy, systems, and advocacy	• choose medicines in relation to comparative efficacy, safety, and cost-effectiveness against medicines already on the market • prescribe for individual patients, considering history, current medicines, allergies, and preferences, ensuring that resources are used wisely for the benefit of patients	• prescribe in accordance with the organisational policy

EPA 10: Procedures

Theme	Procedures	NP-EPA-10
Title	**Plan, prepare for, perform, and provide aftercare for important practical procedures**	
Description	This activity requires the ability to: • select appropriate procedures in partnership with patients[13] and their families and/or carers • obtain informed consent • set up the equipment, maintaining an aseptic field • perform procedures • manage unexpected events/complications during and after procedures • provide aftercare for patients • communicate aftercare protocols and instructions to patients and medical and nursing staff • interpret the results/outcomes of procedures • communicate the outcome of the procedure and associated investigations to patients • perform this activity across multiple relevant settings.	

Behaviours		
Professional practice framework Domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• select procedures by assessing patient-specific factors, risks, benefits, long term suitability, and alternatives • confidently and consistently perform a range of common procedures • ensure that team members are aware of all allergies/adverse reactions identified, and take precautions to avoid allergies/adverse reactions during the procedure • ensure patients have complied with pre-procedure preparation • confirm the correct position/site/side and level on the patient for the planned procedure • recognise and effectively manage complications arising during or after procedures • recognise and manage potential complications of kidney biopsy	• recognise different types of dialysis access and select procedures by assessing patient-specific factors, risks, benefits, and alternatives • assess patients and identify indications for procedures • check for allergies and adverse reactions • consider risks and complications of procedures • interpret results of common diagnostic procedures • organise and document post-procedure review of patients • perform basic troubleshooting for common dialysis access

[13] References to patients in the remainder of this document may include their families and/or carers.

	• recognise and correctly interpret normal and abnormal findings of diagnostic procedures	
Communication	• accurately document procedures in the clinical notes, including informed consent, procedures requested and performed, reasons for procedures, medicines given, aseptic technique, and aftercare • explain procedures clearly to patients, families and/or carers, including reasons for procedures, potential alternatives, and possible risks, to facilitate informed choices • counsel patients sensitively and effectively, and support them to make informed choices • address patients' and families' and/or carers' concerns relating to procedures, providing opportunities to ask questions • tailor language according to patients' age and capacity to understand • communicate effectively with team members, patients, and family and/or carers prior to, during, and after procedures • ensure team members are confident and competent in their assigned roles	• explain the process of procedures to patients without providing a broader context • help patients and family and/or carers to choose the procedure • communicate with members of procedural teams so all team members understand who each member is • discuss post-procedural care with patients and family and/or carers • complete relevant patients' documentation and conduct an appropriate clinical handover
Quality and safety	• obtain informed consent or other valid authority before undertaking any procedure • set up all necessary equipment, and consistently use universal precautions and aseptic technique • confirm patients' identities, verify the procedure/s, and, where appropriate, the correct site/side/level for the procedure/s • ensure that information on patients' consent forms match procedures to be performed • identify, document, and appropriately notify any adverse events or equipment malfunctions • explain the risk and benefit associated with a kidney biopsy • gain informed consent regarding kidney biopsy • explain the risks, safety benefits, and consequences of dialysis access • conduct a quality kidney biopsy based on current guidelines	• provide information in a manner so that patients, families and/or carers are fully informed when consenting to any procedure • demonstrate an inconsistent application of aseptic technique • identify patients using approved patients' identifiers before any treatment or intervention is initiated • attempt to perform a procedure in an unsafe environment

Teaching and learning	• refer to and/or be familiar with relevant published procedural guidelines prior to undertaking procedures • organise or participate in in-service training on new technology • provide specific and constructive feedback and comments to junior colleagues • initiate and conduct skills training for junior staff	• participate in continued professional development • help junior colleagues develop new skills • actively seek feedback on personal technique until competent
Cultural safety	• understand individual patients' cultural perceptions of health and illness, and adapt practice accordingly	• respect religious, cultural, linguistic, and family values and differences
Ethics and professional behaviour	• confidently perform common procedures • identify appropriate substitute decision makers when required • show respect for knowledge and expertise of colleagues • maximise patient autonomy in decision making	• perform procedures when adequately supervised • follow procedures to ensure safe practice
Judgement and decision making	• identify role and optimal timing for diagnostic procedures • critically appraise information from assessment, and evaluate risk/benefit to prioritise patients on a waiting list • make clinical judgements and decisions based on available evidence • select the most appropriate and cost-effective diagnostic procedures • adapt procedures in response to assessments of risks to individual patients • select appropriate investigations on the samples obtained in diagnostic procedures	• prioritise which patients receive procedures first, if there is a waiting list • assess personal skill level, and seek help with procedures when appropriate • use tools and guidelines to support decision making • recommend suboptimal procedures for patients
Leadership, management, and teamwork	• explain critical steps, anticipated events, and equipment requirements to teams on planned procedures • provide staff with clear aftercare instructions, and explain how to recognise possible complications • identify relevant management options with colleagues according to their level of training and experience to reduce error, prevent complications, and support efficient teamwork	• ensure that all relevant team members are aware that a procedure is occurring • discuss patients' management plans for recovery with colleagues

	• coordinate efforts, encourage others, and accept responsibility for work done	
Health policy, systems, and advocacy	• discuss serious incidents at appropriate clinical review meetings • initiate local improvement strategies in response to serious incidents • use resources efficiently when performing procedures	• perform procedures in accordance with organisational guidelines and policies

EPA 11: Clinic management

Theme	Clinic management	NP-EPA-11
Title	**Manage an outpatient clinic**	
Description	This activity requires the ability to: • manage medical procedures and treatments • manage clinic services • oversee quality improvement activities • communicate with patients • liaise with other health professionals and team members • demonstrate problem-solving skills • use public resources responsibly.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision The trainee will:	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity The trainee may:
Medical expertise	• effectively identify and address current clinical concerns as well as longer-term clinical objectives, as appropriate to patient context • evaluate environmental and lifestyle health risks, and advocate for healthy lifestyle choices • create an accurate and appropriately prioritised problem list in the clinical notes or as part of an ambulatory care review • update documentation in a time frame appropriate to the clinical situation of patients	• demonstrate understanding of the importance of prevention, early detection, health maintenance, and chronic condition management
Communication	• help patients[14] navigate the healthcare system to improve access to care by collaboration with other services, such as community health centres and consumer organisations • link patients to specific community-based health programs and group education programs • triage referrals to clinic in terms of timely review and appropriateness of referral	• wherever practical, meet patients' specific language and communication needs • facilitate appropriate use of interpreter services and translated materials
Quality and safety	• practice health care that maximises patient safety • adopt a systematic approach to the review and improvement of	• take reasonable steps to address issues if patients' safety may be compromised

[14] References to patients in the remainder of this document may include their families and/or carers.

	professional practice in the outpatient clinic setting • identify aspects of service provision that may be a risk to patients' safety • ensure patients are informed about fees and charges	• understand a systematic approach to improving the quality and safety of health care • participate in organisational quality and safety activities, including clinical incident reviews
Teaching and learning	• evaluate their own professional practice • demonstrate learning behaviour and skills in educating junior colleagues • contribute to the generation of knowledge • maintain professional continuing education standards relevant to the profession	• recognise the limits of personal expertise and involve other professionals as needed to contribute to patients' care • use information technology appropriately as a resource for modern medical practice
Research	• obtain informed consent or other valid authority before involving patients in research • inform patients about their rights, the purpose of the research, the procedures to be undergone, and the potential risks and benefits of participation before obtaining consent	• refer to evidence-based clinical guidelines • consult current research on investigations
Cultural safety	• apply knowledge of the cultural needs of the community serving and how to shape service to those people • mitigate the influence of own culture and beliefs on interactions with patients and decision making • adapt practice to improve patients' engagement and health outcomes	• acknowledge the social, economic, cultural, and behavioural factors influencing health, both at individual and population levels
Ethics and professional behaviour	• identify and respect the boundaries that define professional and therapeutic relationships • respect the roles and expertise of other health professionals • comply with the legal requirements of preparing and managing documentation • demonstrate awareness of financial and other conflicts of interest	• understand the responsibility to protect and advance the health and wellbeing of individuals and communities • maintain the confidentiality of documentation and store clinical notes appropriately • ensure that the use of social media is consistent with ethical and legal obligations
Judgement and decision making	• integrate prevention, early detection, health maintenance, and chronic condition management, where relevant, into clinical practice • work to achieve optimal and cost-effective patients' care that	• understand the appropriate use of human resources, diagnostic interventions, therapeutic modalities, and health care facilities

	allows maximum benefit from the available resources • decide on the effective use of telehealth and outreach when appropriate	
Leadership, management, and teamwork	• prepare for and conduct clinical encounters in a well-organised and time-efficient manner • work effectively as a member of multidisciplinary teams or other professional groups • ensure that all important discussions with colleagues, multidisciplinary team members, and patients are appropriately documented • review discharge summaries, notes, and other communications written by junior colleagues • support colleagues who raise concerns about patients' safety • manage and escalate open disclosure	• attend relevant clinical meetings regularly
Health policy, systems, and advocacy	• demonstrate capacity to engage in the surveillance and monitoring of the health status of populations in the outpatient setting • maintain good relationships with health agencies and services • apply the principles of efficient and equitable allocation of resources to meet individual, community, and national health needs	• understand common population health screening and prevention approaches

EPA 12: Comprehensive conservative care

Theme	Comprehensive conservative care	NP-EPA-12
Title	**Manage the care of patients with kidney failure**	
Description	This activity requires the ability to: • document patients'[15], families' and/or carers' wishes for supportive care • support patients, families and/or carers to plan for their advance care and document their own wishes • support the transition of patients between treatment modalities based on their care • manage symptoms and psychosocial distress to optimise patients' quality of life • preserve residual kidney function and manage non-dialysis pathways and withdrawal from dialysis care • manage end-of-life care plans.	
Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision The trainee will:	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity The trainee may:
Medical expertise	• accurately assess patients' symptoms, including physical, psychological, and spiritual aspects • estimate prognosis and communicate this appropriately, if requested, including the uncertainties around such estimates • provide appropriate prescribing and deprescribing of medications based on the patients' treatment goals • work with a multidisciplinary team to treat and reduce the symptoms of kidney failure • develop and clearly document individualised advance care plans, including patients', families and/or carers preferences for treatment options, resuscitation plans, preferred place of care, and preferred place of death • provide holistic symptom management focusing on physical and psychological distress according to patients', families' and/or carers' wishes	• demonstrate an understanding of the principles of care for patients who are not undertaking kidney replacement therapies • provide timely assessment and document patients' care plans • manage physical symptoms in alignment with patients', families and/or carers' wishes • take steps to alleviate patients' symptoms and distress • correctly identify patients approaching the end of life, and provide symptomatic treatment • adequately manage patients in their terminal phase

[15] References to patients in the remainder of this document may include their families and/or carers.

		• avoid unnecessary investigations or treatments, ensuring physical and psychosocial support • review the goals of care and treatment plans with patients, family and/or carers if significant changes in patients' conditions or circumstances occur • recognise and manage the terminal phase in a timely way	
Communication		• establish supportive relationships with patients and their families and/or carers based on understanding, trust, empathy, and confidentiality • explore thoughtfully patients' concerns across physical, psychological, and cultural domains • identify opportunities to discuss end-of-life care, aligning it with the values and preferences of patients, their families and/or carers • identify proxy decision makers patients' wish to be involved in discussions about end-of-life care • identify and document lists of close family members and/or carers, and develop support plans for them • provide bereaved families and/or carers with written information about access to bereavement support • communicate effectively and in a timely manner with other health professionals involved in patients' care, including GPs and other consultants • discuss the withdrawal of dialysis with patients and their families and/or carers	• discuss with patients, families and/or carers the goals of care and treatment, and document this in patients' clinical records • discuss with patients, families and/or carers the benefits and risks of conservative kidney management for appropriate patients • ensure consistent messages are given to patients, families and/or carers about treatment options, their likelihood of success, risks, and prognosis • provide an honest and clear clinical assessment summary of the situation using plain language, avoiding medical jargon • discuss with family and/or carers appropriate support and bereavement care
	PCH	• recognise when a follow-up consultation is required following the death of a child	
Quality and safety		• conduct medication chart safety audits, multidisciplinary mortality and morbidity reviews, and provide feedback to colleagues • develop monitoring and evaluation strategies to capture feedback about the quality of care from multidisciplinary team members, patients, families and/or carers • review all deaths to determine the safety and quality of patients'	• collect and review data on the safety and effectiveness of end-of-life care delivery • communicate the content of discussions about prognosis and advance care planning to multidisciplinary teams • ensure that actual care is aligned with documented wishes of patients, families and/or carers

	end-of-life care and how it could be improved • review technological systems and processes that support safe, high-quality end-of-life care	
Teaching and learning	• provide supervision, support, and teaching to develop the skills of junior colleagues on end-of-life care • reflect on personal practice and use this process to guide continuing professional development • ensure all members of multidisciplinary teams receive education on their roles and responsibilities for managing end-of-life care • recognise feelings of moral distress and burnout in self and colleagues • promote education covering: » ethical and medicolegal issues » relevant legislation in the state, territory, or region » competencies for providing culturally responsive end-of- life care to Aboriginal and Torres Strait Islander and Māori peoples, and to people from other cultural backgrounds	• participate in education on disease-specific symptom assessment and evidence-based symptom management • participate in upskilling in best practice of end-of-life care management • encourage junior colleagues to participate in multidisciplinary case reviews, mortality and morbidity meetings, and adverse event reviews
Research	• ensure that quality end-of-life care management processes are evidence based and outcome focused • use systematic reviews or personal reviews and appraisal of the literature as evidence for the appropriate management • support clinical trials to build the end-of-life care evidence base	• recognise that the evidence may be insufficient to resolve uncertainty and make definitive decisions
Cultural safety	• practise culturally responsible medicine based on understanding the personal, historical, and cultural influences on patients, families and/or carers • develop strategies for identifying culturally appropriate decision makers and the role of family, obtaining their input into discussions of patients' end-of-life care • offer support to patients, families and/or carers to include cultural or religious practices in care	• understand, respect, and respond to individual preferences and needs of patients, families and/or carers, regardless of their culture and religious beliefs • support patients, families and/or carers with communication difficulties associated with cultural and linguistic diversity

Ethics and professional behaviour	• ensure all team members discuss end-of-life care with patients, families and/or carers, and act on expressed preferences • enhance the quality of life for patients before death by minimising pain and suffering caused by ineffective treatments • recognise the complexity of ethical issues related to human life and death, when considering the allocation of scarce resources	• ensure that information on advance care plans, treatment plans, goals of care, and patients' treatment preferences is available to all involved in patients' care • ensure patients' dignity is preserved • respond appropriately to distress or concerns from patients, families and/or carers, or colleagues
Judgement and decision making	• maximise patients' autonomy and their best interests when making treatment decisions • liaise with other relevant services and provides referral as necessary • tailor care in older persons' chronic kidney disease (CKD)	• define and document patients', families' and/or carers' goals and agreed outcomes • assess adherence to treatment and monitoring plans • assess the health literacy of patients, families and/or carers
Leadership, management, and teamwork	• ensure care plans are communicated to all teams involved in patients' care, including relevant community care providers • define the roles and responsibilities of team members involved in patients' care • achieve agreement between multidisciplinary teams about patients' treatment options • coordinate care and support to be provided in patients' preferred place of care • effectively manage personal challenges of dealing with death and grief	• coordinate end-of-life care to minimise fragmentation of care • document multidisciplinary care plans, including the terminal phase
Health policy, systems, and advocacy	• participate in developing frameworks for organisational advance care planning • manage resources according to the organisational strategic plan to support systems for effective delivery of end-of-life care • advocate for the needs of individual patients, social groups, and cultures within the community who have specific palliative care needs or with inequitable access to palliative care services	• allocate scarce health care resources effectively • support community-based service providers to build capacity for people to be cared in their preferred place of death

EPA 13: Transplantation

Theme	Transplantation	NP-EPA-13
Title	**Assess and manage kidney transplants**	
Description	This activity requires the ability to: • assess patients' eligibility for a transplant • assess suitability of potential donors, live and deceased • recognise the principles involved in organ allocation, including the pre-workup and decisions at the time of allocation • coordinate investigations, treatments, and follow-up plans for transplant recipients • provide longitudinal care for living kidney donors • manage patients'[16], families' and/or carers' expectations about the outcomes of transplantation • assess and manage patients' preoperative and postoperative status, progress, and required treatments • recognise early and late complications of kidney transplantation • manage patients receiving immune-modulating therapies, and monitor for adverse effects and complications • collaborate with other health care providers in the management of transplant recipients for the short- and long-term care of the transplant • observe and participate in the management of patients with uncomplicated and complex courses, including patients with a complicated course in the first days/weeks following transplantation.	

Behaviours		
Professional practice framework domain	**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
	The trainee will:	The trainee may:
Medical expertise	• conduct work-ups on transplant recipients to evaluate their health • identify and evaluate suitable kidney transplantation candidates • review the results of tissue typing and cross-matching of potential donor kidneys • understand the kidney donor risk index (KDRI) and its relationship to transplant outcomes • prescribe induction and maintenance immunosuppression regimens • prescribe fluid requirements to optimise volume status and/or kidney recovery • explain the risks and benefits of kidney replacement therapy when	• ascertain indications for dialysis pre-transplants • interpret measures of kidney function in donor work-ups • assess the risk of disease transmission • collate relevant clinical information about potential donors • recognise the risk of infection, malignancy, and other diseases that may occur post-transplant • advise patients about lifestyle changes required post-transplant

[16] References to patients in the remainder of this document may include their families and/or carers.

		assessing patients' eligibility for transplants • recognise outcomes of kidney transplants in terms of deceased versus living donors, donation after brainstem death versus after cardiac death, expanded criteria donors, tumorectomised kidneys, and increased viral risk donors • assess and monitor for infectious diseases and malignancy pre- and post-transplantation • advise on vaccinations required pre- and post-transplant • explain potential post-transplant long-term health impacts, including new onset diabetes after transplantation (NODAT), obesity, and hypertension • prepare patients for discharge post-transplantation, including organising follow-ups, discussing medications, food choices and immunosuppression, and other risks with the patient	
	PCH	• monitor growth and manage weight of children post-transplant	
Communication		• provide patients with information about the variation in type, such as living or deceased, and quality of donor organs • discuss risks and benefits of transplantation appropriate to patients' age and decision-making capacity, also considering mental health and intellectual impairment • empower patients to self-manage through education, and support problem solving • encourage patients' access to self-monitoring devices and assistive technologies • communicate with multidisciplinary team members, involving patients in that dialogue	• provide healthy lifestyle advice and information to patients • promote the importance of effective self-management • partner with patients and motivate them to comply with agreed care plans • summarise the patients' issues in the discharge summary, and ensure it is transferred to stakeholders
Quality and safety		• use telehealth and digitally integrated support services to provide innovative models of post-transplant care • review medicine use and ensure patients understand safe medication administration to prevent errors • support patients' self-management post-transplant by balancing minimising risk with helping them become more independent	• participate in continuous quality improvement processes and clinical audits on chronic disease management • identify activities that may improve patients' quality of life

	• participate in quality improvement processes examining issues impacting on patients' ability to undertake normal activities of daily living	
Teaching and learning	• contribute to the development of clinical pathways for chronic diseases management and post-transplant surveillance based on current clinical guidelines • educate patients to recognise and monitor their symptoms, and undertake strategies to assist their recovery	• use clinical practice guidelines for chronic diseases management
Research	• resolve clinical areas of uncertainty by searching and critically appraising evidence • review current literature on transplantation	• apply the literature to an individual patient • recognise appropriate use of review articles
Cultural safety	• encourage patients to join culturally aligned local networks to receive support for long-term self-management • use a shared decision-making model with patients, families and/or carers • identify and implement strategies to improve the inequity of access to services	• work with patients' cultural beliefs, values, and practices in developing relevant management plans • explain the impact patients' cultural and spiritual beliefs may have on their decision to accept a donor organ
Ethics and professional behaviour	• obtain informed consent for living kidney donation • support a multidisciplinary team approach with the ethical principles in clinical decision making about transplantation • undertake transplantation only when it is believed that it provides benefit to the recipient • ensure just and equitable assessment of patients' eligibility for transplantation • ensure that donated organs are given freely and voluntarily, without coercion, exploitation, or payment • obtain patients' consent for receiving transplanted organs with thorough discussion of risks and benefits, and with the understanding that patients may withdraw their consent to transplantation at any stage before the procedure • share information about patients' health care, consistent with privacy law and professional guidelines about confidentiality	• share information between relevant service providers • seek input from other health professionals involved in patients' care • assess patients when assessing eligibility for transplantation based on factors such as past lifestyle, previous refusal of an offer of an organ for transplantation, or refusal to participate in research

	• use consent processes for the release and exchange of health information • assess patients' decision-making capacities, and appropriately identify and use alternative decision makers when needed • avoid any potential or perceived conflicts of interest by not being involved in decision making about end-of-life care or determination of death of individuals who may become organ donors	
Judgement and decision making	• modify treatment options in response to infectious complications and knowledge of microbiological principles • make optimal use of scarce resources such as donor organs	• identify patients who require a kidney biopsy • follow-up results of investigations, and monitor responses to treatments • identify patient-specific clinical features that influence transplant eligibility and outcomes • assess patients' capacity for decision making • develop management plans for transplantation and/or patients on the waiting list
Leadership, management, and teamwork	• involve the multidisciplinary team, particularly nurses and live donor program coordinators, in the initial counselling of potential kidney transplant recipients and donors • coordinate whole-person care through all stages of patients' care journeys	• demonstrate awareness of personal and other team members' skills, expertise, and roles in caring for transplant patients • select appropriate patient education resources related to nephrology • synthesise patient information to determine dialysis small solute clearance and solutions to non-achievement
Health policy, systems, and advocacy	• use health screening for early intervention and chronic diseases management • assess alternative models of health care delivery for patients with chronic diseases and disabilities • participate in government initiatives for chronic diseases management to reduce hospital admissions and improve patients' quality of life • facilitate patients' access to initiatives and services for patients with chronic diseases and disabilities • incorporate prevention, health promotion, and health surveillance into patient interactions • recognise and apply local/national and international kidney	• develop and implement local protocols for pre-transplant assessment of recipients and living donors • access and refer patients to government initiatives and services for patients with chronic diseases and disabilities • advocate for deceased and living donation

	guidelines, such as CARI and KDIGO

EPA 14: Dialysis

Theme		**Dialysis**	**NP-EPA-14**
Title	AIM	**Prescribe and manage dialysis for patients with kidney failure**	
	PCH	**Prescribe and manage dialysis for paediatric and neonatal patients with kidney failure**	
Description		This activity requires the ability to: • select and interpret appropriate investigations • identify indications for kidney replacement therapy, and assess patients for suitability • arrange dialysis, and examine, monitor, and maintain access function • order and adjust dialysis prescriptions • discuss patients'[17] goals of care to inform shared decision making about the prescription of individualised, patient-centred dialysis • prevent and manage kidney replacement therapy complications to improve morbidity, mortality, and quality of life • collaborate with other health professionals to develop a holistic care model to include physical, mental, social, and spiritual wellbeing.	
Behaviours			
Professional practice framework domain		**Ready to perform without supervision** Expected behaviours of a trainee who can routinely perform this activity without needing supervision	**Requires some supervision** Possible behaviours of a trainee who needs some supervision to perform this activity
		The trainee will:	The trainee may:
Medical expertise		• establish goals of care, which may include slowing disease progression, improving function, and palliation • describe different dialysis modalities • select and interpret infectious investigations specific to dialysis patients • recognise individual patients' factors that will contribute to the success of dialysis compared with comprehensive conservative care, such as comorbidities and frailty • ascertain volume status and determine dry weight/target weight for dialysis, and prescribe the rate of ultrafiltration either on the haemodialysis (HD) machine or the concentration of the peritoneal dialysis (PD) bag • apply knowledge of mechanisms of fluid delivery, machine mechanics and membrane	• describe methods of creating vascular access for HD and PD • manage common medical comorbidities in patients on PD or HD, such as unique diabetes characteristics • examine and assess the dialysis access, monitoring and troubleshooting access function or dysfunction • manage common symptoms of PD including: » constipation » exit site issues and technique issues • manage common symptoms of HD, including: » pre-dialysis overload » uremic symptoms of itch » post-dialysis symptoms of fatigue and dizziness

[17] References to patients in the remainder of this document may include their families and/or carers.

		physiology as they relate to dialysis modalities, including dangers of high ultrafiltration (UF) rates in HD patients and concentration of bags • monitor and manage vascular access • use strategies to optimise solute clearance • recognise the importance of residual kidney function and how to preserve it, linking to better modality and patient survival • document dialysis prescriptions as per local standards and health records • manage and develop long-term plans for access, transplantation, or independent dialysis • prescribe, adjust, and maintain high-quality, patient-centred dialysis • recognise and manage acute dialysis emergencies • develop advanced care plans, anticipating future needs in consultation with patients, families and/or carers	• develop and implement plans to manage traditional and non-traditional cardiovascular system (CVS) risks specific to dialysis patients • determine if the patient requires transition to another access or modality due to underdialysis or technique failure
	PCH	• recognise the barriers to dialysis in very low weight infants • identify the technical issues and potential complications of dialysis in children and infants	
	Communication	• encourage and educate patients to be involved in their care, enabling supportive problem-solving environments • encourage patients' access to self-monitoring devices and assistive technologies • communicate with multidisciplinary team members and patients, families and/or carers, including working closely with the: » dietitian, due to restrictions » dialysis coordinators, to improve quality of life with changes in timing, location of dialysis, and transport » clinical psychologists, to help cope with dialysis • use cognitive aids, such as pre-printed orders or care paths • discuss travel and holiday plans with patients on dialysis, including organising holiday dialysis using Big Kidney Red Bus (AU only) • discuss the therapeutic and lifestyle implications of home	• provide lifestyle advice that is beyond healthy lifestyle, including fluid and diet restriction in HD patients, as well as high fibre diets in PD patients • work in partnership with patients and motivate them to comply with agreed care plans, including: » fluid restrictions » low phosphate diets » low salt and cholesterol due to high CVS risk » early presentations to kidney units when dialysis complications occur

		versus hospital-based dialysis with patients, families and/or carers	
	PCH	• work with parents/carers of children on dialysis and recognise the impact of dialysis on the family • outline unique issues regarding dialysis initiation and maintenance in children and infants • communicate with educators to maintain educational outcomes, particularly for children on HD	
Quality and safety		• use innovative models of home HD and PD care using telehealth and digitally integrated support services and remote monitoring • review the anaemia, mineral and bone disorder (MBD), and CVS medications, and ensure patients understand their importance • support home HD and PD patients' self-management by balancing between minimising risk with new safety monitoring and helping patients become more independent • participate in quality improvement processes examining issues impacting on patients' abilities to undertake normal activities of daily living	• participate in continuous quality improvement processes and clinical audits, particularly the regular review of blood results: » HD and PD access surveillance » solute clearance » electrolyte management » fluid assessment » anaemia management • identify activities that may improve patients' quality of life, including help with transport, timing of dialysis, and other home support services
Teaching and learning		• educate patients to recognise and monitor their symptoms and present early to their dialysis service	• use local CARI or KDIGO guidelines for chronic diseases management
	PCH	• educate families regarding the management of dialysis in children • provide appropriate information to schools regarding children on dialysis	
Research		• prepare reviews of literature on dialysis advances to present at journal club meetings • search for and critically appraise evidence related to dialysis	• search literature using Problem/Intervention/Comparison/ Outcome (PICO) format • recognise appropriate use of review articles
Cultural safety		• encourage patients from diverse backgrounds to join local networks to receive the support needed for long-term self-management, in particular the specific needs of Indigenous dialysis patients • recognise the statistics indicating a higher incidence of kidney failure resulting in dialysis in Indigenous populations	• provide culturally safe chronic disease management

	PCH		• provide children and young people with information that is appropriate for their age and cognitive level
Ethics and professional behaviour		• share information about patients' dialysis plans, consistent with privacy law and professional guidelines about confidentiality • use consent processes before commencing dialysis • assess patients' decision-making capacities about commencing and continuing dialysis, and appropriately identify and use alternative decision makers when needed • outline financial support options for dialysis, including travel and carer supports • support patients who choose to withdraw from or refuse dialysis	• share information between relevant service providers • recognise the contribution of access surgeons, dietitians, dialysis nurses, and psychologists involved in patients' care
	PCH		• discuss care plans with children and young people at an age- and cognition-appropriate level
Judgement and decision making		• implement stepped care pathways in the management of dialysis, including responding to underdialysis and clinical complications • recognise patients' needs and the supports required on long-term health care journeys	• recognise personal limitations and seek help in an appropriate way when required, including from the dialysis team • synthesise patients' information to determine dialysis solute clearance and solutions to non-achievement
Leadership, management, and teamwork		• lead monthly bloods meetings and dialysis quality assurance meetings with the multidisciplinary team • use a multidisciplinary approach across services to manage patients with the unique issues of dialysis patients • develop collaborative relationships with patients, families and/or carers, and the dialysis team, including dialysis nurses, educators, dietitians, and social workers • coordinate whole-person care through involvement in all stages of patients' care journeys	• organise the day-to-day management of HD and PD units • demonstrate an understanding of the range of personal and other team members' skills, expertise, and roles • recognise the cost implications of different catheters, fluids, and systems in both HD and PD • participate in multidisciplinary team care for patients with chronic diseases and disabilities, including organisational and community care on a continuing basis, appropriate to patients' context

Health policy, systems, and advocacy		• use health screening for early intervention and chronic diseases management • assess alternative models of health care delivery to patients with chronic diseases and disabilities • participate in government initiatives for dialysis, including promoting home dialysis to reduce hospital admissions and to improve patients' quality of life • refer patients to available disability and chronic disease initiatives and services • contribute to the development of clinical pathways for dialysis management based on KHA-CARI and KDIGO guidelines • understand the implications of green dialysis, and work towards minimising environmental impact	• demonstrate awareness of government initiatives and services available for dialysis patients, including transport and medication funding, and how to access these • document dialysis prescriptions as per local standards, and help provide ANZDATA entries
	PCH	• outline the effect of hospital versus home dialysis on children's education	• work in partnership with educators of school-age children to maximise educational attainment

Knowledge Guides

Knowledge guides (KGs) provide detailed guidance to trainees on the important topics and concepts trainees need to understand to become experts in their chosen specialty.

KGs will vary from program to program. The KGs listed below have been developed for the Advanced Training in nephrology program.

#	Title
1	**Clinical sciences**
2	**Acute kidney injury**
3	**Chronic kidney disease**
4	**Kidney transplantation**
5	**Hypertension**
6	**Glomerular, tubular, and interstitial nephritis**
7	**Dialysis**
8	**Inherited, congenital, and rarer diseases**
9	**Urological issues and onco-nephrology**
10	AIM only **Adult interventional nephrology**

AIM: Adult Internal Medicine
PCH: Paediatrics & Child Health

EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND CLINICAL SCIENCES

Advanced Trainees will describe the principles of the foundational sciences.

For the statistical and epidemiological concepts listed, trainees should be able to describe the underlying rationale, the indications for using one test or method over another, and the calculations required to generate descriptive statistics.

Clinical sciences

- Acid–base regulation and its link to the respiratory system
- Community presentations, including incidental diagnosis of structural kidney disease
- Embryology of kidney and urogenital development
- Kidney autoregulation and how it changes with acute kidney injury (AKI)
- Normal physiology and homeostasis and pathophysiology of electrolytes
  - » sodium, potassium, calcium, magnesium, chloride, and phosphate balances, and water balance
- Normal urine composition
- Physiology of calcium, phosphate, bone, and mineral metabolism
- Physiology of tubular disorders
- Physiology of water, electrolyte, and acid–base abnormalities
- Process of fluid and electrolyte regulation
- Process of hormonal regulation:
  - » aldosterone and its link to the endocrine system
  - » antidiuretic hormone (ADH)
  - » renin-angiotensin system (RAS)
- Structure and function of the kidney system and prostate
- The role of the kidney in regulation of erythropoiesis and causes of anaemia in people with kidney disease

PCH

Anatomy, development, and physiology

- Factors that contribute to impaired growth in children with kidney disorders and chronic kidney disease (CKD)
- Neurodevelopmental outcomes in children with kidney disease
- Normal blood pressure in children
- Physiology of the developing nephron
- Physiology of the developing nephron, including tubular and glomerular maturation with age, including changes in:
  - » homeostasis, fluid and electrolyte requirements
  - » glomerular filtration rate (GFR)
  - » urine protein excretion

The development and anatomy of the urinary tract

- Embryological, histological, clinical, and radiological features of kidney dysplasia and developmental abnormalities of the kidney
- Epidemiology and microbiology of urinary tract infections (UTIs) and the role of host defence mechanisms
- Genital abnormalities and their association with kidney disease
- Physiology of normal micturition and acquisition of bladder control, along with potential barriers to this
- Syndromes associated with kidney disease
- The pathophysiology of the neuropathic bladder

Clinical study design

- Clinical trials
- Consumer engagement
- Evidence based medicine (EBM) in nephrology
- Good Clinical Practice (GCP)
- Implementability and implementation
- Pragmatic versus explanatory
- Systematic reviews
- Trial registration
- Trials networks and guideline groups

Determinants of health

- Prevalence of kidney disease in Indigenous populations
- Socioeconomic determinants of health

Health economics

- Resource allocation for the provision of dialysis and needs that are important to patients, such as transportation
- Resource allocation for transplantation

Measures of treatment efficacy and interpretation of study results

- Clinical outcomes
- Core outcomes
- Grading of Recommendations, Assessment, Development and Evaluation (GRADE) assessment
- Patient reported experience measures (PREMs)
- Patient-reported outcome measures (PROMS) in studies, including Standardised Outcomes in Nephrology (SONG) initiative
- Surrogate outcomes

Pharmacology

- Immunological kidney injury from drugs – different types of AKI
- Influence of drugs on eGFR [angiotensin-converting enzyme inhibitors (ACEI), angiotensin II receptor blockers (ARBS), sodium-glucose transport protein 2 (SGLT2)]
- Modification of drug dose according to eGFR
- Nephrotoxicity

Pharmacokinetics

- Altered drug-protein binding and metabolism in kidney disease, such as insulin

Pharmacodynamics

- Altered volume of distribution in patient with kidney disease, such as nephrotic syndrome and other low albumin states

Population statistics

- Complications
- Cost to community of kidney failure, including treatment with dialysis, transplantation, or conservative kidney management, and non-dialysis CKD
- Epidemiology – incidence, prevalence
  Quality of life

INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS

Advanced Trainees will know the indications for – and how to interpret the results of – these investigations, procedures, and clinical assessments tools.

Advanced Trainees will know how to explain the investigation, procedure, or clinical assessment tool to patients[18], families, and/or carers.

- Formulae used to estimate GFR, and their limitations
- Kinetic eGFR calculation for situations in which eGFR is unreliable (non-steady state)
- Measurement techniques, including:
  - cystatin C
  - diethylene triamine pentaacetic acid (DTPA)
  - dimercaptosuccinic acid scan (DMSA)
  - ethylenediaminetetraacetic acid (EDTA)
  - mercapto acetyl tri glycine scan (MAG-3)
- Normal appearance and common features of the kidney
- Pathological features of kidneys shown by imaging modalities
- Single photon emission computed tomography (SPECT) and PET scans for vasculitis
- Tests to measure electrolytes, such as:
  - blood tests – serum creatinine, eGFR, blood urea nitrogen (BUN)
  - imaging – CT scan, MRI, including strengths and shortcomings of imaging modalities
  - urine tests – urinalysis, urine protein, microalbuminuria, albumin-to-creatinine ratio (ACR), creatinine clearance
- The implications of interpreting glomerular filtration rate
- The limitations of eGFR

PCH

Paediatric-specific kidney function tests

- Developmental abnormalities on antenatal imaging and provide counselling as needed
- Imaging modalities used in adults, plus:
  - dimercaptosuccinic acid scan
  - MAG-3 and pyelograms for assessment of obstruction
  - micturating cystourethrogram

Laboratory tests

- Biomarkers of acute and chronic kidney injury
- Blood analyses including acid–base, electrolytes, and hormone measurements
- eGFR and its limitations
- Microurine interpretation – bacteria, cells, casts, other biomarkers
- Patterns of abnormalities in the above tests, including glomerulonephritis, tubulointerstitial disease, and kidney failure
- Traditional and non-traditional CVS risk markers
- Urine dipstick test – its characteristics in normal and pathophysiological states, such as solutes, protein, and bacteria, including patient factors that may impact (age and gender)

PCH

Paediatric-specific laboratory tests

- eGFR in children
- Urine collections methods and their application in the setting of UTIs

IMPORTANT SPECIFIC ISSUES

Evidence-based clinical practice

- Consistency
- Continuous quality improvement
- Critical appraisal

[18] References to patients in the remainder of this document may include their families and/or carers.

Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis, management and outcomes.	• Directness • Evaluating certainty of evidence • GRADE assessment • Other bias, such as publication, commercial bias • Precision • Risk of bias • Understanding enablers of, and barriers to, implementation **Health needs of specific patient groups** • CKD in patients with diabetes • Indigenous populations **Management considerations** • Acquired and genetic podocyte and tubular disorders that lead to acid–base disorders • Antenatal and postnatal assessment of kidney morphology and function, including physiological changes that occur during childhood • Changes in acid–base metabolism and volume homeostasis in pregnancy • Changes in the anatomy and function of the kidneys in normal pregnancy Postnatal changes in kidney tubular function and GFR **Prescribing** • Aminoglycosides • Drugs that should be withheld in AKI or in sick day plans (SADMANS acronym) • Effects of commonly prescribed kidney drugs on nephron function, such as diuretics, sodium-glucose cotransporter-2 (SGLT2) inhibitors, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor antagonists • Non-steroidal anti-inflammatory drugs (NSAIDs) • Trimethoprim • Considerations for prescribing: » adjustment of drug dosage in prescribing therapies » mechanisms of action and side effect profiles of immunosuppressive agents (calcineurin inhibitors [CNI], mechanistic target of rapamycin [mTOR], cyclophosphamide, steroids, biologic agents), commonly used agents associated with kidney injury

Knowledge guide 2 – Acute kidney injury (AKI)

Advanced Training in Nephrology

KEY PRESENTATIONS AND CONDITIONS

Advanced Trainees will have a comprehensive depth of knowledge of these presentations and conditions.

Presentations

- Acidosis
- Haematuria
- Hypertension
- Hypertensive emergency
- Fluid overload
- Oligo-anuria
- Oliguria
- Proteinuria
- Sodium, potassium, and calcium disturbances
- Uraemia

Conditions

- Nephrotoxins
- Outflow obstruction
- Sepsis
- Reduced perfusion

LESS COMMON OR MORE COMPLEX PRESENTATIONS AND CONDITIONS

Advanced Trainees will understand these presentations and conditions.

Advanced Trainees will understand the resources that should be used to help manage patients with these presentations and conditions.

Conditions

- Abdominal compartment syndromes
- Atypical haemolytic uraemic syndrome/thrombotic microangiopathy (TMA)
- Cardio-renal syndromes
- Congenital anomalies of kidney and urinary tract (CAKUT)
- Delayed graft function post-kidney transplant
- Endemic nephropathy
- Haematology disorders, including monoclonal gammopathy of renal significance (MGRS) (AIM only)
- Hepato-renal syndrome
- Infections of the urinary tract and kidney
- Renal artery dissection:
  - » toxicological indications for dialysis drug metabolism, pharmacokinetics in patients with reduced kidney function
- Renal-vascular disease:
  - » renal artery stenosis
- Rhabdomyolysis and myoglobinuric AKI
- Tumour lysis syndrome

For each presentation and condition, Advanced Trainees will know how to:

Synthesise

» recognise the clinical presentation
» identify relevant epidemiology, prevalence, pathophysiology, and clinical science
» take a relevant clinical history
» conduct an appropriate examination
» establish a differential diagnosis
» plan and arrange appropriate investigations
» consider the impact of illness and disease on patients[19] and their quality of life

Manage

» provide evidence-based management
For less common or more complex presentations and conditions the trainee must also seek expert opinions
» prescribe therapies tailored to patients' needs and conditions
» recognise potential complications of disease and its management, and initiate preventative strategies
» involve multidisciplinary teams

Consider other factors

» identify individual and social factors and the impact of these on diagnosis and management

[19] References to patients in the remainder of this document may include their families and/or carers.

AIM	
	• Myeloma and the kidney

EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND CLINICAL SCIENCES

Advanced Trainees will describe the principles of the foundational sciences.

Pathophysiology of acute tubular injury

- Hypoxia
- Inflammatory response
- Linkages between physiology and pathophysiology
- Normal physiology – AKI, tubular abnormalities, metabolic acidosis, drug induced acidosis, sodium
- Tubular factors:
  - » proximal tubular injury including apoptosis and necrosis
  - » sub-lethal proximal tubular injury
- Vascular factors:
  - » thrombosis

INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS

Advanced Trainees will know the indications for – and how to interpret the results of – these investigations, procedures, and clinical assessments tools.

Advanced Trainees will know how to explain the investigation, procedure, or clinical assessment tool to patients, families, and/or carers.

Investigations

- ADAMTS-13
- Clinical diagnosis versus biochemical versus biomarkers
- Contemporary biomarkers (blood and urine) of AKI
- Current biomarkers for research
- Full blood count (FBC)
- Immunology testing, including:
  - » antineutrophil cytoplasmic antibodies (ANCA)
  - » anti-glomerular basement membrane (anti GBM)
  - » antinuclear antibodies (ANA)
  - » Anti-DNase B
  - » creatine kinase (CK)
  - » complement component 3 (C3)
  - » complement component 4 (C4)
  - » cryoglobulins
  - » double stranded NDA (dsDNA)
  - » extractable nuclear antigen (ENA)
  - » serum electrophoresis (light and heavy) chain
- KDIGO stages G1–G5
- Kidney histopathology
- MRI
- Nuclear medicine scans
- Peripheral blood (PB) film (aHUS/TMA)
- Arterio-venous fistulas of the kidney post biopsy
- Stool for ST-producing E. coli (STEC)
- Ultrasound or CT of kidneys, ureters, and bladder (KUB)
- Urine microscopy
- Urine albuminuria/proteinuria
- Urine electrolytes (stone work-up)

Procedures

- Kidney biopsy

IMPORTANT SPECIFIC ISSUES

Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis and management.

- AKI following endovascular procedures
- Haptoglobin and lactate dehydrogenase (LDH) to full blood count for haemolytic uremic syndrome (HUS)

Difficult management issues

- Acidaemia
- Appropriate fluid prescription
- Disequilibrium
- Electrolyte and acid base disturbances

- High AKI risk groups in the emergency department, including:
  - cardiac arrest
  - CKD
  - heart failure
  - hyponatraemia
  - increased creatinine
  - liver disease
  - myocardial infarction
  - post-trauma
  - sepsis
  - shock
  - toxic ingestions
- Hyperkalaemia
- Malignant hypertension or emergent hypertension
- Uraemia
- Vascular access complications:
  - bleeding
  - central line-associated bloodstream infections (CLABSI)
  - pneumothorax

Nephrotoxicity of medications/drugs and therapies

- Antibiotics
- Anti-fungal agents
- Anti-inflammatories
- Iodinated contrast (intra-arterial)
- Nephrotoxic agents, such as:
  - checkpoint inhibitors
  - cisplatin
  - proto-inhibitors
- Some herbal supplements and natural therapies
- Toxic alcohols – ethylene glycol, methanol
- Vascular endothelial growth factor inhibitors

Pregnancy

- Causes of AKI in pregnancy
- Comorbid medical conditions in patients with pre-existing kidney disease, dialysis, or a kidney transplant during pregnancy, with particular emphasis on risk minimisation
- Hypertension
- Nephrotic syndrome in pregnancy
- Pre-eclampsia and eclampsia

Prescribing, therapy, and pharmacology

- Choice of kidney replacement therapy modality, intensity of solute and volume removal, anticoagulation
- Choice of vascular access
- Dialysis and drug metabolism
- Plasmapheresis or plasma exchange
- Timing of initiating acute kidney replacement therapy
- Urgent indications for acute kidney replacement therapy

Prevention

- Primary prevention in high-risk patients (e.g. cardiac surgery)
- Secondary prevention in patients at risk of recurrent AKI

	PCH	• Choice of modality for acute kidney replacement therapy • Definitions and staging of AKI in children and neonates • Diarrhoea-associated (D+) haemolytic uremic syndrome and diarrhoea negative (D-) or atypical HUS, and use of biologics • Fluid status evaluation • Prevention and management of AKI in neonates

KEY PRESENTATIONS AND CONDITIONS

Advanced Trainees will have a comprehensive depth of knowledge of these presentations and conditions.

Presentations

- Antenatal diagnosis
- Decreased urine output
- Growth failure
- Haematuria
- Hypertension
- Incontinence
- KDIGO – GFR stages G1–G5
- Nephritic syndrome
- Nephrotic syndrome
- Oedema
- Polyuria
- Uraemia

Conditions

- CKD sequalae with complications:
  - » acidosis
  - » anaemia
  - » β2-microglobulin amyloidosis
  - » cardiovascular disease
  - » CKD mineral bone disorder (MBD) including:
    - calcium/phosphate/PTH and vitamin D control
  - » electrolyte disturbances, including hyperkalaemia and hypocalcaemia
  - » hypertension
  - » increased risk of infections
  - » infectious complications
  - » iron stores, erythropoietin, preparation for transplant
  - » physiology, and use of, hypoxia inhibitor stabilisers and hepcidin
- Diabetic kidney disease
- Environmental chronic kidney disease of unknown aetiology (CKDu)
- Glomerulonephritis
- Hyperuricaemia and gout
- Nephropathy:
  - » hypertensive
  - » obstructive
  - » vascular/renovascular

LESS COMMON OR MORE COMPLEX PRESENTATIONS AND CONDITIONS

Conditions

- Extraosseous and vascular calcification:
  - » calciphylaxis
  - » medial vessel calcification
  - » other extraosseous and vascular calcification, including visceral organs

For each presentation and condition, Advanced Trainees will know how to:

Synthesise

- » recognise the clinical presentation
- » identify relevant epidemiology, prevalence, pathophysiology, and clinical science
- » take a relevant clinical history
- » conduct an appropriate examination
- » establish a differential diagnosis
- » plan and arrange appropriate investigations
- » consider the impact of illness and disease on patients[20] and their quality of life

Manage

- » provide evidence-based management
  For less common or more complex presentations and conditions the trainee must also seek expert opinions
- » prescribe therapies tailored to patients' needs and conditions
- » recognise potential complications of disease and its management, and initiate preventative strategies
- » involve multidisciplinary teams

Consider other factors

- » identify individual and social factors and the impact of these on diagnosis and management

[20] References to patients in the remainder of this document may include their families and/or carers.

Advanced Trainees will understand these presentations and conditions. Advanced Trainees will understand the resources that should be used to help manage patients with these presentations and conditions.	• Inherited and genetic kidney disease (see KG8) • Kidney failure protein energy wasting • Kidney hypertension • Kidney manifestations of systemic and chronic disease, hepato-renal, and cardio-renal • Metabolic acidosis • Mineral and bone disorder: » kidney osteodystrophy (and related pathophysiology): ▪ adynamic bone disease ▪ mixed uremic osteodystrophy ▪ osteitis fibrosis ▪ osteomalacia ▪ other kidney osteodystrophy, including low bone mass (osteoporosis) • Renal artery stenosis complications	
EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND CLINICAL SCIENCES Advanced Trainees will describe the principles of the foundational sciences.	• Allergic/interstitial kidney disease • Bone–kidney axis and its physiology, including: » fetuin » fibroblast growth factor 23 (FGF23) » klotho » parathyroid hormone (PTH) • Calcium and phosphate and vitamin D balance • Chronic kidney disease of unknown aetiology (CKDu), including Balkan nephropathy • Classification and description of CKD – KDIGO stages G1–G5 • Kidney endocrine functions: » erythropoietin (EPO) » vasopressin » vitamin D3 • Measurement of kidney function and estimation of glomerular filtration rate (eGFR) using creatinine clearance • Nephrotoxins including drugs, contrast, and envenomation • Pathophysiology of diabetic nephropathy, its predisposing factors, and available screening methods • Pathophysiology of kidney anaemia, and the haematological and biochemical methods to diagnose, assess, and monitor treatment for kidney anaemia • Pathophysiology of kidney mineral and bone disease (MBD) including: » adynamic mineral and bone disease » hyper parathyroid-associated mineral and bone disease » osteomalacia • Physiology of electrolyte and acid base disturbances • Progression and progressive disease predictors (senescence versus disease and predicting progression) • The common nephrotoxins causing: » AKI – drugs, contrast » CKD – environmental, drugs, herbs, e.g. Balkan nephropathy	
INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS	**Imaging** • CT scan and MRI • Kidney angiogram • Kidney tract ultrasound • Nuclear medicine testing • Pyelography	

Advanced Trainees will know the indications for, and how to interpret the results of these investigations, procedures, and clinical assessments tools.

Advanced Trainees will know how to explain the investigation, procedure, or clinical assessment tool to patients, families, and carers.

Laboratory studies

- 24-hour urine electrolyte collection
- Arterial blood gases (ABGs)
- Bone studies
- Creatinine clearance
- Electrolytes
- Full blood count (FBC)
- Glomerular filtration rate (eGFR)
- Haematuria (urine microscopy and phase contrast microscopy)
- Kidney function
- Other labs appropriate to underlying disease – nephrotic state TFTs, lipids
- Proteinuria
- PTH
- Urinalysis
- Urine microscopy and dipstick analysis
- Vitamins D and A

Procedures

- Renal artery angioplasty and stenting
- Kidney biopsy

IMPORTANT SPECIFIC ISSUES

Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis and management.

- CARI guidelines identifying the components relevant to patients and their family and/or carers in supporting non-dialysis patients:
  - continuity of care
  - multidisciplinary management with allied health staff, particularly social work and dietetics
  - symptom control
- Pregnancy in patients with CKD:
  - perinatal and postnatal support
  - pregnancy outcomes
  - risk and incidence of AKI
- Post significant AKI screening
- Prevalence and aetiology of kidney disease in Aboriginal and Torres Strait Islander and Māori peoples
- Strategies to improve diagnosis and prognosis by opportunistic and at-risk screening and early intervention

Impacts and considerations for patients with CKD

- Common pathological, pharmacological, and sexual health impacts
- Dermatological complications, such as pruritis
- Factors that affect progression of kidney failure
- Fatigue, xerostomia, depression, constipation, insomnia, nausea, vomiting, dyspnoea, and pain
- Management of patients with CKD in palliative care
- Nephrotoxicity of environmental and occupational agents, including lead, organic solvents, cadmium, and mercury
- Nutritional issues facing kidney patients and special dietary regimes prescribed, such as low protein diet in CKD
- Referral for vascular access where appropriate
- Transplant preparation
- Vein preservation

Pharmacology and treatment

- Anti-hypertensive agents
- Cardiovascular risk factor management
- Causes of resistance to erythropoietic stimulating agent (ESA) therapy and its investigation

	• CKD mineral and bone disorder (MBD) pharmacology management, including: » calcimimetic drugs » parathyroidectomy to manage the condition » phosphate binders » vitamin D preparation • Continued immunosuppression therapy for proliferative glomerulonephritis and vasculitis immunosuppressive agents and regimes • Diabetic management • Drug interactions • ESAs and their complications • Ethical considerations for treatment equity in different populations • Hypertensive medications • Immunosuppressive agents • Kidney disease and anaemia – erythropoietin and Fe, including hypoxia-inducible factor (HIF) stabilisers and hepcidin • Oral and parenteral iron therapy and its complications • Patient response to treatment for kidney mineral and bone disease • Pharmacology of major drug classes used to treat kidney disease • Proteinuria reducing drugs • The interrelationship between drug dosing to GFR and age using Cockcroft–Gault equation (CG) or eGFR equation to identify the toxicity of certain agents in CKD • Therapeutic drug level monitoring
PCH	• Growth, and the role of nutrition and growth hormone in paediatrics • Outcomes of kidney failure in infants and children diagnosed at an early age • The principles of bioethics and ethics support available • Transition of kidney patients to adult care

CLINICAL SCIENCES

Advanced Trainees will describe the principles of the foundational sciences.

Transplant immunology

- Management of highly sensitised recipients, including blood group incompatibility and paired exchange
- The immunological basis for allograft rejection
- The pharmacology of immunosuppressives used in transplantation, including their short- and long-term side effects and drug interactions
- The process of tissue typing and crossmatching, and how to interpret tissue typing reports
- The risk factors for HLA sensitisation, which can include the role of epitope matching for recipients expected to need future transplantation

ELIGIBILITY AND CONSIDERATIONS

Advanced Trainees will assess the patient's current condition and plan the next steps.

Recipient eligibility

- Blood group, human leukocyte antigen (HLA) testing, and sensitisation and impacts on graft waiting times and outcomes
- Cancer (previous cancer and screening)
- Cardiac investigations
- Cause of kidney disease
- Comorbidities
- Counselling patients[21], family and/or carers regarding benefit and risk of transplant and the process of eligibility, activation, donor offers, and acute and chronic transplant management
- Inclusion and exclusion criteria:
  - absolute and relative
  - cardiovascular status and function
  - cognitive and carer factors
  - metabolic
  - socioeconomic factors
- Infection in particular viral status and prophylaxis including:
  - cytomegalovirus (CMV)
  - Epstein–Barr virus (EBV)
  - hepatitis B and C
  - HIV
- Medical and psychological complications of transplant
- Urinary tract and bladder function
- Vaccinations
- Vascular imaging

Kidney donors

- Living donor (e.g. related versus unrelated, directed, paired kidney exchange and chains, altruistic):
  - donor evaluation
  - ethics of donation
  - outcomes and short- and long-term donor risks
  - paired kidney donation and chains
  - post-transplant follow-up of transplant donor
  - potential donor counselling and/or referral to specialist services, e.g. psychiatric, cardiac, and anaesthetic assessment

[21] References to patients in the remainder of this document may include their families and/or carers.

	» understand organisations including Donate Life as a strategy for improving organ availability • Deceased donor kidney transplantation: » deceased donor wait list process » donor risk – high kidney donor profile index (KDPI), increased viral risk, cancer risk » how the allocation system works, which strongly informs whether or not to accept a kidney offer » kidney transplant outcomes » types (e.g. DBD, DCD, SCD, ECD) **Reviewing a kidney donation** • Current data recorded by ANZDATA living kidney donor registry • Incompatible live donors • Protocols of the local transplant unit • Reviewing and accepting a donor organ offered to a patient
UNDERTAKING THERAPY Advanced Trainees will monitor the progress of patients during the therapy.	• Acute transplant, including: » immunosuppression, particularly risks and benefits of commonly used drugs (calcineurin inhibitors (CNI), glucocorticoids, mammalian target of rapamycin (mTOR) inhibitors, antimetabolites and monoclonal antibodies): ▪ effects ▪ induction ▪ maintenance » perioperative management » preparation of a patient • Comorbidities in patients due to conditions including cardiovascular disease, hypertension, and obstruction
POST THERAPY Advanced Trainees will know how to monitor and manage patients post-therapy.	**Short-term** • Bone status evaluation and treatment • Complications and their short- and long-term impacts, including: » BK virus nephropathy » diabetes, including worsening of pre-existing diabetes or new onset diabetes after transplant (NODAT) » diarrhoea » neutropenia • Evaluation of graft function and dysfunction in the early post-transplant period • Fluid management • Immunosuppression • Kidney transplant biopsy indications and interpretation, including use of Banff classification in the diagnosis of acute rejection • Management of cytomegalovirus (CMV) viraemia and infection • Management of early complications • Management of rejection: » antibody mediated » hyperacute » T-Cell mediated • Management of the failing graft • Radiological investigation, such as ultrasound scan and radioisotope scanning • Prophylactic antibiotics • Transplant glomerulopathy

Long-term

- Bone health
- Living with a donor kidney:
  - » counselling regarding healthy lifestyle
  - » immunosuppression
  - » prescribe and monitor effects
  - » regular outpatient review
- Prevent, identify, and manage longer-term complications:
  - » increased risk of cardiovascular disease
  - » increased risk of malignant disease, including post-transplant lymphoproliferative disease (PTLD) and other cancers
  - » primary kidney disease recurrence
- Strategies that maximise long-term graft function and survival

IMPORTANT SPECIFIC ISSUES

In addition to what is listed above, Advanced Trainees will identify important specific issues and the impact of these on diagnosis and management.

- BK virus diagnosis and management
- Combined kidney and pancreatic transplant
- Ethical issues in organ transplantation
- Interpretation of kidney biopsy histopathology changes, including:
  - » BK nephropathy
  - » calcineurin inhibitor toxicity
  - » rejection
  - » thrombotic microangiopathy (TMA)
  - » transplant glomerulopathy
- Male and female fertility in transplantation
- Organ sharing and allocation processes
- Other organ transplant including liver, lung, and heart
- Patients with known comorbid conditions which make transplant difficult, including:
  - » diabetes
  - » obesity
  - » polycystic kidney disease
  - » vascular disease
- Pregnancy in patients with transplanted kidneys:
  - » evaluating and minimising risks to kidney transplant
  - » evaluating and minimising risks to mother
  - » fetal outcomes
- Previous transplant patients being retransplanted:
  - » graft removal prior
  - » immunosuppression issues
  - » MBD issues
- Survival matching
- The importance of immunologic compatibility in recipients likely to require repeat transplantation
- Timing of dialysis recommencement
- Vaccination recommendations, risks, and benefits

PCH

- Growth in children post transplantation
- Maintain adequate perfusion where there is a mismatch between donor and recipient blood pressure
- Patients with substantial native urine output at transplantation
- Peri-operative complications specific to small children at transplantation, e.g. abdominal compartment syndrome
- The effects of immunosuppression in children
- The increased risk of graft thrombosis among small children, and practises to minimise this risk

KEY PRESENTATIONS AND CONDITIONS

Advanced Trainees will have a comprehensive depth of knowledge of these presentations and conditions.

Presentations

- Asymptomatic hypertension (HT)
- Endocrine hypertension, such as Cushing syndrome
- Hypertension emergency or urgency syndromes

Conditions

- Chronic kidney disease
- Primary hypertension:
  - » isolated systolic
  - » masked
  - » pseudohypertension
  - » resistant
  - » severe
  - » white coat
- Resistant and secondary hypertension:
  - » adrenal adenoma
  - » adrenal hyperplasia
  - » atherosclerotic
  - » dissection
  - » hyperaldosteronism
  - » kidney vascular disease
  - » pheochromocytoma

LESS COMMON OR MORE COMPLEX PRESENTATIONS AND CONDITIONS

Advanced Trainees will understand these presentations and conditions.

Advanced Trainees will understand the resources that should be used to help manage patients with these presentations and conditions.

Conditions

- Aortic coarctation
- Drug-induced hypertension
- Genetic conditions, including monogenic disorders associated with hypertension
- Kidney compression, such as Page kidney
- Obesity
- Renin-secreting tumour, such as juxtaglomerular cell tumour
- Sleep apnoea
- Syndrome of apparent mineralocorticoid excess
- Tuberous sclerosis
- Vasculitis and arteritis

For each presentation and condition, Advanced Trainees will know how to:

Synthesise

» recognise the clinical presentation
» identify relevant epidemiology, prevalence, pathophysiology, and clinical science
» take a relevant clinical history
» conduct an appropriate examination
» establish a differential diagnosis
» plan and arrange appropriate investigations
» consider the impact of illness and disease on patients[22] and their quality of life

Manage

» provide evidence-based management
For less common or more complex presentations and conditions the trainee must also seek expert opinions
» Be familiar with and know how to prescribe anti-hypertensive medications for both acute and chronic hypertension
» recognise potential complications of disease and its management, and initiate preventative strategies
» involve multidisciplinary teams

Consider other factors

[22] References to patients in the remainder of this document may include their families and/or carers.

	» identify individual and social factors and the impact of these on diagnosis and management
EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND CLINICAL SCIENCES Advanced Trainees will describe the principles of the foundational sciences.	• Kidney vascular disease acceleration and its effects • Other main regulators of BP, including: » adrenal glands » endothelial function » sympathetic nervous system • Pathophysiology of HT and the cardio-renal axis • Pathophysiology of hypertension: » renin-angiotensin system (RAS) » salt and volume control in CKD » sympathetic system • Pharmacology of major drug classes used to treat hypertension • Physiological BP changes and definition of HT across age groups • Prescribing in hypertension based on specific comorbidities, including: » cardiovascular disease » diabetes » obesity » obstructive sleep apnoea (OSA) » psychiatric disorders • Process of fluid and electrolyte changes due to drugs and hypertension • Process of hormonal regulation: » aldosterone and its link to the endocrine system » antidiuretic hormone (ADH) » renin-angiotensin system (RAS) • The biomedical principles used to determine blood pressure by different devices, e.g. oscillometric sphygmomanometers • The impact and risk factors of HT on the progression of kidney impairment and associated cardiovascular risk • The life course model of health and disease to the development and treatment of hypertension • The kidneys' contribution to blood pressure (BP) regulation, including: » pressure natriuresis » renin angiotensin aldosterone system » tubuloglomerular feedback (TGF) » volume homeostasis
INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS Advanced Trainees will know the indications for – and how to interpret the results of – these investigations, procedures, and clinical assessments tools. Advanced Trainees will know how to explain the investigation, procedure, or	**Imaging** • Echocardiography • Kidney angiogram • Kidney tract ultrasound **Laboratory tests** • 24-hour collections for catecholamines, cortisol • Aldosterone and renin, including impact of medications on testing • Kidney function and urate • Measuring BP by different means: » 24-hour ambulatory BP » clinic BP » home BP (and community) • Salivary cortisol • Serum catecholamines, chromogranin, and 5HIAA • Urinalysis

clinical assessment tool to patients, families, and carers.

IMPORTANT SPECIFIC ISSUES

Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis and management.

Diet and lifestyle

- A <2-g/d sodium diet
- Diet low in unsaturated fats
- High-potassium diet
- Reduction in alcohol intake
- Weight loss

End-organ damage resulting from hypertension

- Coronary heart disease/myocardial infarction and heart failure
- Pregnancy in patients with organ damage
- Proteinuria
- Retinopathy
- Stroke or subarachnoid bleeding

Guidelines

- Hypertension Guidelines – National Heart Foundation of Australia (NHF), Cardiac Society of Australia and New Zealand
- KDIGO 2021 guidelines

Hypertension in special situations

- Acute kidney injury
- Adolescents
- After kidney transplantation
- Cardiac (e.g. left ventricular hypertrophy, heart failure)
- Central nervous system disease
- Nocturnal hypertension
- Pregnancy
- Race and ethnicity in considerations of BP treatment

Investigations, therapies, and prescribing

- Baroreceptor activation
- Indications for particular medications
- Mechanisms of action, benefits, and potential side effects of anti-hypertensive drug classes, and the tolerability and convenience of prescribed regimens
- Non-pharmacological measures for achieving blood pressure targets
- Thiazide effects
- Treatment modalities for renal artery stenosis (RAS)

PCH

- Age-specific dosing and delivery of antihypertensives in paediatric patients
- BP measurements in different age groups
- Standard graphs defining blood pressure values in children

KEY PRESENTATIONS AND CONDITIONS

Advanced Trainees will have a comprehensive depth of knowledge of these presentations and conditions.

Presentations

- Acute kidney injury/disease
- Allergic presentation with fever and rash
- Hypertension
- Nephritic syndrome
- Nephrotic syndrome
- Proteinuria/haematuria +/- oedema
- Rapidly progressive GN

Conditions

- Diabetic kidney disease
- Glomerular disease:
  - » ANCA-associated vasculitis
  - » anti-glomerular basement membrane disease
  - » focal segmental glomerulosclerosis
  - » Henoch–Schönlein purpura (HSP)
  - » lupus nephritis
  - » membranous nephropathy
  - » minimal change disease
  - » post-infectious glomerulonephritis
  - » thin basement membrane nephropathy
  - » complement-related GN:
    - C3 GN, atypical hemolytic-uremic syndrome (HUS)
  - » pregnancy-related disorders:
    - haemolysis, elevated liver enzymes and low platelets (HELLP)
    - pre-eclampsia (PET)
- Paraprotein-related kidney disease, including:
  - » disorders amyloid, myeloma, monoclonal gammopathy of kidney significance (MGRS)
  - » fibrillary and immunotactoid glomerulonephritis
  - » cryoglobulinemic glomerulonephritis
- Tubulointerstitial nephritis (acute/chronic):
  - » drugs/toxins
  - » granulomatous
  - » hemoglobinopathy
  - » immune
  - » infections

For each presentation and condition, Advanced Trainees will know how to:

Synthesise

- » recognise the clinical presentation
- » identify relevant epidemiology, prevalence, pathophysiology, and clinical science
- » take a relevant clinical history
- » conduct an appropriate examination
- » establish a differential diagnosis
- » plan and arrange appropriate investigations
- » consider the impact of illness and disease on patients[23] and their quality of life

Manage

- » provide evidence-based management
  For less common or more complex presentations and conditions the trainee must also seek expert opinions
- » prescribe therapies tailored to patients' needs and conditions
- » recognise potential complications of disease and its management, and initiate preventative strategies
- » involve multidisciplinary teams

[23] References to patients in the remainder of this document may include their families and/or carers.

LESS COMMON OR MORE COMPLEX PRESENTATIONS AND CONDITIONS Advanced Trainees will understand these presentations and conditions. Advanced Trainees will understand the resources that should be used to help manage patients with these presentations and conditions.	**Conditions** • Fabry disease • Immunoglobulin G4 (IgG4) disease • Infections including: » Covid-19 » HIV • Rare vasculitides: » Kawasaki disease » Polyarteritis nodosa (PAN) » Takayasu's arteritis (TA) • Sarcoidosis • Scleroderma kidney disease	**Consider other factors** » identify individual and social factors and the impact of these on diagnosis and management
EPIDEMIOLOGY, PATHOPHYSIOLOGY AND CLINICAL SCIENCES Advanced Trainees will describe the principles of the foundational sciences.	• Aetiology, pathology and clinical manifestations of glomerulonephritis, proteinuria, and haematuria • Basics of the immune system, including immune system regulation and the relationship to nephritis • Genetics associated with GN, such as thin membrane nephropathy • Pathophysiology of interstitial nephritis and tubulo-interstitial disease, their causes, and links with systemic disease • Systemic diseases with renal involvement including infection	
INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS Advanced Trainees will know the indications for – and how to interpret the results of – these investigations, procedures, and clinical assessments tools. Advanced Trainees will know how to explain the investigation, procedure, or clinical assessment tool to patients, families, and carers.	**Imaging** • Ultrasound • CT • MRI • Nuclear scans **Laboratory tests** • Complement levels • Cryoglobulins • Disease-specific auto-antibodies • Genetic studies • Kidney biopsy • Serum electrophoresis • Urinalysis and urine microscopy: » spot urine and timed urine in the assessment of glomerular and tubular proteinuria (UACR, UPCR)	
IMPORTANT SPECIFIC ISSUES Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis and management.	• Evolving treatments/high-cost treatments of glomerular and tubulo- interstitial diseases • Need for rapid diagnosis in most rapidly progressive GN and thrombotic microangiopathies • Pharmacology and monitoring of the use of immunosuppressive drug classes, including drugs modulating complement • Supportive treatments including: » diet » lipid lowering diuretics » renin-angiotensin-aldosterone system inhibitors (RAASi) » salt and potassium restrictions » treatments directed towards nephrotic syndrome, e.g. anticoagulation • The role of plasma exchange	

PCH	• Common lesions causing nephrotic syndrome in children, including: » diffuse mesangial sclerosis » focal segmental glomerulosclerosis (FSGS) » glomerulonephritis (GN) » manage immunosuppression, diuretics, ACEI/ARB, statins » membranoproliferative » minimal change disease » systemic lupus erythematosus (SLE) • Congenital nephrotic syndrome • Referral for genetic studies • The impact of steroids on growth and behaviour, including educational impact, and therefore the need for steroid sparing agents • The pathogenesis, clinical considerations, management, and prognosis of children with: » Henoch-Schönlein purpura » post-infectious GN » rapidly progressive GN

CLINICAL SCIENCES

Advanced Trainees will describe the principles of the foundational sciences.

Haemodialysis (HD)

- Blood filtration
- Dialysis system including water treatment, membranes, dialysate fluids, dialysis safety monitors
- Diffusion versus convection
- General principles of haemodialysis (high flux, low flux), haemofiltration, and haemodiafilitration (pre-, mixed- and post-dilution)
- Osmotic versus hydrostatic pressures
- Solute removal – small, middle, and large
- The theory of sodium profiling and ultrafiltration
- Water removal (ultrafiltration)

Peritoneal dialysis (PD)

- Peritoneal membrane anatomy
- Peritoneal membrane solute and fluid transport, including principles of diffusion and convention:
  - fluid kinetics
  - kinetics of peritoneal ultrafiltration
  - large versus small molecule clearance
  - peritoneal surface
  - solute transport by convection
  - solute transport by diffusion
  - three pore model
- Physiology of peritoneal dialysis fluids:
  - biocompatibility issues – neutral pH, low glucose degradation product solutions
  - concentrations of electrolytes – sodium, potassium, magnesium, calcium, and buffers (lactate and bicarbonate)
  - principles of using the osmotic agents – glucose, amino acids, icodextrin
- Types of PD:
  - automated PD (APD), including tidal PD, continuous cycler-assisted peritoneal dialysis (CCPD), continuous flow-through peritoneal dialysis (CFPD), and intermittent peritoneal dialysis (IPD)
  - continuous ambulatory PD (CAPD)

Water

- The means to deliver purified water, the necessary standards, and methods of assessing these
- Toxic water system treatment contaminants
- Treatment (prevention) of water and dialysate problems
- Water treatment and monitoring water quality, including bacterial and endotoxin studies
- Water, dialysate composition, and extracorporeal circuit complication

ELIGIBILITY AND CONSIDERATIONS Advanced Trainees will assess the patient's current condition and plan the next steps.	**Dialysis modality** • Advantages and disadvantages of each modality • Patient lead indications and contraindications: » geographic issues » socioeconomic factors » surgical access issues » the role of the kidney option coordinator » transport issues **Patient eligibility** • Patient[24] related factors, including: » carer support » health literacy » home dialysis options » lifestyle choice and influence » mobility/dexterity » transport concerns • Symptoms of chronic kidney disease (CKD) requiring dialysis, including: » electrolyte disturbances » refractory acidosis » refractory fluid overload » uremic symptoms
UNDERTAKING THERAPY (HAEMODIALYSIS AND PERITONEAL DIALYSIS) Advanced Trainees will monitor the progress of patients during the therapy.	**Prescribing and modality switch** • Change of prescription • Dialysis prescriptions and monitoring the small solute clearance of dialysis • International Society for Peritoneal Dialysis (ISPD), CARI and other clinical guidelines • Therapeutic drug monitoring with reference to various dialysis modalities and/or clinical states of altered volume of distribution • Timing and requirement of switching patients on continuous therapy to intermittent HD or PD
UNDERTAKING THERAPY (HAEMODIALYSIS) Advanced Trainees will monitor the progress of patients during the therapy.	• Principles of plasma exchange, prescribing considerations, and potential complications of treatment **Complications – vascular and catheter considerations** • Abscess • Catheter-related bacteraemia (CRB) • Common sites used for insertion of dialysis central venous catheters (CVCs) • Fistula aneurysm • Genesis of access stenosis • Insertion of temporary vascular access • Insertion of tunnelled dialysis line • Options and potential complications of different catheter locking solution • Preoperative vascular mapping • Preventative strategies to ensure catheter longevity • Surface and structural anatomy of the subclavian, jugular, and inguinal regions • The difference between cuffed/tunnelled and non-tunnelled CVCs, and the different indications for use

[24] References to patients in the remainder of this document may include their families and/or carers.

- The risk of complications with the site chosen for vascular access
- The surgical methods of creating vascular access

Dialysis machine

- Cross infection control policies and procedures
- Dialyser reprocessing – procedures, issues relating to biocompatibility, infection and economics, biocompatibility issues, composition of dialysis fluid
- Dialyses – membrane types, properties of dialyses
- Different line sizes membranes, dialysers, and options for dialysis fluid composition
- Different profiling programs and online monitoring of small solute clearance and blood volume monitoring

Prescription

- Appropriate dialyser
- Blood flow rates including venous and arterial pressures
- Choice of dialyser size
- Dialysate composition and concentration (i.e., electrolytes)
- Dialysate concentration
- Dialysate flow rate
- Fluid status and ultrafiltration rates
- Haemodiafiltration versus haemodialysis
- Patient-centred goal approach, including target weight and nutritional status
- Solute clearance
- Vascular access

UNDERTAKING THERAPY (PERITONEAL DIALYSIS)

Advanced Trainees will monitor the progress of patients during the therapy.

APD machine

- Components of setting up the machine
- PD card and characteristics
- Remote monitoring

Complications of dialysis

- Access failure
- Biochemical abnormalities including hypoalbuminemia and hypercalcaemia
- Catheter dysfunction including types, causes and management
- Catheter malpositioning
- Constipation
- Dialysate leakage through congenital (e.g. patent processus vaginalis) or acquired (e.g. pericatheter or prior incisional site) abdominal wall defects
- Hernias, abdominal wall, or genital oedema
- Long-term complications, e.g. sclerosing peritonitis
- Mechanical complications
- Metabolic abnormalities, including hyperglycaemia
- Peritonitis and peritoneal catheter site infection
- Pleuroperitoneal leak
- Ultrafiltration failure
  Under dialysis – symptoms burden and dialysis measures
- Understanding the principles, local policies, and prevention
- Weight gain

	Prescription • Adjust prescription to patient centred management • CAPD/APD – prescribing the appropriate patient-centred type of PD • Concentration of PD solutions and PD bags • Number and volume of bags • Patient-centred factors including surface area, education • The relative therapeutic and lifestyle differences of all modes of peritoneal dialysis • Tidal/full exchange • Understanding incremental versus full dialysis dose
POST THERAPY (HAEMODIALYSIS AND PERITONEAL DIALYSIS) Advanced Trainees will know how to monitor and manage patients post therapy.	• Anticoagulation for dialysis and in dialysis patients • Cardiovascular disease, including risk factors, modification strategies, the impact of morbidity and mortality on patients with kidney disease • Economics of dialysis treatment
POST THERAPY (HAEMODIALYSIS) Advanced Trainees will know how to monitor and manage patients post therapy.	**Green dialysis** • Alternative power-assisted home HD, solar power, and green energy providers • Re-use of reverse osmosis (RO) reject water • Waste management **Home haemodialysis** • Benefits and barriers of home HD • Nocturnal dialysis • Patient suitability • Short daily dialysis **Investigations** • Arteriovenous fistulae – screening, flow measurements and surveillance • Flow measurement • Ultrasound
POST THERAPY (PERITONEAL DIALYSIS) Advanced Trainees will know how to monitor and manage patients post therapy.	• Nutritional assessment, including dietary protein intake • The methods used to assess small solute clearance of peritoneal dialysis and peritoneal membrane function (PET test)
PCH	• Age-relevant considerations regarding access and choice of KRT modality, such as the need to consider extracorporeal blood volume in young infants • Growth • Psychosocial impact on children and families • The role of adaptive/tidal PD in young children

KEY PRESENTATIONS AND CONDITIONS

Advanced Trainees will have a comprehensive depth of knowledge of these presentations and conditions.

Presentations

- Abnormal electrolytes
- Acute kidney injury
- Chronic kidney disease
- Findings or risk identified in association with a genetic or syndromic diagnosis
- Growth failure
- Macro or microhaematuria
- Nephrolithiasis or nephrocalcinosis
- Proteinuria
- Structural abnormalities detected antenatally as incidental findings or during investigation of a syndromic diagnosis
- Urinary tract infection

Conditions

- Congenital abnormalities of the kidney and urinary tract (CAKUT):
  - » kidney dysplasia
  - » posterior urethral valves
  - » urinary tract obstruction
  - » vesicoureteral reflux
- Congenital nephrotic syndrome
- Cystic diseases of the kidneys, including:
  - » autosomal dominant polycystic kidney disease (ADPKD)
  - » autosomal recessive polycystic kidney disease (ARPKD)
  - » other forms of cystic kidney disease, e.g. nephronophthisis and HNF1b mutation
- Genetic tubular disease:
  - » Fanconi syndrome and related diseases
  - » renal tubular acidosis
  - » salt losing tubulopathies, e.g. Bartter and Gitelman syndromes
- Inborn errors of metabolism causing CKD, including:
  - » Fabry disease
  - » glycogen storage disorders
  - » methylmalonic acidemia (MMA)
  - » oxalosis (inherited)
  - » renal tubular acidosis

For each presentation and condition, Advanced Trainees will know how to:

Synthesise

- » take a relevant clinical history
- » conduct an appropriate examination
- » recognise the clinical presentation
- » establish a differential diagnosis
- » plan and arrange appropriate investigations
- » identify relevant epidemiology, prevalence, pathophysiology, and clinical science
- » consider the impact of illness and disease on patients[25] and their quality of life
- » recognise the risk to future generations and to other family members

Manage

- » provide evidence-based management
  For less common or more complex presentations and conditions the trainee must also seek expert opinions
- » prescribe therapies tailored to patients' needs and conditions
- » recognise potential complications of disease and its management appropriate screening and where possible, preventative strategies
- » involve multidisciplinary teams

Consider other factors

- » identify individual and social factors and the impact of these on diagnosis and management
- » identify the wider family implications of a genetic

[25] References to patients in the remainder of this document may include their families and/or carers.

	• Podocytopathy, glomerular basement membrane (GBM)/structural abnormalities: » congenital nephrotic syndrome » diffuse mesangial sclerosis » genetic disorders of collagen • Thrombotic microangiopathy (TMA), including haemolytic uremic syndrome (HUS) and thrombotic thrombocytopenic purpura (TTP)	diagnosis and arrange appropriate genetic counselling
LESS COMMON OR MORE COMPLEX PRESENTATIONS AND CONDITIONS Advanced Trainees will understand these presentations and conditions. Advanced Trainees will understand the resources that should be used to help manage patients with these presentations and conditions.	• Difficult or rare metabolic acidosis – amino acid metabolism disorders, mitochondrial disorders • Kidney manifestations of systemic and genetic disease including: » amyloid » connective tissue disease » Von Hipple Lindau syndrome • Neurocutaneous diseases • Other rare genetic kidney diseases, e.g. tuberous sclerosis • Uromodulin-related disorders	
EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND CLINICAL SCIENCES Advanced Trainees will describe the principles of the foundational sciences.	• Broad understanding of general concepts of genetic inheritance and limitations as they apply to evolving epidemiology and clinical research • Pathophysiology and genetics where relevant to the above conditions • Physiology of antidiuretic hormone (ADH) and the use of tolvaptan or high water intake to moderate cyst growth	
INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS Advanced Trainees will know the indications for – and how to interpret the results of – these investigations, procedures, and clinical assessments tools. Advanced Trainees will know how to explain the investigation, procedure, or clinical assessment tool to patients, families, and carers.	**Clinical work-up** • Appropriate referral to other clinical services • Genetic testing • Imaging where indicated: » CT intravenous pyelogram » micturating cystourethrogram (MCUG) » nuclear imaging, such as MAG3, dimercapto succinic acid (DMSA), and kidney scan » ultrasound • Laboratory work-up • Pre-symptomatic screening of patients' at-risk family members for genetic disease **Genetic testing** • Have an understanding of cascade testing • Implications of a positive genetic test on the patient and family • Knowledge of the currently available genetic tests where indicated, including the use of comparative genomic hybridization (CGH) arrays, renal panels for exome sequencing, whole exome sequencing, and specific gene testing where there is a strong clinical indication	

- Use of specialist clinics, genetics counsellors, and gene testing where there is a strong clinical indication

IMPORTANT SPECIFIC ISSUES

Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis and management.

- Clinical, diagnostic, and epidemiologic differences between simple, acquired, and inherited cystic diseases
- Genetic investigations and their limitations
- Implications of bladder abnormalities on native or other graft kidney function, such as neurogenic bladder, reconstructions
- Inherited causes of nephrocalcinosis
- Kidney pathologic manifestations associated with hereditary and congenital kidney diseases

ADPKD

- Clinical manifestations and management of ADPKD, including:
  - conventional therapy for slowing progression
  - cyst growth and monitoring
  - haematuria
  - kidney cell carcinoma
  - kidney failure
  - nephrolithiasis
  - novel therapy, including tolvaptan
  - proteinuria
  - urinary tract infections
- Clinical observations and implications:
  - genetic testing, predictive testing, and screening
  - insights into disease prevalence
  - molecular mechanisms
  - phenotype definition
- Co-incident diagnosis of cystic kidney and work-up required
- Definitions of number of cysts per age group to diagnose cystic kidney disease
- Extrarenal manifestations of ADPKD:
  - hepatic cysts
  - intracranial aneurysms
  - other organ involvement from failure of the primary cilia
- Importance of counselling, including pregnancy and reproductive issues

PCH

- Paediatric trainees are expected to have a more detailed knowledge of information contained in this knowledge guide compared to trainees in adult medicine.

KEY PRESENTATIONS AND CONDITIONS

Advanced Trainees will have a comprehensive depth of knowledge of these presentations and conditions.

Presentations

- Kidney cell cancer
- Kidney stone disease
- Urothelial cancer

Conditions

- Congenital abnormalities of the kidney and urinary tract:
  - congenital abnormalities of the urinary tract
  - kidney dysplasia
  - posterior urethral valves
  - ureteropelvic junction obstruction
  - urinary tract obstruction
  - vesicoureteral reflux and reflux nephropathy
- Nephrolithiasis, including:
  - calcium stones
  - cystine stones
  - drug stones
  - oxalate
  - struvite stones
  - uric acid stones
- Onco-nephrology conditions:
  - AKI and acute tubular injury (ATI), including chemotherapy nephrotoxicity
  - clear cell carcinoma
  - immune checkpoint inhibitor kidney disease
  - paraneoplastic glomerular diseases
  - tumour lysis syndrome
  - water and electrolyte disturbances
- Paraprotein-related kidney disease:
  - plasma cell dyscrasias, including myeloma kidney, amyloid and immunotactoid glomerulopathy
- Post-kidney obstruction:
  - bladder, bladder outlet, and benign prostatic hyperplasia
  - bleeding/clot
  - malignancy
  - prostate cancer
  - retroperitoneal fibrosis
  - retroperitoneal infiltrative disease
  - stones and crystals
  - ureteral stenosis

For each presentation and condition, Advanced Trainees will know how to:

Synthesise

- recognise the clinical presentation
- identify relevant epidemiology, prevalence, pathophysiology, and clinical science
- take a relevant clinical history
- conduct an appropriate examination
- establish a differential diagnosis
- plan and arrange appropriate investigations
- consider the impact of illness and disease on patients[26] and their quality of life

Manage

- provide evidence-based management
  For less common or more complex presentations and conditions the trainee must also seek expert opinions
- prescribe therapies tailored to patients' needs and conditions
- recognise potential complications of disease and its management, and initiate preventative strategies
- involve multidisciplinary teams

Consider other factors

- identify individual and social factors and the impact of these on diagnosis and management

[26] References to patients in the remainder of this document may include their families and/or carers.

	• Urothelial cancer: » kidney mass » squamous cell carcinomas (SCC) » transitional cell carcinomas (TCC)	
LESS COMMON OR MORE COMPLEX PRESENTATIONS AND CONDITIONS Advanced Trainees will understand these presentations and conditions. Advanced Trainees will understand the resources that should be used to help manage patients with these presentations and conditions.	• Associated conditions and complications of nephrolithiasis: » kidney failure » medullary nephrocalcinosis » medullary sponge kidney » osteopenia and osteoporosis • Kidney disease after stem cell transplant • Radiation nephropathy • Rare forms of nephrolithiasis	
EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND CLINICAL SCIENCES Advanced Trainees will describe the principles of the foundational sciences.	• Epidemiology of kidney stones: » diet and medication as risk factors » prevalence, sex, and geography » stone recurrence » systemic diseases • Mechanisms of stone formation: » calcium stones » causes of nephrolithiasis: ▪ autosomal dominant hypocalcaemia ▪ distal RTA, vitamin D intoxication ▪ hyperoxaluria ▪ hyperthyroidism ▪ hyperuricosuria ▪ hypocitraturia ▪ rare genetic disorders – Dent disease » cystinuria » infection stones » inhibitors » modes and sites of stone growth » promoters » saturation and crystallization » urinary risk factors for nephrolithiasis: ▪ hypercalciuria ▪ low urine volume	
AIM	• Primary hyperparathyroidism • Sarcoidosis	

- Onco-nephrology:
  - pathogenesis of kidney cell cancer and urothelial cancer, including transitional cell carcinomas (TCC) and squamous cell carcinomas (SCC) in the bladder, kidney, pelvis, and ureters
  - pathophysiology of cancer chemotherapy nephrotoxicity, in particular:
    - checkpoint inhibitors
    - concomitant drugs often used, such as aminoglycosides
    - gemcitabine
    - methotrexate
    - platinum salts
    - tyrosine kinase inhibitors
  - pathophysiology underlying water and electrolyte disturbances in cancer
- UTI pathophysiology

INVESTIGATIONS, PROCEDURES, AND CLINICAL ASSESSMENT TOOLS

Advanced Trainees will know the indications for – and how to interpret the results of – these investigations, procedures, and clinical assessments tools.

Advanced Trainees will know how to explain the investigation, procedure, or clinical assessment tool to patients, families, and carers.

- Haematuria:
  - assessment of kidney function and imaging
  - cystoscopy
  - urine cytology
- Immune system tests:
  - serum electrophoresis light and heavy chain
- Metabolic evaluation of calcium nephrolithiasis:
  - 24-hour urine studies – calcium, oxalate, citrate, uric acid, sodium, urea nitrogen or ammonia, volume
  - serum studies – metabolic panel, calcium, phosphate, magnesium, PTH, vitamin D metabolites
- Mid-stream urine (MSU) microscopy and culture
- Possible kidney mass:
  - CT scans
  - ultrasound
- Predisposition to kidney stones calculi:
  - blood tests
  - imaging
  - stone analysis
  - urine solute excretion analysis
- Radiological studies:
  - dimercaptosuccinic acid (DMSA)
  - micturating cystourethrogram (MCU)
  -

IMPORTANT SPECIFIC ISSUES

Advanced Trainees will identify important specialty-specific issues and the impact of these on diagnosis and management.

- Advantages and disadvantages of screening for prostate cancer
- Kidney tumours:
  - common benign and malignant tumours of the kidney and the significance of the histological grading and staging used
- Prevention of calcium nephrolithiasis:
  - normal excretion of solute and the protective mechanisms against stone formation
  - pharmacological and non-pharmacological preventions
  - predisposing metabolic, dietary, and environmental factors
  - systematic high fluid intake
- Patient factors, such as age and gender, that influence:
  - bacteriuria, including asymptomatic
  - complicated urinary tract infections (UTIs)
  - simple UTIs
  - recurrent infection (relapse versus reinfection)
- UTI:
  - conditions mimicking UTI, and their additional diagnostic and management considerations
  - difficult to control infection, including:

- complicated UTI
- dysfunctional voiding
- postmenopausal women
- pregnant patients
- structural abnormalities of the urinary tract
- upper and lower UTIs in different age groups

» host defence mechanisms
» predisposing structural abnormalities
» rationale for prophylactic and suppressive antimicrobial therapy, potential benefits, and complications

TCC/SCC

- Association between urothelial tumours and toxins
- Ongoing surveillance once urothelial tumours have been diagnosed or risk factors identified
- Referral to urology for further investigation
- Surveillance required for TCC in patients at high risk

PCH

- Acute presentation of urinary tract obstruction, and the long-term consequences
- Antenatal and postnatal features and management of hydronephrosis
- Antenatal counselling for CAKUT and antenatally diagnosed genetic kidney disease
- Causes of obstructive uropathy, including posterior urethral valves
- Clinical signs and symptoms of UTI in different ages in children, and methods to obtain urine samples
- Imaging strategies for UTI in childhood
- Pathophysiology of the neurogenic bladder
- Physiology of normal micturition and acquisition of bladder control
- Radiological studies:
  - » MAG3 for obstruction
- Recurrent UTIs in childhood, including:
  - » assessment of bladder function
  - » indications for surgical intervention
  - » upper tract involvement
- Role of urodynamics in the investigation of disturbed micturition
- Types of reconstructive procedures undertaken in children with bladder abnormalities, and their relevance to future kidney transplantation
- Wilms tumor and other rare paediatric kidney tumours

Knowledge guide 10 – Adult interventional nephrology

Advanced Training in Nephrology

AIM only

CLINICAL SCIENCES

Advanced Trainees will describe the principles of the foundational sciences.

Ultrasound guided percutaneous kidney biopsy

- Anatomy:
  - » standard kidney anatomy as per KG1
  - » relational anatomy of kidneys – adjacent structures and landmarks from posterior view for native kidneys and anterior lower abdomen for allografts
- Clinical pharmacology of antiplatelet agents, oral anticoagulants including novel oral anticoagulants (NOACS), and fractionated and unfractionated heparin

Cuffed and uncuffed catheter insertion and removal

- Relational anatomy of neck structures

ELIGIBILITY AND CONSIDERATIONS

Advanced Trainees will assess the patient's current condition and plan the next steps.

- Complications and incidence of complications when performing the procedure
- Informed consent from the patient, family and/or carer[27]
- Pre-biopsy medications

LESS COMMON OR MORE COMPLEX PATIENT CONSIDERATIONS

Advanced Trainees will understand the resources that should be used to help manage patients.

- Adapting to patient body size
- Air embolus
- High bleeding risk
- Inadvertent biopsy of other structures or cannulation of artery
- Management of patient anxiety and compliance
- Managing breathless patients
- Monitor and respond to the pain induced by procedure
- Peri-catheter bleeding/haematoma
- Peri-procedural haemodynamic instability differential diagnosis and management

UNDERTAKING PROCEDURE

Advanced Trainees will monitor the progress of patients during the procedure.

- Imaging, needles and positioning
- Indications to abandon procedure

POST PROCEDURE

Advanced Trainees will know how to monitor and manage patients post procedure.

- Post-biopsy bleeding
- Indications and contraindications for kidney biopsy or dialysis catheter insertions

[27] References to patients in the remainder of this document may include their families and/or carers.

IMPORTANT SPECIFIC ISSUES Advanced Trainees will identify important specific issues and the impact of these on diagnosis and management.	• Biopsy equipment requirements – types of biopsy devices, gauge and sample length, and throw • Local context considerations – location, staffing, monitoring devices, all equipment required, and reporting and procedure documentation system **Cuffed and uncuffed catheter insertion and removal** • Clinical pharmacology as per kidney biopsy, plus agents for light sedation and catheter-locking solutions • Ultrasound as per biopsy, plus appearance of veins and arteries using ultrasound **Ultrasound guided percutaneous kidney biopsy** • Ultrasound transducers and machine settings – normal versus pathologic kidney findings on ultrasound imaging

Glossary