Moving on: transitioning young people with chronic kidney disease to adult care

Anna Francis 1 · David W. Johnson 2,3,4 · Jonathan C. Craig 1 · Germaine Wong 1

Abstract Advances in the care of children mean that adolescents with chronic kidney disease (CKD) are surviving to adulthood and requiring transition to adult care. The transition phase is well-recognised to be associated with considerable excess morbidity and graft loss, but these outcomes may be avoidable through a structured transition programme. This review will discuss the (1) challenges encountered by patients with CKD, caregivers and clinicians during transition; (2) predictors and outcomes of transition; (3) current guidelines on transition from paediatric to adult renal services; (4) interventions and research directions that may help to improve the care and outcomes for young people with CKD in transition. In spite of the substantial improvement in health gains required for this disadvantaged population, there is to date only limited evidence on the effects of current transition programmes.

Keywords Adolescent · Child · Chronic renal insufficiency · Graft survival · Kidney transplantation · Transition to adult care · Young adult

Introduction

There has been an increase in the number of young adults transitioning from paediatric to adult services over the past few decades, which can be largely attributed to advances in paediatric nephrology care and improved patient survival. [1] The current prevalence of end stage kidney disease (ESKD) in young adults in Australia, New Zealand, the USA and the UK is approximately 300–470 patients per million population [2–4].

For some young people and their parents, transition is a highly stressful period [5–8]. A transition programme aims to provide structure and support to the young person as he/she navigates the turbulent waters of emerging adulthood (18–25 years [9]). Transition is defined as a well-planned process that occurs over time and involves the transfer of care from paediatric to adult health services [10–12]. A transition programme may involve short- and long-term structured input from a multi-disciplinary team of paediatric and adult nephrologists, youth workers, specialised nurses, psychologists, social workers, dieticians, occupational therapists and pharmacists [13].

Summary points

• Transition is not as a single event in time, but rather a well-planned process that occurs over time, involving the transfer of care from the paediatric health service to the adult health service.
• The complex burden of chronic kidney disease (CKD) is challenging for young people, especially as they negotiate the transfer from paediatric to adult care and contend with their own maturation. This may be exacerbated by concomitant developmental delay with substantial variability in the transitional requirements among young people with CKD, and in some the need for longer-term transitional support in the adult care facility until they are able to function unsupported.
• Transition may be associated with poor medical outcomes, including reduced medication adherence, and those with kidney transplants may experience acute rejection and graft loss.
• Transition programmes involving a multi-disciplinary team appear to improve the outcomes post transition, but further research is needed.
Despite the complex disease burden during late adolescence and emerging adulthood [14–16], there is a dearth of quality evidence suggesting that a structured transition programme does improve long-term outcomes. The current body of available evidence is limited by small sample sizes, short follow-up time, varied exposures, lack of adjustment for confounders and the use of historical controls, thus limiting the validity of the conclusions which may be drawn [17–22].

The primary objectives of this review are to summarise (1) the challenges encountered by patients with chronic kidney disease (CKD), caregivers and clinicians during transition; (2) evidence for the outcomes of transition and transition interventions; (3) the current guidelines on transition from paediatric to adult renal services; (4) research directions that may help to improve transition in young people with CKD. The review will primarily focus on young people with a kidney transplant, as this is the population where most transition research has occurred.

Challenges encountered by patients with CKD, caregivers and clinicians during the transition phase

As the young person with kidney disease becomes an adult, the primary responsibility for their healthcare moves from the caregivers to the young adult. Adolescence and emerging adulthood is a complex period of cognitive, emotional and psychosocial change. In healthy young people, full development of executive functioning may continue until the late 20s. [23] Importantly, the time line of maturation is highly variable, meaning that the care of and expectations for young adults need to be individualised.

For youth with kidney disease, the path of transition to adulthood has added complexity. Their illness often hinders individuation, as the child may be reliant on parents and hospital staff for day-to-day medical care. Dialysis is time consuming, ties the child closely to their parents and the hospital and often interferes with normal schooling. Transplantation, medical and urological conditions may lead to prolonged hospitalisations, further isolating the young person from their peers. In some children, advanced kidney disease may be associated with reduced cognitive capability and increased psychological distress [24–29]. Although these complications may be mitigated by transplantation, particularly in the domains of working memory and mental processing speed [30], their impact may lead to developmental delay and reduced coping skills, making transition to adult care challenging for children, their families and healthcare providers [31]. Such challenges are reflected in the literature, with studies showing that adults with a history of ESKD in childhood had decreased autonomy, vocational attainment and social development compared to healthy peers or those who developed ESKD in adulthood [27, 32, 33].

Patients and their parents in the paediatric care system may often feel anxious and frightened about the process of transition [5, 6, 8]. Common themes in qualitative research on solid organ transplant recipients include the fear of the unknown adult healthcare system, concerns about the competency of the adult teams, fear of letting go (for the parents) and the assuming of more responsibility (for the young person) [5, 6]. A study of European paediatric nephrologists’ perceptions of the barriers to successful transition identified issues such as reluctance of patients and parents to leave the paediatric team, difficulties for parents relinquishing responsibility and difficulties for young people assuming responsibility of their care [34]. A review of the perspectives of adolescents with CKD or diabetes on transition found that adolescents wanted to start transition early and meet adult care providers prior to transfer [8]. The reports of patient experience after transition are varying. In one report, solid organ transplant recipients discussed feelings of anonymity in the larger adult setting and the difficulties of getting to know and trust the adult healthcare providers [35]. An Australian study of a young adult/transition clinic revealed similar perspectives (Table 1) [36]. Transition can also be a source of anxiety for adult healthcare providers. One study found many adult physicians felt both anxious when dealing with congenital illness and that transitioned patients did not accept full responsibility for their healthcare [37]. Two studies provided some positive experiences, describing empowerment for those who had successfully transitioned [38] and the feeling of pride among young adult transplant recipients after successfully taking sole responsibility for their own healthcare [39].

<table>
<thead>
<tr>
<th>Table 1</th>
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<td>You look at some of the dialysis patients, and they are all pretty old. It freaks you out a little bit, well it freaks me out. Sometimes you might feel alone. You are like the only person in your age and everyone else is fit and healthy, so just meeting new people and talking to them about it, like this is good. You can talk to your friends and your family but they do not really understand, they are not going through it themselves, so it’s hard for them to understand what’s happening. You kind of try and explain, but they do not really get it. Talking to people and getting to hear how they deal with it. . . And I got talking to people here that have got really rigid procedures [for taking medications] . . . But now I take it obviously more seriously. I am doing it myself and my mum’s taken a step back because I am old enough to do it myself.</td>
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Adapted with permission from Giedd [23]
<table>
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<tr>
<th>Study</th>
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<tr>
<td>Akchurin 2014 [18]</td>
<td>N= 25 transplant patients</td>
<td>Medication adherence 2 years pre- and post-transfer (coefficient of variation of tacrolimus levels)</td>
<td>Adherence pre-transfer was not significantly different to adherence post-transfer [42.9 (95%CI 31.4-51.0) pre-transfer vs. 40.4 (95%CI 29.9-50.4) post-transfer, ( p = 0.53 )]</td>
<td>Measurement: used 2 validated measures to assess adherence</td>
<td>Selection: only included those who were transferred to the onsite adult hospital, retrospective Statistical methods: no adjustment for confounders</td>
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<td>Annunziato 2015 [19]</td>
<td>N= 22 transplant patients</td>
<td>Medication adherence 1 year pre- and post-transfer (SD( ^{a} ) tacrolimus)</td>
<td>Medication adherence worsened post-transfer [2.95 (SD 0.75) vs 2.03 (SD 1.38), ( p = 0.007 )]</td>
<td>Measurement: adherence measured with validated technique</td>
<td>Selection: retrospective Statistical methods: no adjustment for confounders</td>
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<td>Koshy (2009) [20]</td>
<td>N= 115 transplant patients</td>
<td>Graft loss 3 years pre-transfer and 2 years post-transfer</td>
<td>Graft loss rates were similar for pre-transition (5.06/100 person-years) and after transition (5.63/100 person-years)</td>
<td>Measurement: graft loss verified from central database Statistical methods: results adjusted for age at transplant</td>
<td>Selection: transfer date not identified but inferred from age, retrospective Measurement: hospitalisation for biopsy used as proxy for rejection but biopsy results unknown, Statistical methods: no adjustment for confounders</td>
</tr>
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<td>Samuel (2011) [21]</td>
<td>N= 149 transplant patients, function &gt;3 months</td>
<td>Graft loss</td>
<td>Adjusted hazard ratio of graft loss was 2.24 (95% CI 1.19-4.20) for the transfer period (0.5 years pre-transfer and 2.5 years post-transfer) compared to pre-transfer period</td>
<td>Selection: multi-centre, transfer date identified Measurement: organ failure registry Study participation: well described Statistical methods: age time since transplant attempted to be adjusted for</td>
<td>Selection: retrospective Measurement: differing transition practices between centres, hence variation in exposure</td>
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<td>Samuel (2014) [22]</td>
<td>N= 92 patients with ESKD</td>
<td>Hospitalisation Proportion of hospital visits that were avoidable</td>
<td>Decreasing hospitalisation rate ratios after transfer Increased risk ratios (1.55-3.19) of proportion of hospital visits that were avoidable between 1 and 5+ years post-transfer, but most confidence intervals crossed 0.</td>
<td>Selection: multi-centre, transfer date identified Sample size: larger Statistical methods: age attempted to be adjusted for</td>
<td>Selection: retrospective Measurement: potential mis-classification of hospitalisation type Statistical methods: incomplete adjustment for confounders, including age.</td>
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<td>van den Heuvel (2010) [23]</td>
<td>N= 162 transplant patients</td>
<td>Acute rejection at any time Graft loss</td>
<td>Acute rejection in 92/162 (57%) pre-and 15/116 (13%) post-transfer ( (p &lt; 0.0001) ), 28/154 (18%) graft failure in 3 years prior to transition and 19/116 (16%) in the 3 years post-transition ( (p = 0.08) )</td>
<td>Selection: multi-centre Sample size: larger numbers</td>
<td>Selection: retrospective Measurement: early rejection episodes in the pre-transition cohort were included, but have a largely different aetiology to late rejection Statistical methods: time since transplant and age at event not accounted for</td>
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CKD, Chronic kidney disease; ESKD, end-stage kidney disease; CI, confidence interval

\( ^{a} \) Standard deviation (SD) of tacrolimus blood levels
Outcomes after transition

The entire period of emerging adulthood is associated with an increased risk of graft loss [14, 40]. Those transplanted as teenagers and young adults experience poorer long-term outcomes than other age groups [41]. Younger recipients often have a relatively stable period before subsequently experiencing higher risks of non-adherence, rejection and graft loss when they enter adolescence [14, 42]. This risk is not simply due to the transfer of care but rather to the entire bio-psycho-social milieu. There may be complex and dynamic hormonal, social and environmental changes, resulting in behavioural variations as well as possible alterations in immune system activation.

The methodological quality of the studies of transition have been generally sub-optimal and the overall risk of bias has been considered high for most studies (Table 2). The two studies with a low risk of bias suggested an increased risk of avoidable hospitalisations and graft loss around or after the point of transfer [43, 44]. Two small studies found decreased medication compliance and increased graft loss after transfer [45, 46]. In comparison, a single study reported a reduction in the risk of acute rejection after transfer [47], which may be explained by the inclusion of early rejection episodes in the pre-transition cohort and the failure of the authors to adjust for age and time since transplantation. Another study found no change in graft loss pre- and post-transfer; however transfer date was inferred from age, and age at event was not adjusted for in the analysis, leading to potential misclassification bias [48].

Interventions in kidney transplant patients to improve transition to adult care

Transition programmes act in multiple ways to bridge the gap between paediatric and adult care. Adult nephrology clinics often have much higher patient loads than paediatric clinics, meaning appointments are shorter and less frequent. The adult clinic expects its patients to function autonomously, self-advocate and have reasonable health literacy. This is not always the case for recent graduates from paediatric care. The effects of transition interventions, usually in the form of a transition programme, for children with CKD have been evaluated (Table 3). Other targeted interventions include camps. The use of electronic apps and online forums has not yet been evaluated.

The methodological quality of the studies of transition interventions was generally suboptimal, and the overall risk of bias was considered high. The risk of selection bias was high, with a predominance of single-centre reports and small cohorts, with no adjustment for confounders. The three studies of highest quality found increased patient satisfaction and variable estimated glomerular filtration rate (eGFR) decline following attendance at a transition clinic and improved self-efficacy after a camp. Another study found that patients transitioned through a structured clinic had a similar decline in eGFR compared to those who received usual care but that patient satisfaction was highest in the transition clinic group [22]. In contrast, a Swiss study found that their transition programme cohort had a lower rate of decline in eGFR than a historical cohort [21]. A residential camp designed to improve self-management in young people with ESKD yet to transition to adult care has been described [49]. Peers who had successfully transitioned to adult care ran the week-long annual camp and acted as mentors. Questionnaires examining self-management, health-related quality of life and social participation were administered before and after the intervention, and the results revealed an improvement in general self-efficacy but not in disease-related self-efficacy. Independence and social inclusion were also improved following the camp.

Predictors of a successful transition

Several risk factors for difficult transition have been identified in the kidney disease population. A study of adolescents with CKD found that poor family cohesion was associated with decreased readiness for transition [50]. In one North American study, younger age (less than 21 years) at transfer to adult services was associated with an increased age-standardised risk of kidney transplant failure [51]. Similarly, another study reported that older age may have been associated with improved readiness for transition in adolescents and young adults with CKD [52].

Recommendations for transitioning from paediatric to adult care

There are multiple guidelines informing transition care. The joint International Society of Nephrology/International Paediatric Nephrology Association (ISN/IPNA) guidelines are specific for nephrology transition, and both the American Academy of Paediatrics and the United Kingdom National Institute for Health and Care Excellence (NICE) have comprehensive guidelines for transition to adult care (Table 4). In general, recommendations included initiating transition planning from a young age and involving the patient in a developmentally appropriate way. All guidelines focus on the importance of a healthcare provider who oversees the long-term planning and co-ordinates all of the members of the team. The actual transfer is recommended to occur during a stable period, with comprehensive communication between paediatric and adult teams (Fig. 1).

The timing of transition varies among jurisdictions depending upon how care is organised and delivered. In Australia, the UK and Canada, the point of transfer is usually...
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<tr>
<td>Amunziato 2015 [19]</td>
<td>Paediatric transition co-ordinator: addresses gaps in self-management, intermediary between paediatric and adult team</td>
<td>Intervention group (n = 12)</td>
<td>Medication adherence (mean SD of tacrolimus levels)</td>
<td>No difference in post-transfer medication adherence between intervention (2.68, SD 1.08) and historical controls (3.37, SD 1.76) (p = 0.32)</td>
<td>Statistical methods: attempted to control for age Measurement: used 2 measures to assess adherence</td>
<td>Selection: historical controls, retrospective Sample size: small numbers Statistical methods: no adjustment for confounders</td>
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<td>Chaturvedi 2009 [25]</td>
<td>A dedicated transition clinic with paediatric and adult nephrologist and a transition nurse</td>
<td>Transition group (n = 11) assessed for the year pre-and post-transfer</td>
<td>a) Serum creatinine b) Acute rejection c) Clinic attendance</td>
<td>a) Stable serum creatinine in 82% (9/11) b) Acute rejection in 10% (1/11) post-transfer and 0% pre-transfer c) Decreased from 73% pre-transfer to 57% post-transfer</td>
<td>Study design: also performed patient satisfaction questionnaires Comparability: within subject control (before and after study)</td>
<td>Selection: retrospective Sample size: small numbers Measurement: 12-month follow-up too short to fully capture events Statistical methods: no adjustment for confounders</td>
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<tr>
<td>Ghazanfar 2011 [26]</td>
<td>Transition clinic</td>
<td>Intervention group (n = 78)</td>
<td>a) Clinic non-attendance b) Graft survival c) Patient survival</td>
<td>a) Improved clinic non-attendance (9% vs. 15% in historical controls) b) Improved graft survival for intervention group (5-year: 95% vs. 86%) c) Improved survival for intervention group (5-year: 96% vs. 88%)</td>
<td>Measurement: lengthy (5 year) follow-up of each group</td>
<td>No further information available (conference abstract only, no full text available)</td>
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<td>Harden 2012 [27]</td>
<td>Multi-disciplinary transition clinics at the paediatric centre with adult nephrologist, nurse and youth worker</td>
<td>Intervention group (n = 12)</td>
<td>a) Graft loss b) Late acute rejection</td>
<td>a) Decreased rates of graft loss in transition group (0 vs. 66%) b) Decreased rates of acute rejection in transition group (0 vs. 33%)</td>
<td>Measurement: lengthy (5 year) follow-up of each group</td>
<td>Selection: historical controls, retrospective Sample size: small numbers Measurement: youth worker started during study period, hence variation in exposure Statistical methods: no adjustment for confounders</td>
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<td>Pape 2013 [28]</td>
<td>Transfer to young adult transition clinic or general renal transplant clinic or a general nephrologist. Transition clinic is run by a single adult nephrologist and seen every 4 weeks</td>
<td>Intervention group 1: (n = 15) transition clinic 2: (n = 25) transfer to adult nephrologist + transplant clinic 3: (n = 19) transfer to adult nephrologist</td>
<td>a) Change in GFR b) Patient satisfaction</td>
<td>a) Change in GFR was similar (1.4 ± 8.7 vs. 3.1 ± 10.6 vs. 0.8 ± 4.4 ml/min/1.73 m², p = not significant) b) Patient satisfaction highest with the transition clinic (100% vs. 64% transplant clinic, 78% nephrology p &lt; 0.05)</td>
<td>Selection: compared to two interventions, improving generalisability Measurement: GFR from patient record Study design: also performed patient satisfaction questionnaires Comparability: within subject control (before and after study)</td>
<td>Selection: retrospective Sample size: short follow-up time Statistical methods: confounders were not adjusted for</td>
</tr>
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<td>Prestige 2012 [29]</td>
<td>Multi-disciplinary transition clinic visit at intervals of 4–6 months with specific goals (e.g., understanding kidney disease, medication knowledge)</td>
<td>Intervention group $(n=12)$ Comparison group: Historical controls $(n=33)$</td>
<td>a) 2-Year mortality post transfer b) Average yearly cost per patient.</td>
<td>Patients in transition clinic felt transfer was less of a change $(p = 0.002)$ a) Decreased mortality in transition group (0 vs. 24%) b) Costs were similar (transition group CAD $11,380–34,312, pre-transition group CAD $17,127–38,909)</td>
<td>Study design: only study to assess costing of a transition programme, GFR decline and graft loss derived from patient record Selection: retrospective, historical controls</td>
<td>Sample size: small numbers Statistical methods: no adjustment for confounders</td>
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<tr>
<td>Satte 2013 [30]</td>
<td>Week-long camp for youth with ESKD prior to transfer run by peer mentors</td>
<td>Adolescents pre transfer $(n=32)$</td>
<td>a) Self-efficacy skills (measured by General Self-Efficacy Scale) b) Social inclusion and independence (health–related quality of life questionnaire)</td>
<td>Improvement in general self-efficacy $(p &lt; 0.05)$ although not disease-related self-efficacy $(p = n.s.)$ Independence $(p &lt; 0.01)$ and social inclusion $(p &lt; 0.05)$ were also improved by the camp</td>
<td>Sample size: larger numbers Study design: prospective Measurement: multiple assessment methods Validated questionnaire comparability: within subject control (before and after study)</td>
<td>Study design: no exploration of long-term effects of the intervention and no direct control group Study participation: large proportion was lost to follow-up Statistical methods: no adjustment for confounders</td>
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<tr>
<td>Weitz 2015 [31]</td>
<td>Structured multi-disciplinary transition clinic from age 14 years with paediatric nephrologist, nurse, social worker, dietician</td>
<td>Intervention group $(n=26)$ Comparison group: Historical controls $(n=33)$</td>
<td>a) Decline of eGFR at 3 years post transfer b) Graft loss c) Acute rejection</td>
<td>a) Slower decline in transition group $(−11.3 ± 44,\text{ml/min/1.73},\text{m}^2)$ compared to historical group $(−28.4 ± 33,\text{ml/min/1.73},\text{m}^2)$ $(p = 0.004)$ b) 3/33 (9%) in transition group and 11/26 (42%) in controls c) 3/33 (9%) in transition group compared to 9/26 (35%), $p = 0.16$</td>
<td>Study design: long follow-up time to assess outcomes Statistical methods: eGFR adjusted for type of organ and age of graft</td>
<td>Patient selection: historical controls, retrospective study Statistical methods: no adjustment for confounders</td>
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eGFR, Estimated glomerular filtration rate; CAD Canadian dollar
at the age of 18 years, whereas in Europe and the USA, there is more flexibility in timing. In Japan, the median age of transfer is 20–24 years [54].

Despite the well-recognised dangers at the time of transition, not all paediatric nephrology centres have a formal transition programme. Two years after the 2011 ISN/IPNA guidelines for transition were established, one-third of European centres had integrated the guidelines into their transition service and approximately one-half had a formal transition clinic [34]. A 2006 study of 58 paediatric dialysis centres across Europe and North America found one-third of centres had a formal transition programme and only 20% of young adults were thought to be autonomous at the time of transfer [55]. A recent study of transition in Japan found that only four of 101 paediatric nephrology centres had a formal transition programme [54].

Several transition programmes, with varying recommendations on timing of transfer, have been described (Table 5). The transition programmes are united by a multi-disciplinary approach but differ greatly in methods of delivery. There are currently no completed randomised trials assessing a structured approach to transition to inform units starting their own transition programme. In addition, each unit wishing to start a programme must work within the constraints of funding, staffing, geography and rules surrounding age of transfer to adult care for their local health system.
Few studies have examined the costing implications of a transition programme. A transition programme in England was funded by reallocating existing clinical activity and through charitable donations and logistical support from the local community [17]. Transition programmes are resource intensive, but the costs of developing and conducting a multi-disciplinary transition programme may be offset by the incremental gains in long-term patient outcomes. For example, a study of 45 Canadian adolescents with kidney transplants reported similar short-term average annualised per patient costs for the transition group compared to the transfer group, but the transition group had lower mortality than the transfer group [20]. If transition programmes can deliver graft and patient survival gains, then this will potentially outweigh the costs incurred.

**Assessment of transition readiness**

An important aspect of optimising transition is assessing the transition readiness of the young person (and their parents) and exploring areas of weakness in order to deliver targeted interventions. Critiquing these tools is outside the scope of this review, although there are several tools amenable to use in CKD/ESKD, including TRxANSITION, “Youth Quiz” from the On Trac programme, Transition Readiness Assessment Questionnaire (TRAQ), and the Readiness for Transition Questionnaire (RTQ) [58, 59, 60]. “Got Transition” (http://www.gottransition.org) is a useful website which explores transition policy, monitoring, assessment and transfer. In addition, Ferris et al. have one-page intervention documents for areas of weakness identified in their assessment of transition readiness questionnaire TRxANSITION [59].

**Future directions**

Observational studies have limited ability to assess the impact of transition on patient and graft outcomes. Such studies are confounded by age and era as well as unknown confounders. Future research should include randomised control trials of interventions to improve transition and specifically to examine the best methods of assessing transition readiness, risk factors for poor transition and costing of transition interventions. In addition, further qualitative research is warranted to explore patient, parent and healthcare provider perspectives on optimising transition.

Currently, some trials are underway to assess the impact of structured transition interventions on graft and patient outcomes. For example, the formation of an internet-based self-management programme for solid organ transplant recipients, aimed at improving adherence and transition skills, has been described [61]. There is also a randomised controlled trial, the European TRANSNephro study, which is examining a transition intervention programme using a case manager, transition
interviews and smartphone apps targeting medication adherence [62].

Conclusions

- Adolescent and young adult kidney transplant recipients have the worst graft outcomes of any age groups. Transition may play a role in this outcome. Transition from paediatric to adult renal services is a highly stressful period for young people and their parents and is generally associated with poor medical outcomes, including decreased medication adherence and increased avoidable hospitalisation. In those with kidney transplants, there are the added risks of acute rejection and renal allograft loss.
- Structured multi-disciplinary transition programmes and targeted interventions may lead to improved outcomes for adolescents and young adults, although the available evidence is sparse, poor quality and often conflicting.
- Further research is needed to evaluate targeted interventions that could be part of a transition programme, the cost of these interventions, methods to assess transition readiness and risk factors for poor transition.
- Until more evidence is available, well-planned, timely, structured transition programmes should be considered by both paediatric and adult healthcare services for facilitating the care of young people with CKD who are moving on to the adult healthcare system.

Questions (answers are provided in the backmatter)

1. Transition is:
   a) The transfer of care from paediatric to adult services
   b) Something that can be organised quickly
   c) A process that involves only paediatric care providers
   d) Not a single event in time, but rather a well-planned process that occurs over time, involving the transfer of care from the paediatric healthcare service to the adult healthcare service
2. The risk of graft failure is highest for those in which age group?
   a) Adolescence and early adulthood
   b) 50- to 60-year olds
   c) 40- to 50-year olds
   d) 5- to 10-year olds
3. Which outcomes have been reported post-transition compared to pre-transition?
   a) No change in medication adherence
   b) Worsening medication adherence
   c) Increased graft loss
   d) No change in graft loss
   e) All of the above
4. Which interventions have been reported to improve transition in the literature?
   a) Multidisciplinary transition clinic
   b) Residential camps
   c) Electronic apps
   d) Websites and social media support
   e) a and b
5. How many randomised controlled trials have been reported on transition in CKD/ESKD?
   a) 0
   b) 1–4
   c) 5–10
   d) 10 +

Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

References


Answers: 1. d; 2. a; 3. 3; 4. e; 5. a