Lifelong congenital urology : the challenges for patients and surgeons

Congenital Lifelong Urology –
the challenges for patients and surgeons

Chair: Dan Wood (University College London Hospitals)

Authors: Andrew Baird^, Luca Carmignani^^, Gunter De Win^*°, Piet Hoebeke+, Gundela Holmdahl++, Gianantonio Manzoni**^, Rien J.M. Nijman^^*, Claire Taylor*, , Serdar Tekgul**,

^University Hospital Aintree and Alder Hey NHS Foundation Trusts, Liverpool, UK

^^ Department of Urology, Università degli Studi di Milano,
, Italy.

^*Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp Belgium and University College London Hospitals, London, UK

+ Department of Urology, Ghent University Hospital, Gent, Belgium

++Queen Silvia's Children's Hospital, Gothenburg, Sweden.

**^ UOC Urologia Pediatrica - Fondazione IRCCS Cà Granda , Ospedale Maggiore Policlinico, Milan, Italy

^^* ~~Professor of Urology,~~ Department of Urology, University Groningen, University Medical Centre Groningen, Groningen, Netherlands ~~University Hospital Groningen, Netherlands~~

*Guys and St Thomas's Hospital, London, UK.

** Division of Pediatric Urology, Department of Urology, Hacettepe University, Ankara, Turkey

Word Count 3983

REVIEWER COMMENTS 2nd Review

Authors:

We thank the reviewers and the Journal for their support with this manuscript. We recognize the complex nature of this subject and are eager to get our submission right. Your input is greatly valued.

Reviewer #2: I think the paper is improved and more logical in its flow in the current version.

Thank you.

However, it does not contain very much concrete information/advice and as such I believe it should be shortened. I suggested this in the previous review as well but the new version is longer than before.

Further, the purpose of the statement still seem a bit unclear. I would suggest that the authors add a well-defined purpose at the end of the introduction so that the paper can be read in that context.

An excellent suggestion – we have added this.

Finally, for table 1, lower limits for observations should be noted. It is not really useful for the reader to know that some studies didn't report on the problem and this does not work as lower limits.

Reviewer Comments 1st review

Comments to Author:

Reviewer #1: The authors present a superficial review or consensus of the challenges posed by patients who need transitional urology care. This topic is not new. This paper would have been informative 5 years ago. As written, there are few or no relevant data, the English needs editing, and it does not add to the current literature. The resources used to meet in Copenhagen to finalize this paper could have been put to better use.

We thank the reviewer for their comments. We agree that this is a topic that has been in existence since D.I.Williams, Christopher Woodhouse and Phillip Ransley (and others) began to provide lifelong care for these patients. To date it has been relatively easy to stimulate interest in paediatric urologists who have the cohort of older patients – it remains difficult to stimulate interest in adult practitioners where the need is becoming

Met opmaak: Superscript
Met opmaak: Lettertype: Vet
Met opmaak: Lettertype: Niet Vet
Met opmaak: Lettertype: Vet
Met opmaak: Lettertype: Vet
Met opmaak: Lettertype: Niet Vet
Met opmaak: Tekstkleur: Achtergrond 1

greatest but least well met. Our brief was to write a consensus or position statement about the current state of this work. We have deliberately chosen an approach that examines how people can do this, why they should do it and gives some examples of the challenges. It is still the case that only a few units are undertaking this work but interest is starting to build. Limitations on space and word count preclude a more in depth look into particular disease datasets the aim is to present the need

Abstract: The authors should specify which disorders need transitional care.

Thank you we have added these.

Under Conclusion, 2nd paragraph, add "evidence-based" before "practice guidelines".

Thank you we have changed this

I would delete the phrase that they have produced the first consensus statement.

It is (to our knowledge) the first consensus statement of its kind but we have altered this statement

The table does not have a reference.

References added

References 4, 9, 10, 15, 18. 19, 21, 22, 23, 39, 40, 48, 52, and 61 are not in standard form. Ref 62 appears incomplete. Ref 2 is not a journal.

Thank you for pointing this out – all suggested references reformatted.
Ref 2 – is an abstract and the product of a survey performed and shows important data that are relevant to our text

Reviewer #2: The paper deals with an interesting topic and the idea behind it is good and different from normal manuscripts. It also contains relevant information in the sections on specific conditions, which will be of interest for the readers of European Urology and provides clear value. However, the beginning of the text and also partly the discussion section seems unstructured and vague in many aspects. As such the paper would benefit from a major revision of these sections in which they are made more concise, shortened and made to include specific suggestions. Logically, the discussion on transition from pediatric care to adult care could be moved later in the manuscript.

Thank you – we have re-written these sections to clarify these points. We have not moved the section as suggested as the aim is to explain the need, patient approach and systemic systems for achieving transition. This is then followed by clinical examples of why this is important.

Of more specific suggestions, I can mention:
The first paragraph: "The transition process - a patient-centred approach" seems oddly unspecific when reading the section. The authors could try to answer how are problems created by a poor transition? How the process can be initiated? What the RCTs showed?. Even after reading the manuscript several times, it is unclear to me if the "Models of care" section is supposed to be an extension of the "Transition" section. If so that needs to be made clear and if not, it is confusing that the manuscript goes back to discussing "Transition of care" in a subtitle when it was already a major title.

Thank you we have corrected this

It would seem like a mistake that the section on "Lifelong care from a paediatric urologist" states in one place that "…the need to integrate with adult specialists outside urology - including nephrologists, radiologists, endocrinologists and gynaecologists." and just after that the importance to "…co-operate effectively with specialists in reconstructive surgery, endourology, andrology and gynaecology". Then in the discussion section "adult urology, gynaecology, general surgery and sexual psychology" is mentioned.

Thank you. We can now see how this may appear inconsistent. We have altered the manuscript accordingly.

The section "Direct transfer from the paediatric urologist to adult urology" would benefit from some references for the rather direct claims.

Thank you. We have added a reference but there are not really data to support this view but it is a universal experience common to all authors of this paper.

In addition to this, table 1 needs to be redone. It's not really clear what it depicts by looking at it.

Thank you – we have altered the title and added references to clarify this.

Reviewer #3: With all due respect to the esteemed authors of this review article, it reads to me as a long editorial. This is actually anticipated when reading how the document was put together. Perhaps this is a reflection of the current state of congenitalism. The authors offer many more opinions regarding the conditions

that carry through into adulthood than facts, and that likely reflects the paucity of available facts. This is noted to some extent in the Discussion. The majority of references are those from the pediatric urology literature.

Thank you. We agree that many of the references are from paediatric literature and authors – this is a more mature literature base than that relating specifically to transition. We have included many of the recent adolescent/transition publications and data – we feel that in order to convey the challenges that are part of this work both sets of data are important.

My own opinion is that the pediatric urologist is MOST SUITED carer of these adolescents and adults. We start out with these patients and care for them and operate upon them as children and establish long-term relationships with them and their parents. We have the best understanding of their conditions and knowledge of their individual anatomy and physiology. Patient age is a poor, and frankly irresponsible reason to dispense with caring for these patients. Transitioning these adolescent and adult patients to those with very imperfect experience of their conditions is bad care, in many cases. Those physicians with significant experience with these pediatric conditions constitute the rare exception. While the patients have no choice but to age, the pediatric urology community has the choice to continue to provide care and to gain the expertise of other providers, when necessary to address condition of which we have limited experience; for example an elevated PSA, or complex stone or fertility issues. We need to admit to our limitations in more peripheral medical issues but why must we send our patients to providers whose limitations are in the arena of the medical conditions central to the lives of these individuals. There are no data that an adult "reconstruction" urologist is better than a pediatric urologist in addressing strictures in the adult hypospadias patient; similarly, there are no data that the adult urologist handling female incontinence or BPH has better qualifications for managing the bladders of adult spina bifida or valve patients. The authors should better address these issues as well as the basic principle that the simple solution may be that pediatric urologists need to maintain the responsibility and find more appropriate venues for the comfort and convenience of these adult patients

We thank this reviewer for their opinion. We have written this paper to try and highlight EXACTLY the points they have raised. We have no bias in doing so – the reviewer will recognise that many of the authors are bona fide paediatric urologists and we all agree that there is no evidence for the statements made in this particular review. We have tried to present a view that allows patients to have access to appropriate care no matter what their healthcare environment – recognising that one solution does not work for all. We have tried to present an account of what is needed and some examples as to why. Word limits preclude us from giving more granularity in this particular consensus.

Reviewer #4: Thank you for the great opportunity to review the above-mentioned manuscript.

The submitted manuscript is the consensus of the pediatric reconstructive surgeons which gives on the one hand a great overview of the opportunities we are to make a change for these patients and the limited possibilities to have a long term follow-up because of the limited numbers all over and on the other hand the needed to hand over the patient to the adult world.

The article is well written.

There is almost no criticism on the entire article. From the review as aspects as a adult reconstructive surgeon there might be only the suggestion to adopt a little bit more the changes we are all have to face and have to accept. These young patients are becoming even earlier mobile and they learn to have their own "will". Therefore it might be a suggestion to involve the ones of the "adult" world even earlier like in a transition time. It might be before worthwhile to have a certain period where both disciplines pediatric and adult urologist for working closer together.

Thank you. We have added a comment to this effect

It is always helpful to learn from each other, which is a two-way road. It would ne helpful beside the suggestion of the authors to have a good knowledge what are the possibilities in the adult world, to which the patient and the parent should be informed and not as it often seems contradictive or out of the blue.

We agree and the manuscript has tried to convey this

The collaboration and the long-term follow-up of pediatric patients - especially those indications with small incidents - will help definitely to improve the quality of life for our patients with their increasing flexibility mobility. Such an effort and follow-up in registries are often the only opportunity to further improve the long-term outcome..

We agree and the manuscript has tried to convey this

Accept with minor changes

Keywords

Adolescent Urology; Transition; Bladder Exstrophy; Exstrophy, Epispadias; Neurogenic bladder; Hypospadias; Posterior Urethral Valves

Congenital Lifelong Urology – the challenges for patients and surgeons

Structured abstract

Context

Patients born with complex congenital genitourinary anomalies (including bladder exstrophy, cloacal exstrophy, epispadias, neurogenic bladder, hypospadias and posterior urethral valves) often require major reconstructive surgery in childhood. These conditions, their treatment and sequelae require lifelong follow-up. This has created the need for adult urologists to provide care as these patients grow into adults.

Objective

To evaluate current strategies for transition and provide a current position statement with examples of the challenges faced by patients and their healthcare teams as a result of these conditions and their treatment.

Evidence Acquisition

Each of the authors was asked to provide a 500 word synthesis, based on current literature; to highlight the challenges faced in an area of their expertise.

Evidence Synthesis

The authors assembled in March 2018 to form a consensus based on the gathered data. The aforementioned sections were reviewed and following the consensus discussion the paper was formulated and reviewed.

Conclusion

Lifelong care of congenital problems is challenging and essential for many but not all – expertise is needed to provide the best care for patients and make the best use of resource. Specialist centres appear to be the most effective and safe model.

In the long term it would be ideal to establish an evidence base focused on the common long-term problems of these condition to ensure excellent care with appropriate expertise.

Patient Summary

Patients born with complex congenital anomalies of the genito-urinary system require specialist care in childhood. Many will need lifelong care to manage their condition and the treatment of it. There is a growing interest in this area of medicine and this consensus statement aims to look at the need for lifelong care ion this group. The aim is to ensure that all patients that need care at any age are able to find what they need.

Introduction: Identifying the need for long-term follow-up of common congenital problems surgically treated in childhood

We are amongst the first generation of surgeons and patients to see the long-term implications of urogenital congenital anomalies and the consequences of surgery to improve them. Current data are poor – the potential for improvement lies in better measures of outcome, standardization and ~~understanding the importance of~~ patient satisfaction.

Patients who have been treated under the care of paediatric urologists in the past 40 years are now appearing with long-term problems~~ needing care~~. There is a lack of expertise in this area and a rudimentary understanding of outcomes~~ and how to measure them~~.

The conditions and patients can be medically, surgically and psychologically challenging – including urological, nephrological, gynaecological, orthopaedic and psychological aspects. Unfamiliar practitioners will unsettle patients, jeopardizing the doctor patient relationship – risking patients dropping out of care [1]. Patients need guidance and structure about who should look after them in their adult life.

In a recent survey of European paediatric urologists, just under 300 responded and estimated that between 10 and 20 % of their treated patients will need long-term follow-up numbers of patients are expanding [2].

~~This statement has 3 clear purposes:~~

~~1. To recognize and state the importance of specialized long-term follow-up for patients born with and treated for congenital urological anomalies~~
~~2. To educate practitioners about the challenges that arise in these complex patients~~
~~3. To attract greater interest from adult urologists in this fascinating field of urology~~

Methodology:

This consensus was commissioned and supported by the European Association of Urology (EAU). All authors were selected on the basis of experience in this work and from a range of areas and health systems across Europe. A framework of topics was designed by the chairman and each author given one topic and asked to write a section All contributions were collated and circulated to the whole group. Following this, all authors were invited to comment on all topics and a consensus meeting was held to examine the text. The principal messages were presented and open for comment at the

2018 EAU meeting (Copenhagen). Thereafter the text was further modified. Consensus views sought and the paper formulated and submitted for peer review.

There are two major elements of care – the first is to maintain the patient centered approach and the second is the model of care to deliver that.

1. A patient-centered approach

Transition is the process that allows an adolescent to assume responsibility for their own healthcare and become the primary decision maker in their care. ~~Transfer of care is the move from one set of carers to another (and possibly a new environment).~~

Effective transition into adult healthcare is paramount in complex conditions, in other specialties there have been improvements in long-term function, respiratory outcomes and survival [3] [4] [5] [6]. Although this requires investment in teenagers the long-term aim is to reduce the impact of their condition on them and the cost to healthcare as a whole.

The timing of transition will vary with ~~a patient's~~ maturity and independence. Preparation of the child and family should begin from 11-12 years of age in order to prepare both child and family [7].

A number transitional models have evolved to suit a range of different healthcare environments and varying patient needs [8]. Adolescents require focus on their needs and the security of a life-long plan. If this is absent the patient is more vulnerable to problems such as malignancy, renal impairment, incontinence, sexual problems and a low health related quality of life (HRQoL) [9]. A dedicated keyworker e.g. nurse, social worker or doctor needs to monitor, coordinate and act as a focal point for care and/or advice when needed [10] [11] [12].

It is estimated that a population of four million would provide enough work for one adolescent urologist [10]. Evidence for transition is limited with only 4 small, short RCTs in any disease area: these showed better knowledge of their condition, improved self-efficacy and confidence in their healthcare system. It appears that those transitioning around the age of 18 years fair better and those with spina bifida are the most reluctant to transition [13] [14] [15] [16] [17] [18].

Therefore, good preparation, a clear plan and education are vital elements [19]. Patient education must include the importance of follow-up and establishing their confidence to ask for health care or address problems that concern them.

2. Potential Models of care:

~~These are complex patients requiring multidisciplinary care as above care needs to focus on the patient but the service will need to be achievable in the local healthcare environment.~~

Some potential models of care are laid out below.

a. Lifelong care from a paediatric urologist - Where the paediatric and adult urology departments are combined:

The paediatric urologists form part of the wider department of urology. This allows absolute continuity and removes the anxiety for patients having to move to another team. The paediatric urologist can monitor their own results in the long term – they must have an adult reconstructive training but will be able to engage further subspecialist expertise e.g. stones and endourology, andrology and oncology when required. There will be increased potential for flexibility including joint clinics and operating.

The potential difficulties will include the paediatric urologist's career will be shorter than the life-long care needed for their patients i.e. these patients will have to move to a new doctor at some point. Lifelong care in a paediatric environment is not healthy for either the patient or other surrounding (paediatric) patients [8].

b. Lifelong care from a paediatric urologist - where the paediatric urologist integrates with the (separate) adult urology department:

This maintains many of the continuity of the first model. The paediatric urologist is, of course, fully aware of the original diagnosis and treatment. It is important that they maintain the links and the insight to hand over patients to other, appropriate experts when it is in the patient's best interest.

The further challenge for paediatric urologists looking after adult patients is the need to integrate with adult specialists outside urology.

c. Transition from the paediatric urologist to an adolescent/adult specialist with an interest in this area:

This requires an interested and appropriately trained 'adult' urologist. The practitioner must understand the paediatric diagnosis and treatment. They must have spent time working in a specialist paediatric centre and ~~develop a training~~be trained in reconstructive urology. This urologist must be focused on the overall care of the patient and co-operate effectively with specialists including nephrology, radiology, psychology, endocrinology gynaecology, reconstructive surgery, endourology and andrology [20]

Transition needs to be run carefully - it requires close working in terms of preparation and handover. A joint clinic and good patient information are important. Views will differ but allowing patients to meet their new carers in the paediatric environment and agree on appropriate timing for transfer (i.e. that is most familiar to the patient) seems ideal [10] [11] [12]. ~~This at least offers the patient a familiar face when they arrive at the new clinic. It also allows the option for everyone to agree to delay the move if there are medical or other reasons for doing so.~~

d. Direct transfer from the paediatric urologist to adult urology

This is the riskiest model if there is no transition plan as part of it and may result in patients becoming lost to follow-up or only presenting in an emergency [21].

Anecdotally, this may be something that patients, unwittingly, introduce for themselves. As they grow – they may wish to go to university or work in another city or country. They may not wish or be able to travel and see their original urologist and it can be difficult to find a comparable level of expertise for them.

There is clearly a need for training in this area and cross-working between both paediatric and adult colleagues – possibly from an earlier stage than is seen in many environments. It does not matter what the origin of that trainee is (whether paediatric or adult) as long as they have the expertise required.

It appears (on the basis of experience), that many urologists have no interest in looking after patients born with spina bifida, or other neurological problems and when confronted with a patient operated because of exstrophy/epispadias, severe hypospadias, differences~~sorders~~ of sex development, reflux or other obstructive uropathy they can be intimidated.

We have highlighted some of the challenges below.

The Challenges of Revision Reconstructive Surgery

~~As demonstrated throughout this paper~~ There is a clear imperative for long-term follow- up with complex diagnoses and surgery. ~~Inevitably, a~~A number of patients will need revision surgery, ~~however,~~ we rarely have an accurate denominator to understand the precise risk ~~of the need~~.

~~In conditions such as exstrophy or the neurogenic bladder where major abdominal surgery is required for many~~ The risks of surgery in adolescents and adults with complex conditions and multiple prior surgery can be significant. In adult neurogenic patients the overall risk of complications is 91.5% [22]. ~~Changing techniques may see a different spectrum or timing of complications – maintaining the need for long-term data.~~

Some of the specific medical and surgical problems to be addressed in adolescent and adult life are:

- male/female fertility and sexual issues [23] [24].
- ~~long-term evaluation of reconstructed bladders and continent diversions and complications~~
- urological problems during pregnancy following reconstruction [25],
- ~~further reconstructive procedures in adult life.~~revision surgery
- anastomotic strictures (ureteric, urethral and uretero-enteric).
- small bowel obstruction (10%),
- stomal stenosis(10%),
- incontinence - urinary (10-20%) or fecal (20%) [26].

In any arena and at any age primary surgery is easier than revision surgery thus~~. This above all should be the motivation for an all- encompassing discussion about improving techniques to minimize the need for and the extent of revision surgery. This should include the timing of surgery and ensuring that at~~ at any age it must be clear that there is a ~~clear~~ defined surgical imperative for operating.

In later life abdominal adhesions, fibrosis, redundant tissue and impaired blood supply ~~may compromise and~~will add to the ~~difficulty~~ complexity of revision surgery. There may be significant technical considerations such as renal access to deal with kidney stones ~~in patients~~ with neobladders or conduits ~~– thus requiring percutaneous surgery~~ [27].

Hypospadias- who to follow~~--~~up, what are the clinical concerns?

Hypospadias forms a substantial part of a paediatric urology practice but assessment and treatment require high-level expertise. Evidence increasingly suggests it is best treated in a specialist centre [28] [29].

Management can be complex and ~~there is a~~ lack~~s~~ ~~of~~ standardisation in surgical technique. More than 300 different ~~techniques~~ methods with a wide variety of modifications ~~have been documented~~are described [28] [30].

Centralisation of care has improved our understanding ~~of the implications~~ of hypospadias reconstruction. Complications may take decades to appear [31] [32]. Pubertal growth may significantly affect the final outcome. Additionally, psychosexual development and sexual function are important but can only be evaluated in adulthood [28] [33] [34] [35] [36].

Long-term aesthetic results need careful follow-up – they become increasingly important to the adult patient [37] [38]. Genital and reproductive function significantly effect the quality of life in adult patients with congenital penile anomalies [35]. ~~Disappointingly, most published studies have reported~~ Many studies only report short-term results in pre-pubertal patients; very few ~~studies~~ examine ~~such~~ outcomes in adulthood [39].

~~Compared to controls there is~~Hypospadias patients have a higher incidence of spraying, post void dribbling and urinary stream deviation worsening further with the ~~degree~~ severity of hypospadias – producing increased dissatisfaction.
~~In some cases poor outcomes may result in a urethra that becomes unsalvageable.~~
Dissatisfaction with sexual function and penile appearance are also more prevalent in adult patients than controls. Table 1 summarises published data from ~~the published studies in~~ the last decade. ~~There appears to be less concern relating to cosmesis and function in mild hypospadias.~~ In these publications more severe hypospadias results for lower urinary tract, psychosexual function and quality of life score are equivalent while the outcomes on cosmesis and penile length are worse.

Table 1 Overview of long-term hypospadias outcomes [36] [38] [39] [40]
NR = not reported

Lower urinary tract function	
Spraying	10~~NR~~ - 63 %
Post void dribbling	20~~NR~~ – 4~~3~~0 %
Stream deviation	14~~NR~~ – 2~~8~~6 %
LUTS	3 - 85%~~NR – 20~~ %
Fistulae	0 % - 25 %
Stricture	0 % - 8 %
Cosmesis	
Patient dissatisfaction (mostly size)	7~~NR~~ – 81 %
Surgeon satisfaction	80~~NR~~ – 97 %
Psychosexual	
Sexual satisfaction	~~NR – lower - Equal~~77-100 %
Curvature	~~NR – 15~~5 - 23 %
Erectile difficulties	~~NR – 73~~0 - 73 %
Ejaculation problems	~~NR~~ 5 – 36 %

In conclusion, long-term outcomes of mild hypospadias repair are good,~~d and~~ those patients usually need shorter follow. ~~up than patients~~Patients with severe hypospadias ~~– these patients~~ will need long-term follow up focusing on urinary and sexual function, fertility and psychosexual support.

The neurogenic bladder in adolescence and adulthood

~~"The neurogenic bladder" encompasses a wide ranging, complex and evolving clinical picture.~~ The majority of adolescents with neurogenic bladders have congenital spinal

abnormalities and therefore have requiring medical care in childhood. The neurogenic bladder may be part of a wider occur alongside other conditions including ano-rectal malformations, UG sinus and cloacal anomaliesexstrophy. Preservation of the upper urinary tracts;, maintaining a safe, compliant, continent bladder with reasonable compliance, capacity and continence are key objectives [41]. Recent Data show improved survival into adulthood without significant renal impairment [42]. However, the onset of puberty brings physical, psychological and social development that can challenge affect the patients renal and bladder function [43].

Regular monitoring of the condition and any reconstruction are important. This can be challenging if the patient choses not to comply – support from the team and those around them are vital to try and keep them safe. – but this can be challenging.

Sensitive discussion is needed regarding the type, practicality and visual appearance of continence aids [46]. Minimising use of indwelling catheters and continence pads is ideal. With physical maturity alternative continence procedures such as fascial slings [47] [48] and artificial urinary sphincters may be more appropriate [49].

Sexual function needs to be considered with the patient – c. Concerns regarding urinary and faecal incontinence are heightened when patients become sexually active. Joint management of pregnancy (including the preparation for conception with folic acid) with urologists and obstetricians seems to be an increasing trendis important.

[illegible] cognitive impairment – they will struggle with executive function, and complex tasks (e.g. CISC) and decision making many. This can impact on their own self care and some depend, to some degree, on the input and supervision of their caregivers.

In most systems These children are often treated in multidisciplinary paediatric neuropathic teams including pediatricians, urologists, social workers, psychologists etc. Both parents (caregivers) and the patients are used to a lot of extra attentionto this way of working and this that is focused on their wellbeing: all of a sudden this can change in an adult setting. There has to be cautious preparation for the increased responsibility for their own care. The balance is creating a safety net that facilitates this, allows independence (avoids rebellion and loss of engagement) but prevents harm.

Posterior Urethral Valves

Posterior Urethral valves are the most common cause of male congenital lower urinary tract obstruction with an incidence of 1:5000 live births. The resultant damage to the urinary tract includes y cause renal dysplasia, severe reflux, chronic hydronephrosis, bladder dysfuntion and prenatal oligohydramnios resulting in pulmonary hyposplasia. Up to 20 % of patients suffer with end-stage renal failure –some authors have suggested an improvement in long-term outcomes as a result of prenatal diagnosis [50].

Early recognition (ideally antenatally) and early agressive management, improvements in endourological instruments, nephrological management, neonatal care and paediatric renal transplant haves improved the initial poor prognosis.

In the longer term, patients with posterior urethral valves achieve daytime and nighttime urinary continence significantly later thaen their healthy peers. [51] ~~Valve associated morbidity continues through adolescence and into adult life.~~ Adult valve patients with ongoing incontinence report more sleep disturbance and regard themselves more phyisically disabled, those with renal insufficiency report lower quality of life in several domains.[52]

Bladder dysfunction

In adulthood, the occurrence and bother of most lower urinary tract symptoms are ~~increased 2-fold~~doubled in PUV patients ~~treated for PUV~~.[53]

Adult c~~C~~linical phenotypes ~~in the adult may include~~range from detrusor overactivity with poor compliance to~~and~~ myogenic failure with ~~increasing~~ a significant post void residual.[54]. Regular (non invasive) bladder assessment is necessary~~. and changes need review and discussion.~~

Renal impairment

The life time risk of end-stage renal disease is around 28% , although a nadir creatinine of 1 mg/dl during the first year of life is a good long-term prognostic factor ~~for renal outcome~~.[55] [56] [57] [58] .

Polyuria may increase post-void residual volumes causing progressive uropathy with a deterioration in the concentrating ability of the renal medulla further compounding polyuria – creating a cycle of decline.

Good bladder emptying is vital - in extreme cases overnight bladder drainage may ~~be a means of delaying~~ delay renal deterioration and improving sleep, ~~for those~~ with polyuria.[60]

Preparing for renal transplant

Patients in end-stage renal disease needing dialysis will have to be prepared for renal transplantation. Before transplantation a full bladder and voiding assessment, including urodynamics is necessary. Some patients will undergo bladder augmentation before renal transplantation. UTIs may be a factor for all sorts of reasons but as long as the bladder is emptying they will not result in impaired graft function.[61]

The outcome of augmentation before or after kidney transplantation is similar – thus it may be acceptable to~~. Many patients with high-pressure bladders will develop myogenic failure. Postponing~~ postpone AC~~-~~cystoplasty ~~in this population may be acceptable~~ as ~~the~~ patients will be closely monitored [62].

Met opmerkingen [RN1]: In full: augmentation cytoplasty

Transitional Care in Bladder Exstrophy

Classic bladder exstrophy (CBE) forms part of the bladder exstrophy-epispadias complex BEEC ~~which~~that also includes cloacal exstrophy, male epispadias, female epispadias and ~~some~~ other rare variants.
CBE has an incidence of 1:30-40,000 live births and has a male to female ratio of 1.5-5:1 [63]. In some European countries, centralisation of CBE care has ~~into nominated paediatric centres has~~ led to ~~focussed~~focused expertise and better organization of care [64]. ~~Despite this however,~~ However, a demographic study ~~published in 2012~~ established that ~~across specialist centres in Europe,~~ only 12 out of 116 units receive more than 6 BE or epispadias referrals ~~each~~ per year [65].

Management of BE in infants is well established and ~~if cared for~~ in specialist centres ~~with expertise~~, continence outcomes are good [66 67]. ~~A major challenge arises however in adolescent patients because the ongoing demanded care, needs when entering young adulthood can be complex and far-reaching.~~ Adolescent and adult care has never been formally centralized but the challenges are complex.
Uterine prolapse in females~~ladies~~ is much higher than those not affected with exstrophy [69]. This highlights the need for well-supported multi-disciplinary care combined with an expert urologist.

Any patient who has had major reconstruction needs advice about what to do in an emergency. ~~They may well encounter professionals who are not as familiar with their condition or surgery as they themselves.~~ Giving contact details of the reference centre for the use of the patient or less experienced staff is helpful – especially in emergencies.

Discussion.

This paper sets out a current position and understanding of what is needed for patients born with congenital urological anomalies. ~~Paediatric urologists have shown have worked hard to improve techniques to treat these complex conditions. The courage to specialize in paediatric urology and to further~~ S~~s~~ubspecialisation within paediatric urology~~ze~~ seems to have shown benefit – whilst evidence to support this is improving, it remains lacking overall.

Transition represents a ~~fundamental~~ difficult stage in the treatment of patients with complex, congenital malformations of the kidney, genital or urinary tract who will require lifelong specialist follow-up. A ~~The initial approach must be~~ multidisciplinary service is important with a range of specialists working together to manage these complex patients from cradle to grave. More often than not, the paediatric urologist will act as the

"team leader" of a group composed of a range of specialists in order to create the necessary" and coordination of care within the multidisciplinary team.

There are a variety of ways in which this Jjoint working can be achieved in a variety of ways, as discussed earlier in this paper. The objective is to guarantee the best possible and most reliable continuity of care for these patients. The decision taken by the European Society for Pediatric Urology (ESPU) and the European Association of Urology (EAU) to initiate a close collaboration is important.

One of the main difficulties has always been the lack of "adult" specialists (in urology) dedicated to the treatment of patients affected by rare and complex congenital diseases. There is a need for adult urology to recognize the expanding group of these patients.

In the first instance there should be the creation ofneed to be settings where "adult" urologists can learn about the paediatric care and how to effectively manageeffective management of the transition of patients. Formal training for dedicated specialists with the correct professional competences, for example a Fellowship in congenital lifelong urology would represent an further, important step in the right directionto generateing interest in the field.

FUTURE RESEARCH

All the authors of this consensus have participated in and contributed to research looking at the long-term outcomes of congenital urological outcomes. All acknowledge the shortcomings of the work to date.

There needs to be a concerted effort to improve the research and thus the evidence available. This will further improve outcomes for patients, support clinicians and demonstrate the importance of this work. Prospective, shared data to produce larger series and more robust outcome measures are necessary. National data sets with full numerical information about procedures would provide clear denominators.

We need to provide a range of validated tools that will provide standardized measures of both patient and surgical outcomes. These may involve Patient Reported Outcome Measures or disease specific quality of life measures. The evolution of specialist centres – in collaboration with other allied centres and focused training and fellowships will further drive research.

There have been some good examples of outcome data in hypospadias, posterior urethral valves and the neuropathic bladder that have taught us all about what we learn from long-term care.

Summary.

Lifelong care of congenital problems is challenging and essential for many but not all – expertise is needed to provide the best care for patients and make the best use of

resources. The political environment may significantly influence care for these patients. Specialist centres appear to be the most effective and safe model.

In the long term it would be ideal to establish practice guidelines focusing on the common long-term problems of congenital urological conditions. The ultimate goal would be a structure whereby all these patients will have access to excellent care with appropriate expertise.

There are no conflicts of interest to declare

References;

1. Wood, D. Adolescent urology: developing lifelong care for congenital anomalies. *Nat. Rev. Urol.* **11,** 289–296 (2014).
2. Tekgul, S. ESPU Survey on transitional care patterns around the world. *ESPU, Barcelona* (2017).
3. Rosen, D. S., Blum, R. W., Britto, M., Sawyer, S. M. & Siegel, D. M. Transition to adult health care for adolescents and young adults with chronic conditions. *J. Adolesc. Heal.* **33,** 309–311 (2003).
4. Okumura, M. J. *et al.* Improving transition from paediatric to adult cystic fibrosis care: programme implementation and evaluation. *BMJ Qual. Saf.* **23,** i64–i72 (2014).
5. Eleftheriou, D., Isenberg, D. a, Wedderburn, L. R. & Ioannou, Y. The coming of age of adolescent rheumatology. *Nat. Rev. Rheumatol.* **10,** 187–93 (2014).
6. Crowley, R., Wolfe, I., Lock, K. & McKee, M. Improving the transition between paediatric and adult healthcare: a systematic review. *Arch. Dis. Child.* **96,** 548–553 (2011).
7. Woodhouse, C. R. J. *Adolescent Urology and Long-term Outcomes*. (Wiley, 2015).
8. Jesus, L. E., Dekermacher, S., Frota, J., Bragança, J. J. & Anderson, K. M. Adolescents and adults in pediatric urology clinics. *J. Pediatr. Urol.* **10,** 408–411 (2014).
9. Bower, W. F. *et al.* The transition of young adults with lifelong urological needs from pediatric to adult services: An international children's continence society position statement. *Neurourol. Urodyn.* **36,** 811–819 (2017).

10. Woodhouse, C. Platinum Opinion Adolescent Urology and Transitional Care. *Eur. Urol.* **68,** 745–746 (2015).
11. Timberlake, M. D., Corbett, S. T., Costabile, R. A. & Herndon, C. D. A. Identification of adolescent and adult patients receiving pediatric urologic care and establishment of a dedicated transition clinic. *J. Pediatr. Urol.* **11,** 62.e1-62.e6 (2015).
12. Chan, R. *et al.* The fate of transitional urology patients referred to a tertiary transitional care center. *Urology* (2014). doi:10.1016/j.urology.2014.08.022
13. Szymanski, K. M., Misseri, R., Whittam, B., Large, T. & Cain, M. P. Current opinions regarding care of the mature pediatric urology patient. *J. Pediatr. Urol.* **11,** 251.e1-251.e4 (2015).
14. Shalaby, M. S., Gibson, A., Granitsiotis, P., Conn, G. & Cascio, S. Assessment of the introduction of an adolescent transition urology clinic using a validated questionnaire. *J. Pediatr. Urol.* (2015). doi:10.1016/j.jpurol.2014.11.024
15. Stephany, H. A. *et al.* Transition of Urologic Patients from Pediatric to Adult Care: A Preliminary Assessment of Readiness in Spina Bifida Patients. *Urology* (2015). doi:10.1016/j.urology.2014.12.019
16. A., H., H., C.-B. & W., F. 5 years after introduction of a transition protocol: An evaluation of transition care for patients with chronic bladder conditions. *J. Pediatr. Urol.* (2017). doi:http://dx.doi.org/10.1016/j.jpurol.2017.09.023
17. Grimsby, G. M., Burgess, R., Culver, S., Schlomer, B. J. & Jacobs, M. A. Barriers to transition in young adults with neurogenic bladder. *J. Pediatr. Urol.* (2016). doi:10.1016/j.jpurol.2016.04.015
18. Campbell, F. *et al.* Transition of care for adolescents from paediatric services to adult health services. *Cochrane Database of Systematic Reviews* (2016). doi:10.1002/14651858.CD009794.pub2
19. Sawicki, G. S. *et al.* Measuring the transition readiness of youth with special healthcare needs: Validation of the TRAQ - Transition readiness assessment questionnaire. *J. Pediatr. Psychol.* (2011). doi:10.1093/jpepsy/jsp128
20. Wood, D. Leading contributors to success of transitional urology units. *Current Opinion in Urology* (2017). doi:10.1097/MOU.0000000000000354
21. Szymanski, K. M., Cain, M. P., Hardacker, T. J. & Misseri, R. How successful is the transition to adult urology care in spina bifida? A single center 7-year experience. *J. Peditr. Urol* **13,** 40.e1-40.e6 (2017).
22. Loftus, C. J. *et al.* Postoperative Complications of Patients With Spina Bifida Undergoing Urologic Laparotomy: A Multi-institutional Analysis. *Urology* **108,** 233–236 (2017).
23. Rubenwolf, P., Thomas, C., Thüroff, J. W. & Stein, R. Sexual Function, Social Integration and Paternity of Males with Classic Bladder Exstrophy following Urinary Diversion. *J. Urol.* **195,** 465–470 (2016).
24. Rubenwolf, P., Thomas, C., Thüroff, J. W. & Stein, R. Sexual Function and Fertility of Women with Classic Bladder Exstrophy and Continent Urinary Diversion. *J. Urol.* **196,** 140–145 (2016).
25. Deans, R. *et al.* Reproductive outcomes in women with classic bladder exstrophy: an observational cross-sectional study. *Am. J. Obstet. Gynecol.* **206,** 496.e1-6 (2012).

26. Biers, S. M., Venn, S. N. & Greenwell, T. J. The past, present and future of augmentation cystoplasty. *BJU International* **109,** 1280–1293 (2012).
27. Okhunov, Z., Duty, B., Smith, A. D. & Okeke, Z. Management of urolithiasis in patients after urinary diversions. *BJU International* (2011). doi:10.1111/j.1464-410X.2011.10194.x
28. MacLellan, D L, Diamond, D. A. Recent advances in external genitalia. *Pediatr Clin North Am* **53,** 449–464 (2006).
29. Springer, A., van den Heijkant, M. & Baumann, S. Worldwide prevalence of hypospadias. *J. Pediatr. Urol.* (2016). doi:10.1016/j.jpurol.2015.12.002
30. Stein, R. & Thuroff, J. W. Hypospadias and bladder exstrophy. *Curr Opin Urol* **12,** 195–200 (2002).
31. Ringert, R. H., Hermanns, M. & Zoeller, G. Outcome after repair of congenital penile malformations. *Andrologia* (1999).
32. Macedo A, Jr., S. M. Surgery to the external genitalia. *Curr Opin Urol* **11,** 585–90 (2001).
33. Mieusset, R. & Soulie, M. Hypospadias: psychosocial, sexual, and reproductive consequences in adult life. *J Androl* **26,** 163–168 (2005).
34. Singh, J. C., Jayanthi, V. R. & Gopalakrishnan, G. Effect of hypospadias on sexual function and reproduction. *Indian J Urol* **24,** 249–252 (2008).
35. Ebert, A. K., Bals-Pratsch, M., Seifert, B., Reutter, H. & Rosch, W. H. Genital and reproductive function in males after functional reconstruction of the exstrophy-epispadias complex--long-term results. *Urology* **72,** 566–570 (2008).
36. Win, G. De & Cuckow, P. Long-term outcomes of pediatric hypospadias and surgical intervention. 69–77 (2012).
37. VanderBrink, B. A., Stock, J. A. & Hanna, M. K. Esthetic outcomes of genitoplasty in males born with bladder exstrophy and epispadias. *J Urol* **178,** 1606–10; discussion 1610 (2007).
38. Rynja, S. P., De Jong, T. P. V. M., Bosch, J. L. H. R. & De Kort, L. M. O. Functional, cosmetic and psychosexual results in adult men who underwent hypospadias correction in childhood. *Journal of Pediatric Urology* (2011). doi:10.1016/j.jpurol.2011.02.008
39. Tourchi, A. & Hoebeke, P. Long-term outcome of male genital reconstruction in childhood. *Journal of Pediatric Urology* (2013). doi:10.1016/j.jpurol.2013.03.017
40. Rynja, S. P. *et al.* Long-term followup of hypospadias: functional and cosmetic results. *J Urol* **182,** 1736–1743 (2009).
41. Dik, P., Klijn, A. J., van Gool, J. D., de Jong-de Vos van Steenwijk, C. C. E. & de Jong, T. P. V. M. Early Start to Therapy Preserves Kidney Function in Spina Bifida Patients. *Eur. Urol.* (2006). doi:10.1016/j.eururo.2005.12.056
42. Shin, M. *et al.* Prevalence of Spina Bifida Among Children and Adolescents in 10 Regions in the United States. *Pediatrics* (2010). doi:10.1542/peds.2009-2084
43. Woodhouse, C. R. The fate of the abnormal bladder in adolescence. *J Urol* **166,** 2396–2400 (2001).
44. Ahmad, I. & Granitsiotis, P. Urological follow-up of adult spina bifida patients. in *Neurourology and Urodynamics* (2007). doi:10.1002/nau.20447
45. De Kort, L. M. O. *et al.* The management of adolescents with neurogenic urinary tract and bowel dysfunction. *Neurourol. Urodyn.* (2012). doi:10.1002/nau.22206

46. Whale, K., Cramer, H., Wright, A., Sanders, C. & Joinson, C. 'What does that mean?': A qualitative exploration of the primary and secondary clinical care experiences of young people with continence problems in the UK. *BMJ Open* (2017). doi:10.1136/bmjopen-2016-015544
47. Snodgrass, W. & Barber, T. Comparison of bladder outlet procedures without augmentation in children with neurogenic incontinence. *J. Urol.* (2010). doi:10.1016/j.juro.2010.04.017
48. Perez, L. M. *et al.* Outcome of sling cystourethropexy in the pediatric population: a critical review. *J Urol* **156,** 642–646 (1996).
49. Lopez Pereira, P., Somoza Ariba, I., Martinez Urrutia, M. J., Lobato Romero, R. & Jaureguizar Monroe, E. Artificial urinary sphincter: 11-year experience in adolescents with congenital neuropathic bladder. *Eur Urol* **50,** 1096–101; discussion 1101 (2006).
50. Kousidis, G. *et al.* The long-term outcome of prenatally detected posterior urethral valves: a 10 to 23-year follow-up study. *BJU Int.* **102,** 1020–1024 (2008).
51. Jalkanen, J., Heikkilä, J., Kyrklund, K. & Taskinen, S. Controlled Outcomes for Achievement of Urinary Continence among Boys Treated for Posterior Urethral Valves. *J. Urol.* (2016). doi:10.1016/j.juro.2016.02.2968
52. Jalkanen, J. *et al.* The impact of posterior urethral valves on adult quality of life. *J. Pediatr. Urol.* (2013). doi:10.1016/j.jpurol.2012.07.006
53. Tikkinen, K. A. O., Heikkilä, J., Rintala, R. J., Tammela, T. L. J. & Taskinen, S. Lower urinary tract symptoms in adults treated for posterior urethral valves in childhood: matched cohort study. *J. Urol.* (2011). doi:10.1016/j.juro.2011.03.150
54. Holmdahl, G., Sillén, U., Hanson, E., Hermansson, G. & Hjälmås, K. Bladder dysfunction in boys with posterior urethral valves before and after puberty. *J. Urol.* (1996). doi:10.1016/S0022-5347(01)66502-9
55. Heikkilä, J., Holmberg, C., Kyllönen, L., Rintala, R. & Taskinen, S. Long-Term Risk of End Stage Renal Disease in Patients With Posterior Urethral Valves. *J. Urol.* **186,** 2392–2396 (2011).
56. Sarhan, O. M. *et al.* Posterior urethral valves: multivariate analysis of factors affecting the final renal outcome. *J. Urol.* (2011). doi:10.1016/j.juro.2011.01.023
57. Sarhan, O., El-Dahshan, K. & Sarhan, M. Prognostic value of serum creatinine levels in children with posterior urethral valves treated by primary valve ablation. *J. Pediatr. Urol.* (2010). doi:10.1016/j.jpurol.2009.05.016
58. DeFoor, W. *et al.* Risk factors for end stage renal disease in children with posterior urethral valves. *J. Urol.* (2008). doi:10.1016/j.juro.2008.03.090
59. Lopez Pereira, P., Martinez Urrutia, M. J., Espinosa, L. & Jaureguizar, E. Long-term consequences of posterior urethral valves. *J. Pediatr. Urol.* (2013). doi:10.1016/j.jpurol.2013.06.007
60. Nguyen, M. T. *et al.* Overnight catheter drainage in children with poorly compliant bladders improves post-obstructive diuresis and urinary incontinence. in *Journal of Urology* (2005). doi:10.1097/01.ju.0000179394.57859.9d
61. López Pereira, P. *et al.* Does bladder augmentation negatively affect renal transplant outcome in posterior urethral valve patients? *J. Pediatr. Urol.* (2014). doi:10.1016/j.jpurol.2014.01.011
62. Jesus, L. E. & Pippi Salle, J. L. Pre-transplant management of valve bladder: A

critical literature review. *J. Pediatr. Urol.* (2015). doi:10.1016/j.jpurol.2014.12.001
63. Ben-Chaim, J., Docimo, S. G., Jeffs, R. D. & Gearhart, J. P. Bladder exstrophy from childhood into adult life. *J. R. Soc. Med.* **89,** 39P–46P (1996).
64. Dickson, A. P. The management of bladder exstrophy: The manchester experience. *Journal of Pediatric Surgery* (2014). doi:10.1016/j.jpedsurg.2013.11.031
65. Cervellione, R. M. *et al.* Prospective study on the incidence of bladder/cloacal exstrophy and epispadias in Europe. *J. Pediatr. Urol.* (2015). doi:10.1016/j.jpurol.2015.03.023
66. Purves, J. T., Baird, A. D. & Gearhart, J. P. The modern staged repair of bladder exstrophy in the female: a contemporary series. *J Pediatr Urol* **4,** 150–153 (2008).
67. Chan, D. Y., Jeffs, R. D. & Gearhart, J. P. Determinants of continence in the bladder exstrophy population: predictors of success? *Urology* **57,** 774–777 (2001).
68. Cervellione, R. M. *et al.* Vaginoplasty in the female exstrophy population: Outcomes and complications. *J. Pediatr. Urol.* **6,** 595–599 (2010).
69. Nakhal, R. S., Deans, R., Creighton, S. M., Wood, D. & Woodhouse, C. R. J. Genital prolapse in adult women with classical bladder exstrophy. *Int. Urogynecol. J. Pelvic Floor Dysfunct.* **23,** 1201–1205 (2012).