

Disorders of sex development and transgender health

Program director: Dr Diane Wherrett

Dear CPEG committee,

As I completed my one-year fellowship on disorders of sex development (DSD) and transgender health, here is my fellowship progress report on my main research project about DSDs in adolescents, under the supervision of Dr Diane Wherrett. You will also find additional research progress report on gender dysphoria (GD), under the supervision of Dr Mark Palmert.

My goal for this fellowship was to gain the expertise to be able to set up a DSD and transgender clinic with a multi-disciplinary team. I believe that with this fellowship, I have acquired clinical knowledge and developed specialized expertise to the fields of DSDs and GD. This fellowship has shown me the importance of working in dedicated and specialized multi-disciplinary teams (with genetics and genetic counsellors, gynaecology, urology, social work and psychology for the DSD team, and with adolescent medicine, social work, psychology, psychiatry and nurse practitioner for the GD team). I would be incredibly blessed to have the honour of working with such amazing teams, like the ones I worked with at Sick Kids. While awaiting the end of my maternity leave, my priority is to build those teams with the help of Dr Deal, the endocrinology chief of service, and Dr Frappier, the head of pediatrics, who are actively working on this crucial part of patient and family care. I am also working on an updated clinic protocol for patients with GD based on international societies and groups guidelines (WPATH, Endocrine Society), as well as my experience at the TYC at Sick Kids.

I wanted to conclude this letter by talking specifically about my primary supervisor, Dr Diane Wherrett, and my secondary supervisor Dr Mark Palmert. I cannot emphasize enough how much these mentors are perfect examples of amazing academic center professors. I am truly grateful to have had the opportunity of working closely with both of them, and I will always remember and aspire to be as *knowledgeable* (about their fields, their teams, their patients, the latest papers in the literature, the newest talks at conferences), yet *available* (even with their very busy schedules, they **always** took the time to meet with me, guide me, correct any protocol or papers I submitted) as they were. They were a perfect example of an academic center physician; I will probably sound cliché by citing CanMEDS, but they showed how to be a scholar, a professional, a communicator and collaborator, a manager, and I will add also a teacher.

I would recommend the Sick Kids' and its team to any fellow or resident looking to gain medical expertise to work in an academic center. I believe this fellowship at Sick Kids' has undoubtedly benefit me tremendously to help me attain my goals and objectives to be working in an academic center, and I would be grateful to be able to keep in touch for future research and collaboration, which would ultimately lead to better care for our patients.

Best regards,

Lyne Chiniara

Adolescents with disorders of sex development (DSD): a study describing clinical and psychosocial characteristics

1. Background

Disorders of sex development (DSD) are a heterogeneous group of rare diseases. When including the full range of DSD, the prevalence is approximately 1 in 1500 births (Thyen 2006). They are defined as congenital conditions in which development of chromosomal, gonadal or anatomic sex is atypical (Lee 2006). As proposed by the international consensus group on management of intersex disorders, DSD disorders can be classified into three subgroups: sex chromosome DSD, 46,XX DSD, and 46,XY DSD.

Medical care of DSD patients has been controversial over the past 20 years and debates about the best way to care for these patients continue (Wherrett 2015, Frader 2004, Eugster 2004, Creighton 2004, Conte 2003). However, there is a commonly held view that the goal of DSD treatment is the long-term physical and psychological well-being of the patient (Mazur 2004, Berenbaum 2004, 2003, Krege 2000, Horowitz 1992, Kuhnle 1995), supported by providing patient-centered care (Kogan 2012, Lee 2006).

In order to provide optimal patient-centered care, physicians must understand main clinical outcomes and needs of patients with DSD. According to the 2006 Consensus Statement on management of intersex (now DSD) disorders (Lee 2006), long-term outcome in DSD should include external and internal genital phenotype, physical health including fertility, sexual function, and social and psychosexual adjustment, mental health, quality of life (QoL), and social participation. Reviews and studies about outcomes concerning DSD mainly focus on psychosexual and surgical outcomes (Kohler 2012, Lee 2012, Schonbucher 2012, Fagerholm 2012, Palmer 2012, Crawford 2009, Creighton 2001), especially in congenital adrenal hyperplasia (CAH) (Strandqvist 2014, Han 2013, Mnif 2012, Nordenstrom, 2011-2010, Nermoen 2010, Frisen 2009, Nordenskjold 2008), health related QoL (HRQoL) or mental health (Jurgensen 2013, Bleicken 2012, Reisch 2011, Johannsen 2006) (Table 1,2,3). In fact, to our knowledge, resilience in patients with DSD is a positive construct that has not been studied yet. Resilience can be defined as the capacity of individuals to overcome adversity and do well in spite of exposure to significant adversity. It is associated with individual capacities (for instance, cognitive skills, temperament, capacity to self-regulate and form attachments), relationships, and the availability of community resources and opportunities (Liebenberg 2012).

In summary, some studies suggest satisfactory psychosexual and QoL outcomes from early surgery; however, long-term data regarding sexual function and quality of life among those assigned female as well as male show great variability (Lee 2006). However, most studies were conducted with adult patients and investigated only special diagnostic groups, such as CAH, with a lack of standardized instruments (Lee 2012).

Table 1: Outcome studies in Adults with DSD

Authors	Country	Study group	Psychosexual findings	Surgical findings
Schonbucher 2012	Germany	46XY DSD from 21 studies (1974-2007)	In 4 studies: 75% bad outcomes (but only 4/13 standardized measures)	Variable Limited DSD-specific instruments - #sample
Fagerholm 2012, 2013	Finland	24 F (15 CAH , 9 CAIS) over 15yrs (18>18yrs) Compared to healthy controls	Good outcomes (sexual function, QoL)	Preferred early surgery
Kohler 2012	Germany	57 46XY DSD adults	44.2% anxieties related to sexual health	47.1% ↓ functional results 56.3% dyspareunia (CAIS: 70%)
Migeon 2002	US	39 adults 46 XY PAIS (5M, 9F) PGD (7M, 4F) 20-50yrs (mean:24yrs)	23% not satisfied with gender (5M, 4F) M and F equally satisfied about body image and sexuality	#Surgeries: M5.8 vs F2.1 (mean) ↑ satisfaction with early surgery

F=female, M=male, CAIS=Complete Androgen Insensitivity Syndrome, CAH=Congenital Adrenal Hyperplasia, PAIS=Partial Androgen Insensitivity Syndrome, PGD=Partial Gonadal Dysgenesis

Table 2: Outcome studies in Adults with CAH

Authors	Country	Study group (n)	Standardized measures used	Results
Warne 2005	Australia	50 18-32 yrs Matched with DB and Hirsprung	Yes	+ psychosocial and psychosexual outcomes M DSD ↓satisfaction w body image - sexual activity
Nordenstrom Nordenskjold 2008-10-11	Sweden	62 F 18-69 yrs	No	Vaginal stenosis 43%, severe 8% Correlation with initial virilization and genotype
Artl 2011	UK	203 138 CAH	Yes	QoL: 46 % ↓ vs age/sex matched controls Limitations general health
Finkelstein 2012	US	244	No	↓disease control, obesity, ↓metabolic outcome
Strandqvist 2013	Sweden	588, 335 F Case control	Epidemiologic	Married OR F 0.7 vs M 1.6 Disability OR 1.5 or sick leave Had less often children OR 0.3
Mnif 2012	Tunisia	26 CAH 15 F 27.4 ± 8.2 yrs	Yes	↓ QoL in 63.6% ↓ Adherence or overtreatment 30.7% obesity, 80.7 % final height ↓

DB=diabetes, +=positive, -=negative, OR=odds ratio, F=female, CAH=Congenital Adrenal Hyperplasia

Table 3: Quality of life studies in adults with DSD, adapted from Amaral et al 2015

Authors	Country	n	Main findings
Kuhn and Bullinger 1995, 1997	Germany	45	CAH = healthy controls
Jaaskelainen 2000	Finland	32	CAH > reference group
Johannsen 2006**	Denmark	70*	CAH < other DSD, emotion stress, ↓child.
Frisen 2009**	Sweden	62	CAH Mild < healthy controls, not signif
Nermoen 2010	Norway	47*	CAH impaired health status and working ability
Reisch 2011	Germany	45	CAH ↓ Women with primary adrenal insufficiency ↓↓↓↓
Fagerholm 2012	Germany	24*	N in both groups
Han 2013	UK	151	CAH ↓ = genotype (severity of the mutations) or phenotype (classic or nonclassic) adiposity, insulin resistance, use of corticotx
Amaral 2014	Brazil	144*	DSD = healthy controls late treatment ↓

*not only CAH participants, ** case control study, ***multicenter, N=normal, corticotx=corticosteroids, CAH=Congenital Adrenal Hyperplasia

Table 4: Outcome studies in pediatrics

Author	Country	Study group	Standardized measures	Psychosexual findings	Surgical findings
Gupta 2006	India	50 F CAH 4 -23 yrs (Mean 14.6) 19 >14 yrs	Yes for cosmetic /functional assessment No for psychosexual assessment	Gender identity F 45/50 Endo control + 36/50	Clitoroplasty: Cosmetic + 37/ 50. Vaginoplasty: + 14/19 (over 14yrs)
Sircili 2010	Brazil	52 M 46XY 7 M 46XX DSD, Median 22 yrs 14 < 18yrs	No	Adults: 87% sexually active, 64% normal sexual activity	46XY DSD : +masculinizing genitoplasty (89%), -: penile length, urinary sx, cx (urethral fistula 51%)
Gupta 2010	India	60 M DSD 15-25 yrs (Mean 19.3 ±3.7) Inclusion criteria unclear	Interviews	51/60 ok with Male gender 51/60 = good support system 9/60 =felt that fitted into society	28 =repeat genital surgery 42/60 worried for marriage and infertility

+ = positive, - = negative, F = female, CAH = Congenital Adrenal Hyperplasia, sx = Symptoms, cx = complications

Pediatric studies showed differing results. The German Network of DSD/intersexuality carried out a multi-centre clinical evaluation study on quality of life, gender identity, coping, treatment satisfaction and problems associated with diagnoses and therapies of 439 children, adolescents, their parents and adults with DSD (Lux 2009). Jürgensen *et al* (2013) assessed psychosexual development in 66 adolescents with DSD (aged 13-16 years, mean age 15 years, 59 females), using the Utrecht Gender Dysphoria Scale and DSD study questionnaire developed by the authors. They found that individuals with DSD did not have increased gender dysphoria. However, partnership and sexuality were identified as being difficult areas of life. In 2014, Jürgensen *et al* assessed QoL, gender identity and role, with standardized measures, in children from 8-12 years with CAH (n=33), CAIS and gonadal dysgenesis (n=8). Results showed lower self-esteem, physical and emotional well-being, and gender dysphoria in 6 girls with CAH. Kleinemeier *et al* (2010) studied 60 adolescents aged 13 to 16 years (29 CAH XX females, 7 CAIS or GD females, 18 XY-DSD females and 6 XY-DSD males) using validated QoL, body image, behavioral questionnaires. This study showed that the general psychological well-being of adolescents with DSD was not impaired. However, outcomes related to sexuality showed impairment, especially in girls with DSD. Zhu *et al* demonstrated that the QoL of 50 DSD patients (mean age 17.4) was impaired to varying degrees following DSD related surgery, and social limitations and psychological problems were observed when compared to healthy matched controls (Zhu 2012). However, they did not use a standardized validated QoL questionnaire. Yau *et al* published a recent study comparing health related QoL in 33 pediatric patients with CAH with pediatric patients with hypothyroidism, using the validated PedsQL questionnaire. Participants were aged 6 to 18 (mean age classic CAH 11.7 years, non-classic 13.6 years), and 82% of the 33 subjects had classic CAH and 51% of the 33 subjects were female. Results showed that QoL was adversely impaired in children with CAH when compared to the general population, with strong correlation between child self-report and parent report, but no significant difference in total scores between CAH and hypothyroidism groups. In summary, studies in the literature have limits: there are few studies in the pediatric population, most tend to focus on CAH patients and on surgical or psychosexual outcomes, some studies do not utilize validated and standardized measures, and prospective outcome studies are rare.

Adolescents with DSD are a population with specific issues such as pubertal development and awareness of condition. Also, the adolescent years hold key developmental tasks such as emerging maturity and independence, emotional and social development with intimate relationships and sexuality, to name a few. When faced with adversity and risk, some youth will thrive; these youth exhibit engagement in processes described as resilience (Liedenberg 2013). More studies are needed to better understand and counsel the adolescent patients with DSD and their families, especially regarding medical, surgical and psychosocial characteristics. This study would add to the current knowledge by focusing on both clinical and psychosocial outcomes in the specific adolescent population, reflecting multidisciplinary management, by using standardized and validated instruments. It would also be the first to assess resilience in adolescents with DSD.

1.1 Aim of the study

The aim of this study was to characterize adolescent patients with DSD followed by a multidisciplinary team dedicated to the care of children and adolescents with DSD, with regards

to medical, surgical and psychosocial characteristics, including quality of life and resilience.

1.2 Research questions

- 1) What are the characteristics of adolescents with DSD with regards to the 2006 consensus on management of DSD long-term outcomes?
- 2) Is there impairment in quality of life of adolescent DSD patients? If it is the case, are there factors impacting quality of life?

1.3 Objectives

Primary:

- 1) To describe clinical characteristics in the adolescent DSD population followed in the multidisciplinary uro-genital clinic in terms of:
 - a. Medical characteristics (external and internal genital phenotype, genetics, pubertal development)
 - b. Surgical characteristics (number and type of DSD related surgeries)
- 2) To describe psychosocial characteristics using validated questionnaires:
 - i. Behavioral and emotional concerns
 - ii. Gender identity and dysphoria
 - iii. Body image
 - iv. Resilience
- 3) To characterize resilience
- 4) To characterize quality of life in this population
- 5) To compare results of questionnaires with normative data available in the literature and other disease related populations.

Secondary:

- 1) To explore if factors, from clinical and/or demographic data, impact quality of life of adolescent DSD patients and/or resilience (for instance: ethnicity, socio-economic status, medication (Han 2014), diagnosis, number of DSD related surgeries)
- 2) To explore understanding of diagnosis and compliance

2. Methods

An observational cross-sectional study was conducted. Written informed consent has been obtained from all participants. Data will be collected and organized in two categories: 1) Medical and surgical data, 2) Psychosocial data.

2.1 Study group

The study group targeted outpatient adolescent patients with DSD. Recruitment took place at the Hospital for Sick Children in Toronto, between April 2016 and September 2016.

The Hospital for Sick Children established a team dedicated to the care of children and adolescents with disorders of sex development in 1999. Patients are seen in a monthly Multidisciplinary Uro-Genital (MUG) clinic and in rapid consultation when an infant with a suspected disorder of sex development is referred. Over 150 patients are followed in the clinic. Current team members are: Diane Wherrett, Endocrinology, Barbara Neilson, Social Work, Lisa Allen, Gynecology, Darius

Bagli, Urology, Walid Farhat, Urology, David Chitayat, Genetics, Riyana Babul-Hirji, Genetic Counselling, and Ken Zucker, Psychology.

2.1.1 Inclusion criteria

1. Confirmed diagnosis of DSD, as defined by the 2006 Consensus, by molecular genetic testing, laboratory results, or histology, or a clinical diagnosis by a physician.
2. Patients aged 12 to 18
3. Patients followed at the multi-disciplinary DSD clinic of Toronto's Hospital for Sick Children

2.1.2 Exclusion criteria

1. Known significant cognitive and developmental delay (as documented in the medical chart) and/or language barrier precluding participants to understand and complete the questionnaires, as well as to provide informed consent.

2.1.3 Recruitment

Eligible participants were recruited either during MUG outpatient clinics, during respective specialists clinics and by mail.

During clinics, eligible participants were approached by members of the research team; the study was presented and a package with consent forms and questionnaires was provided. Consenting participants had the option of filling out questionnaires while waiting for their appointment and handing back completed package in a sealed envelope, or mail it back in the postmarked envelope. For eligible participants not presenting to MUG or MUG specialists' clinics during the recruitment period, a study package was mailed. This package contained: an invitation letter signed by members of the MUG team, an information and consent form describing the research project in detail, questionnaires (see section 2.2.3) and a postmarked envelope. To maximize completeness of data, after two to three weeks, the research team extended a reminder by telephoning or by mailing participants. After one month, a second copy of the initial package was sent to all eligible participants, including those approached in clinic, if no questionnaire had been received. After another month, families were contacted for a second reminder. If no information was received after 3 months of reception of the initial package, these participants were coded as "no response". Patients that were unreachable (incorrect address, no answer to the research team phone calls, letters or emails) were coded as "not reached".

A 10\$ gift card will be offered to participants. They will also receive a certificate for "One hour of Volunteering Credit", to be used for their mandatory 40 hours of community service to obtain their Ontario Secondary School Diploma.

2.2 Data collection and materials

2.2.1 Medico-surgical data

A medical and surgical history was obtained by patient chart review. Data collected was organized according to major clinical issues: endocrine data, uro-genital surgical data (comprised of urologic and/or gynecologic data), genetic and genetic counseling data (please see Data Collection Form in Appendix). Data collected included:

Internal genitalia	External genitalia	Gender history	Genetics
Type of gonads (testis, ovary, ovotestis, dysgenetic)	Genital tubercle measurement	Gender announcement at birth	46, XY DSD 46, XX DSD Sex chromosome DSD
Localisation of gonads (inguinal, intraabdominal, labioscrotal folds, not found)	Fusion of labioscrotal folds	Gender of rearing	Karyotype result
Presence of Mullerian or Wolffian structures	Degree of virilisation (Prader scale)	Gender reassignment	Microarray, and other genetics testing results

Description of DSD-related surgery (number of surgeries, description of masculinizing or feminizing surgeries and their complications, exploratory surgery with biopsy or gonadectomy (with histopathology results, presence of malignancy), pubertal development (spontaneous, induced, concordant or not to gender of rearing) and medication was collected.

2.2.2 Demographic data

Parents/legal guardians completed a demographic survey (please see Appendix) composed of ethnicity (possibility of choosing multiple ethnic groups as used by Statistics Canada), highest education level of household, occupation, relationship status, and access to care (duration of travel to Hospital).

2.2.3 Psychosocial questionnaires

Existing validated questionnaires were used.

1) SCREENING OF EMOTIONAL AND BEHAVIORAL PROBLEMS

The Child Behavior Checklist (CBCL) (please see Appendix) was used to measure behavioral and emotional problems. It is part of the Achenbach System of Empirically Based Assessment (ASEBA, 2000). The Youth Self Report is filled out by the adolescent, and the school-age version (CBCL/6-18) for children aged 6 to 18 years, is completed by parents/legal guardians. Answers use a 3 point scale ranging from 0=not true to 2=very true or often true. Depending on age group and sex, Cronbach's alpha for the internalizing, externalizing, and total score scales range from .78 to .93 (Wallien 2008). The CBCL was chosen for its strong validity and reliability data, and for its broad range of screening for depressive and behavioural issues. Also, it has been studied and validated across multiple languages and cultural contexts, which is appropriate for Toronto's multicultural quality.

2) GENDER IDENTITY / GENDER DYSPHORIA

The validated Gender Identity Gender Dysphoria Questionnaire for Adolescents and Adults (North American Task Force on Intersexuality Research Protocol Working Group, Deogracias et al 2007, please see Appendix) was used. This dimensional measure of GD composed of 27 items. Each item is rated on a 5-point response scale for the previous 12 months, and parallel versions exist for both male and female patients. Lower scores indicate more gender dysphoria (Singh 2010). This questionnaire was chosen first for its strong discriminant validity with a Cronbach's alpha of .97 (Deogracias 2007), second because it was created and validated in North America. A second validity study was published in 2010 with control cases and confirmed findings of validity of the initial study. Finally, this is a free questionnaire that can be completed in 5-7 minutes, and normative data for healthy adolescents are available.

3) BODY IMAGE

To measure satisfaction with body features, the Body Image scale (Lindgren 1975, please see Appendix) was used. It is a self-assessment questionnaire for ages 12 and older, composed of 30 items divided in three scales: primary sex characteristics, secondary sex characteristics and neutral body parts. Each item is rated on a 5-point Likert scale, with lower scores indicating higher satisfaction with body (Lindgren 1975). We chose this questionnaire because it is quick to complete (about 10 minutes), free, but mainly because it has been used in German studies (Kleinemeier 2010, Lux 2009) with adolescents with DSD and healthy controls, allowing comparisons with this study's results. Other validated and well published Body Image questionnaires put more emphasis on weight and less on primary and secondary sex characteristics which are more appropriate to our study population, and had no comparative data, which is why we decided not to use them.

4) DSD SPECIFIC ITEMS

As no standardized and validated DSD-specific questionnaire exist to our knowledge, a questionnaire on DSD-specific items was used (please see Appendix), based on studies by Kleinemeier and Kanhere (respectively 2010 and 2015). Items assess coping with DSD, shame/stigmatization, compliance and basic understanding of underlying condition. In order to maximize completion of these questions, "DSD" has been changed for "condition" or "reason why I am followed at MUG clinic" because some participants may not understand the meaning of DSD or urogenital condition.

5) RESILIENCE

The validated Child and Youth Resilience Measure (CYRM, Unger and Liebenberg 2011) was used to measure resilience. This 28-item is a self-report instrument validated with youth from 10-23 from 11 countries. Items are rated on a 5-point Likert scale from 1=*does not describe me at all* to 5=*describes me a lot*. Higher scores indicate higher levels of resilience. This scale is composed of three subcategories influencing resilience processes; individual traits, relationship to caregiver(s), and contextual factors that facilitate a sense of belonging, with Cronbach's alpha of .803, .833 and .794, respectively. This instrument was chosen because it has been validated across cultures and on Canadian youth, has good internal reliability and has norming data for comparison.

6) QUALITY OF LIFE

The validated Pediatric Quality of Life Inventory (PedsQL 4.0 Generic Core Scales, Varni 2001, 2003) was used to measure health-related QoL. This questionnaire measure consists of a child report (ages 5-18 years) and a parent report (ages 2-18 years), and can be used for healthy children and those with acute and chronic health conditions. Its content was designed to measure the core health dimensions outlined by the World Health Organisation (Hullmann 2011): physical, emotional, social, and school functioning are assessed in 23 items for the total scale score. Items are rated on a 5 point ordinal scale from 0 (never) to 4 (almost always), and higher scores indicate better health related QoL. This questionnaire was chosen for its strong internal consistency (total scale: Cronbach's alpha of 0.91 for the child self-report, Cronbach's alpha of 0.93 for the parent-proxy report) and its practicality (completion in 4 minutes, questions written at a third to sixth grade reading level) (Hullmann 2011). Also, it has been widely used in pediatric research, allowing comparison with published data on mean scores for the healthy pediatric population (Varni 2005), and for pediatric patients with thyroid cancer (Oren 2012) and type 1 diabetes (Sud 2011). Participants for the Oren and Sud studies were drawn from clinics at Sick Kids, allowing comparison between participants from the same general population; both groups have offered to share their data. The 36 items Family Impact Module of the PedQL 3.0 was also used to assess family function.

3. Data analysis and statistics

P values < 0.05 will be considered statistically significant. For all statistical analyses, SPSS version 21.0.0 statistical software will be used, with the assistance of a statistician.

3.1 Descriptive statistics

Means (with SD) will be calculated with standard deviation.

3.2 Comparative analysis

The concordance between child self-report and parent self-report for the CBCL and the PedsQL will be determined through Pearson's correlation coefficients.

Although knowing that our sample size will probably be small, we will try to evaluate if correlations exist between medical/surgical/demographic variables (independent variables) and Psychosocial tests results (dependant). ANOVA one-way (if more than 2 groups) will be used for categorical dependant variables (nominal and ordinal) such as: diagnosis degree of initial virilisation, number of DSD related surgeries, socio-economic status. Student t-test will be used for 2 groups and continuous or ordinal dependant variables. Simple linear regression will be used to evaluate if a correlation exists between continuous dependent variables (for example: score) and continuous or ordinal independent variables. Residuals will be studied to make sure they are normally distributed for the model to be adequate to reality. χ^2 test of Pearson will be used for nominal dependant variables (sex or rearing, need for gender reassignment) and continuous or categorical independent variables (Psychosocial test result) for comparisons of 2 groups. Bonferroni corrections will be used to control for multiple comparisons.

4. Ethical considerations

Approval was obtained from the Hospital for Sick Children REB. Informed consent was obtained from parents/legal guardians or capable participants, with assent when the adolescents were not able to provide consent for themselves.

5. Research progress

The data collection is still ongoing; I will send you an updated Results section with figures and tables once completed.

For now, from 40 eligible participants, 16 participated and filled out questionnaires (participation 40%):

- 2 potential participants' parents found the overall topic of DSDs, body image, gender dysphoria, too sensitive for their adolescent and decided not to participate, although adolescents with capacity should have been the ones making that decision
- 1 participant declined participation because of time consumption and lack of interest in the project
- 1 participant left Toronto for university
- 4 said they would participate but no packages were received
- 16 were contacted by phone multiple times but never answered or called back.

5.1 Demographic data and chart review (complete results will be available in table):

- Age: between 12-18 years (mean 15.2 years SD 1.8)
- 12 participants were female (75%):
 - 10 had a diagnosis of CAH (1 with HSD3B2)
 - 1 had CAIS
 - 1 had campomelic dysplasia
- 4 were males:
 - 1 had hypogonadotropic hypogonadism
 - 2 had unspecified disorder of undervirilization
 - 1 had 17BHSD
- Surgical data:
 - Of 16 participants, all but 1 had DSD related surgeries (this participant had CAH), number of surgeries was between 1 and 3 (mean: 1.57 SD 0.9, median and mode=1) with 3 participants having had 3 DSD related surgeries, and 3 participants having had 2 DSD related surgeries.
 - 3 had bilateral gonadectomies: 1 patient with CAIS, one with gonadal dysgenesis due to campomelic dysplasia, 1 with 17beta-HSD
 - Of the female participants: 6 had feminizing surgery, 3 urogenital sinus mobilization, 6 clitoral reduction (2 with corporal sparing), 5 flap vaginoplasty, 4 labioplasty
 - Of the male participants: 2 had masculinizing surgery, 3 had hypospadias with surgery for correction, 3 had orchidopexy single stage without repeat surgery.

5.2 Psychosocial questionnaires

Results not available yet but will be sent when completed.

For some preliminary results:

- GIGD questionnaire: one male participant with unspecified disorder of undervirilization showed results compatible with GD. All other participants did not show GD on the questionnaire.
- PedsQL questionnaire: only one participant with campomelic dysplasia had scored items compatible with reduced quality of life.
- Resiliency scale: available data show high resiliency.
- Body image scale: Female: 1 participant with CAH scored “very dissatisfied” with primary and secondary sexual characteristics, 5 scored “neutral” and 2 “preferred not to answer” for external genitalia, 3 were dissatisfied with “breasts”. Male: 1 was dissatisfied with “penis”, all other items were scored “satisfied” or “neutral”.
- DSD specific questionnaire for adolescents:
 - all but 5 described the “reason I am followed at MUG clinic” by their specific diagnosis (CAH, CAIS). The remaining 5 answered: endocrinology/urology (2), no answer (3: 17 beta HSD deficiency, 2: disorders of undervirilization). All but 3 report a good understanding of their underlying condition (2 preferred not to answer and 1 scored for “I understanding a little”).
 - all but one (17 beta HSD deficiency) knew about their diagnosis
 - all felt comfortable talking about their condition to their parents but one (with CAH), but only 5 felt comfortable talking to friends.
 - 3 admitted to missing to take their medications more than once a week, reason described was “forgetting”.

5.3 Strengths

This study would add to the current knowledge in a specific population of adolescents with DSD, in keeping with the 2006 consensus on management of patients with DSD. Experts in the field carefully chose the psychosocial questionnaires to increase validity of data collected, while not compromising convenience for families. Knowing the methodological limits of our study, we will explore if differences exist between psychosocial tests results between groups of different DSD diagnosis, different socioeconomic status, number of DSD related surgeries.

One participant scored positively on the GD questionnaire, although this issue was never raised in clinic visits. This reinforces the importance of always screening for GD in clinic, remind adolescents that visits are confidential, and involve the psychosocial team in the care of patients with DSDs.

5.4 Limits

We anticipated a sample size of 20-30: larger multicenter studies of adolescents with DSD had sample sizes up to 60 (Kleinemeier 2010). However, this study’s design is observational and descriptive, and less emphasis will be put on inference statistics for which larger sample size are preferred.

We anticipated a larger sample size: when approached in clinic, or when communication was successful by phone, potential participants were more likely to accept participation. 16 potential participants were not reached by phone and did not have a clinic appointment (some patients are seen only once a year or once every 2 years). Although approved by the REB, some parents found questionnaires to be too sensitive.

Moreover, there were missing data from the retrospective chart review.

6. Timeline

JANUARY 2016:

- Research Ethics Board application

APRIL 2016-OCTOBER 2016:

- Data collection

OCTOBER 2016-SPRING 2017

- Data analysis: statistics and discussion

SUMMER 2017:

- Manuscript to complete and submit to peer reviewed journal

7. Conclusion

We believe this study will give us insight into important medico-surgical and psychosocial outcomes of adolescent with DSD, to help better cater to their needs in a patient-centered approach. More studies will be needed with larger cohorts, followed prospectively, and other important issues need to be studied such as needs and concerns for transition to adult health care and fertility.

8. References

- 1) Thyen U, Lanz K, Holterhus PM, Hiort O. Epidemiology and initial management of ambiguous genitalia at birth in Germany. *Horm Res* 2006;66(4):195-203.
- 2) Lee P, Houk P, Ahmed F, Hughes I, in collaboration with the participants in the International Consensus Conference on Intersex organized by the Lawson Wilkins Pediatric Endocrine Society and the European Society for Paediatric Endocrinology. Consensus Statement on Management of Intersex Disorders. *Pediatrics* 2006;118:e488-e500, DOI: 10.1542/peds.2006-0738
- 3) Wherrett DK. Approach to the infant with a suspected disorder of sex development. *Pediatr Clin North Am* 2015 Aug;62(4):983-99. doi: 10.1016/j.pcl.2015.04.011.
- 4) Frader J, Alderson P, Asch A, Aspinall C, Davis D, Dreger A, Edwards J, Feder EK, Frank A, Abelow Hedley L, Kittay E, Marsh J, Miller PS, Mouradian W, Nelson H, Parens E. Health care professionals and intersex conditions. *Arch Pediatr Adolesc Med* 2004;158:424-8.
- 5) Eugster E. Reality vs recommendations in the care of infants with intersex conditions. *Arch Pediatr Adolesc Med* 2004;158(5):428-9.
- 6) Creighton S, Liao L. Changing attitudes to sex assignment in intersex. *BJU Int* 2004;93(5):659-64.
- 7) Conte F, Grumbach M. Diagnosis and management of ambiguous external genitalia. *The Endocrinologist* 2003;13(3):260-8.
- 8) Mazur T, Sandberg D, Perrin M, Gallagher J, MacGillivray M. Male pseudohermaphroditism: Long-term quality of life outcome in five 46,XY individuals reared female. *J Pediatr Endocrinol Metab* 2004;17(6):809-23.
- 9) Berenbaum S, Korman Bryk K, Duck S, Resnick S. Psychological adjustment in children and adults with congenital adrenal hyperplasia. *J Pediatr* 2004;144(6):741 -6.
- 10) Berenbaum S, Bailey J. Effects on gender identity of prenatal androgens and genital appearance: Evidence from girls with congenital adrenal hyperplasia. *J Clin Endocrinol Metab* 2003;88(3):1102-6.
- 11) Kregel S, Walz K, Hauffa B, Korner I, Rubben H. Long-term follow-up of female patients with congenital adrenal hyperplasia from 21-hydroxylase deficiency, with special emphasis on the results of vaginoplasty. *BJU Int* 2000;86(3):253-8; discussion 258-9.
- 12) Horowitz M, Glassberg K. Ambiguous genitalia: Diagnosis, evaluation, and treatment. *Urol Radiol* 1992;14(4):306-18.
- 13) Kuhnle U, Bullinger M, Schwarz H. The quality of life in adult female patients with congenital adrenal hyperplasia: A comprehensive study of the impact of genital malformations and chronic disease on female patients' life. *Eur J Pediatr* 1995;154(9):708-16
- 14) Kogan BA, Gardner M, Alpern AN, Cohen LM, Grimley MB, Quittner AL, Sandberg DE. Challenges of disorders of sex development: diverse perceptions across stakeholders. *Horm Res Paediatr* 2012; 78(1):40-6

- 15) Kohler B, Kleinemeier E, Lux A, Hiort O, Gruters A, Thyen U. DSD Network Working Group. Satisfaction with genital surgery and sexual life of adults with XY disorders of sex development: results from the German clinical evaluation study. *J Clin Endocrinol Metab* 2012; 97(2):577-88
- 16) Lee P, Schober J, Nordenstrom A, Hoebeke P, Houk C, Looijenga L, Manzoni G, Reiner W, Woodhouse C. Review of recent outcome data of disorders of sex development (DSD): Emphasis on surgical and sexual outcomes, *J Pediatr Urol* 2012;8, 611e615
- 17) Schonbucher V, Schweizer K, Rustige L, Schutzmann K, Brunner F, Richter-Appelt H. Sexual quality of life of individuals with 46,XY disorders of sex development. *J Sex Med* 2012;9(12):3154-70.
- 18) Fagerholm R, Mattila AK, Roine RP, Sintonen H, Taskinen S. Mental health and quality of life after feminizing genitoplasty, *J Pediatr Surg* 2012; 47(4):747-51
- 19) Palmer BW, Wisniewski AB, Schaeffer TL, Mallappa A, Tryggestad JB, Krishnan S, Chalmers LJ, Copeland K, Chernausek SD, Reiner WG, Kropp BP. A model of delivering multi-disciplinary care to people with 46 XY DSD. *J Pediatr Urol* 2012; 8(1):7-16
- 20) Crawford JM, Warne G, Grover S, Southwell BR, Hutson JM. Results from a pediatric surgical centre justify early intervention in disorders of sex development. *J Pediatr Surg* 2009;44(2):413-6
- 21) Creighton S, Minto C, Steele S. Objective cosmetic and anatomical outcomes at adolescence of feminising surgery for ambiguous genitalia done in childhood. *Lancet* 2001;358(9276):124-5
- 22) Strandqvist A, Falhammar H, Lichtenstein P, Hirschberg AL, Wedell A, Norrby C, Nordenskjold A, Frisen L, Nordenstrom A. Suboptimal psychosocial outcomes in patients with congenital adrenal hyperplasia: epidemiological studies in a nonbiased national cohort in Sweden. *J Clin Endocrinol Metab* 2014;99(4):1425-32
- 23) Han TS, Krone N, Willis DS, Conway GS, Hahner S, Rees DA, Stimson RH, Walker BR, Arlt W, Ross RJ, United Kingdom Congenital adrenal Hyperplasia Adult Study Executive (CaHASE). Quality of life in adults with congenital adrenal hyperplasia relates to glucocorticoid treatment, adiposity and insulin resistance: United Kingdom Congenital adrenal Hyperplasia Adult Study Executive (CaHASE). *Eur J Endocrinol* 2013;168(6):887-93
- 24) Mnif MF, Kamoun M, Mnif F, Charfi N, Kallel N, Ben Naceur B, Rekik N, Mnif Z, Sfar MH, Sfar MT, Hachicha M, Keskes LA, Abid M. Long-term outcome of patients with congenital adrenal hyperplasia due to 21-hydroxylase deficiency. *Am J Med Sci* 2012;344(5):363-73
- 25) Nordenstrom A. Adult women with 21-hydroxylase deficient congenital adrenal hyperplasia, surgical and psychological aspects. *Curr Opin Pediatr* 2011; 23(4):436-42
- 26) Nordenstrom A, Frisen L, Falhammar H, Filipsson H, Holmdahl G, Janson PO, Thoren M, Hagenfeldt K, Nordenskjold A. Sexual function and surgical outcome in women with congenital adrenal hyperplasia due to CYP21A2 deficiency: clinical perspective and the patients' perception. *J Clin Endocrinol Metab* 2010; 95(8):3633-40
- 27) Neramoen I, Husebye ES, Svartberg J, Lovas K. subjective health status in men and women with congenital adrenal hyperplasia: a population-based survey in Norway. *Eur J Endocrinol* 2010;163(3):453-9
- 28) Frisen L, Nordenstrom A, Falhammar H, Filipsson H, Holmdahl G, Janson PO, Thoren M, Hagenfeldt K, Moller A, Nordenskjold A. Gender role behavior, sexuality, and psychosocial adaptation in women with congenital adrenal hyperplasia due to CYP21A2 deficiency, *J Clin Endocrinol Metab* 2009; 94(9):3432-9
- 29) Nordenskjold A, Holmdahl G, Frisen L, Falhammar H, Filipsson H, Thoren M, Janson PO, Hagenfeldt K. Type of mutation and surgical procedure affect long-term quality of life for women with congenital adrenal hyperplasia. *J Clin Endocrinol Metab* 2008; 93(2):380-6
- 30) Jürgensen M, Kleinemeier E, Lux A, Steensma TD, Cohen-Kettenis PT, Hiort O, Thyen U, Köhler B, and the DSD Network Working Group. Psychosexual development in adolescents and adults with disorders of sex development—Results from the German Clinical Evaluation Study. *J Sex Med* 2013;10:2703–2714.
- 31) Bleicken B, Ventz M, Hinz A, Quinkler M. Improvement of health-related quality of life in adult women with 21-hydroxylase deficiency over a seven-year period. *Endocr J* 2012; 59(10):931-9
- 32) Reisch N, Hahner S, Bleicken B, Flade L, Pedrosa Gil F, Loeffler M, Ventz M, Hinz A, Beuschlein F, Allolio B, Reincke M, Quinkler M. Quality of life is less impaired in adults with congenital adrenal hyperplasia because of 21-hydroxylase deficiency than in patients with primary adrenal insufficiency. *Clin Endocrinol* 2011; 74(2):166-73
- 33) Johanssen TH, Ripa CP, Mortensen EL, Main KM. Quality of life in 70 women with disorders of sex development. *Eur J Endocrinol*. 2006;155:877-85
- 34) Lux A, Kropf S, Kleinemeier E, Jurgensen M, Thyen U, DSD Network Working Group. Clinical evaluation study of the German network of disorders of sex development (DSD)/intersexuality: study design, description of the study population, and data quality. *BMC Public Health* 2009;9:110
- 35) Fagerholm R, Rintala R, Taskinen S. Lower urinary tract symptoms after feminizing genitoplasty. *J Pediatr Urol* 2013 Feb;9(1):23-6.

- 36) Migeon CJ, Wisniewski AB, Gearhart JP, Meyer-Bahlburg H, Rock JA, Brown TD, Casella SJ, Maret A, Ngai KM, Money J, Berkovitz GD. Ambiguous Genitalia With Perineoscrotal Hypospadias in 46,XY Individuals: Long-Term Medical, Surgical, and Psychosexual Outcome. *Pediatrics* 2002;110(3)
- 37) Warne G, Grover S, Hutson J, Sinclair A, Metcalfe S, Northam E, Freeman J, Murdoch Children's Research Institute Sex Study Group. A long-term outcome study of intersex conditions. *J Pediatr Endocrinol Metab* 2005 Jun;18(6):555-67
- 38) Arlt W, Willis DS, Wild SH, Krone N, Doherty EJ, Hahner S, et al. United Kingdom Congenital Adrenal Hyperplasia Adult Study Executive (CaHASE). Health status of adults with congenital adrenal hyperplasia: a cohort study of 203 patients. *J Clin Endocrinol Metab* 2010;95(11):5110e21
- 39) Finkelstein GP, Kim MS, Sinai N, Nishitani M, Van Ryzin C, Hill SC, Reynolds JC, Hanna RM & Merke DP. Clinical characteristics of a cohort of 244 patients with congenital adrenal hyperplasia. *J Clin Endocrinol Metab* 2012 97 4429–4438.
- 40) Amaral RC, Inacio M, Brito VN, Bachega T, Domenice S, Arnhold I, Madureira G, Gomes L, Costa E, Mendonca B. Quality of life of patients with 46,XX and 46,XY disorders of sex development. *Clin Endocrinol* 2015; 82, 159–164
- 41) Gupta DK, Shilpa S, Amini AC, Gupta M, Aggarwal G, Deepika G, Kamlesh K. Congenital adrenal hyperplasia: long-term evaluation of feminizing genitoplasty and psychosocial aspects. *Pediatr Surg Int* (2006) 22:905–909
- 42) Sircili MH, Silva FA, Costa EM, Brito VN, Arnhold IJ, Denes FT, Inacio M, de Mendonca BB. Long-term surgical outcome of masculinizing genitoplasty in large cohort of patients with disorders of sex development. *J Urol* 2010 Sep;184(3):1122e7
- 43) Gupta D, Bhardwaj M, Sharma S, Ammini AC, Gupta DK. Longterm psychosocial adjustments, satisfaction related to gender and the family equations in disorders of sexual differentiation with male sex assignment. *Pediatr Surg Int* 2010 Oct;26(10):955e8.
- 44) Nordenström A. Psychosocial Factors in DSD in a long-term perspective: what clinical opportunities are there to intervene? *Horm Metab Res* 2015; 47: 351–356
- 45) Zhu D, Hu L, Wan X, Li H, You Q, Gao L, Feng J. Quality of life evaluation in juveniles with disorders of sexual development. *Pediatr Surg Int* 2012; 28(11):1119-23.
- 46) Kleinemeier E, Jurgensen M, Lux A, Widenka PM, Thyen U. Disorders of Sex Development Network Working Group, Psychological adjustment and sexual development of adolescents with disorders of sex development. *J Adolesc Health* 2010; 47(5):463-71.
- 47) Yau M, Vogiatzi M, Lewkowicz-Shpuntoff A, Nimkarn S, Lin-Su K. Health-Related Quality of Life in Children with Congenital Adrenal Hyperplasia *Horm Res Paediatr* 2015;84:165-171
- 48) Han TS, Walker BR, Arlt W, Ross RJ. Treatment and health outcomes in adults with congenital adrenal hyperplasia. *Nat Rev Endocrinol* 2014;10(2):115-24.
- 49) Achenbach, T.M., & Rescorla, L.A. (2000). Manual for the ASEBA Preschool forms and Profiles. Burlington, VT: University of Vermont Department of Psychiatry
- 50) Wallien M, Cohen-Kettenis P. Psychosexual Outcome of Gender Dysphoric Children. *J. Am. Acad. Child and Adolesc. Psychiatry*, 2008;47(12):1413Y1423
- 51) Deogracias JJ, Johnson LL, Meyer-Bahlburg HF, Kessler SJ, Schober JM, Zucker KJ. The gender identity/gender dysphoria questionnaire for adolescents and adults. *J Sex Res*. 2007 Nov;44(4):370-9
- 52) Singh D, Deogracias JJ, Johnson LL, Bradley SJ, Kibblewhite SJ, Owen-Anderson A, Peterson-Badali M, Meyer-Bahlburg HF, Zucker KJ. The gender identity/gender dysphoria questionnaire for adolescents and adults: further validity evidence. *J Sex Res*. 2010 Jan;47(1):49-58
- 53) Lindgren TW, Pauly IB. A body image scale for evaluating transsexuals. *Arch Sex Behav*. 1975;4(6):639-56
- 54) Kanhere M, Fuqua J, Rink R, Houk C, Mauger D, Lee P. Psychosexual development and quality of life outcomes in females with congenital adrenal hyperplasia. *Int J Pediatr Endocrinol* 2015:21
- 55) Varni JW, Seid M, Kurtin PS: PedsQL 4.0: reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Med Care* 2001; 39: 800–812.
- 56) Varni JW, Burwinkle TM, Seid M, Skarr D: The PedsQL 4.0 as a pediatric population health measure: feasibility, reliability, and validity. *Ambul Pediatr* 2003; 3: 329–341.
- 57) Hullmann SE, Ryan JL, Ramsey RR, Chaney JM, Mullins LL. Measures of general pediatric quality of life: Child Health Questionnaire (CHQ), DISABKIDS Chronic Generic Measure (DCGM), KINDL-R, Pediatric Quality of Life Inventory (PedsQL) 4.0 Generic Core Scales, and Quality of My Life Questionnaire (QoML). *Arthritis Care Res* (Hoboken). 2011 Nov;63 Suppl 11:S420-30.
- 58) Varni JW, Burwinkle TM, Seid M: The PedsQL as a pediatric patient-reported outcome: reliability and validity of the PedsQL Measurement Model in 25,000 children. *Expert Rev Pharmacoecon Outcomes Res* 2005; 5: 705–719

- 59) Oren A1, Benoit MA, Murphy A, Schulte F, Hamilton J. Quality of life and anxiety in adolescents with differentiated thyroid cancer. *J Clin Endocrinol Metab* 2012 Oct;97(10):E1933-7
- 60) Sud S, Marcon M, Assor E, Daneman D and Mahmud FH. Quality of life in children with diabetes and celiac disease: minimal impact of the 'double diagnosis'. *Pediatr Diabetes* 2012; 13: 163–169.
- 61) Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009 Apr;42(2):377-81
- 62) Liebenberg, L., Ungar, M., Van de Vijver, F. Validation of the Child and Youth Resilience Measure-28 (CYRM-28) among Canadian youth. *Research of Social Work Practice* 2012;22(2), 219-226.
- 63) Liebenberg, L., Ungar, M.,). Assessing resilience across cultures using mixed methods: Construction of the Child and Youth Resilience Measure. *Journal of Multiple Methods in Research* 2011;5(2), 126–149.
- 64) Liebenberg, L., Ungar, M., LeBlanc, J. C.. The CYRM-12: A brief measure of resilience. *Canadian Journal of Public Health* 2013;104(2), 131-135

Abstract submitted for the 10th International Meeting of Pediatric Endocrinology

What are the perspectives among transgender youth and their parents regarding future fertility? Insights from the Fertility and Reproductive Health Survey of Transgender Youth (FROST) study

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Objective

Fertility is an important topic for patients, families, and care providers when considering medical and/or surgical treatment for gender dysphoria (GD). The aim of this study was to investigate the perspectives of youth with GD and their parents concerning fertility and future parenthood.

Methods

A prospective, questionnaire-based study among transgender youth and their parents designed to collect baseline demographic information, knowledge of potential effects of treatments on fertility, current and perceived future life priorities, and preferences regarding future fertility/parenting options.

Results

A total of 61 youth (82% female bodied youth (FBY), 18% male bodied youth (MBY), 70% between ages 16-18 years, 26% between 13-15 years) and 56 parents participated. 47 youth identified as male, 10 as female, and 4 as non-binary. The top three current life priorities for youth were: (1) *Being in good health*, (2) *Have lots of friends* and (3) *Do well in school/work*. The least important

priority was *Having children*. This was ranked last by 58% of FBY and 64% of MBY. Perceived life priorities in 10 years were ranked similarly. Parents' rankings paralleled the youth responses in terms of their top three current priorities for their child. Similarly, parents ranked having children as the lowest current life priority but ranked it a much higher priority for the FBY but not MBY youth in 10 years.

The majority of youth (68% FBY, 73% MBY) want to be a parent in the future. However, most do not envision having a biological child. A large majority (72% FBY, 82% MBY) were open to adoption with smaller numbers open to surrogacy and fewer still considering sperm or egg donation.

All youth knew treatment with cross-sex hormones could alter future fertility but only 6% of FBY and no MBY would delay start of hormone blockers or cross-sex hormones to pursue potential treatments to preserve fertility.

Conclusion

Fertility is a low current and future life priority for transgender youth. Fertility is also a low current priority for parents, although parents of FBY view it as a higher future life priority. The majority of youth wish to become parents but are open to alternative strategies for building a family. Further studies are needed to assess if youths' life priorities change over time.

Abstract submitted for the 10th International Meeting of Pediatric Endocrinology

Guideline-driven laboratory testing in the care of transgender youth: Are all the recommended tests really needed?

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Objectives

Published guidelines addressing the care of transgender youth call for acquisition of many baseline and post-treatment laboratory tests. The aim of this project was to assess the utility of this routine testing.

Methods

Charts from 203 transgender adolescents were reviewed to obtain baseline demographic data and results of blood tests. Baseline blood tests were performed at the initial visit and included hormonal, renal, hepatic and hematologic tests ; suppression labs (LH, FSH, testosterone, estradiol) were performed while on leuprolide acetate (Lupron depot) ; and safety labs (repeat of baseline testing) were performed while on cross-sex hormones to evaluate sex steroid levels and screen for potential complications. Data were analyzed with descriptive statistics, and paired t-tests were used for comparing baseline and follow-up tests.

Results

156 female bodied youth (FBY) and 47 male bodied youth (MBY) were included. Mean age at presentation was 16.3 years SD 1.63 for FBY and 16.1 years SD 1.70 for MBY. Mean bone age was 15.9 years in both FBY (SD 1.3) and MBY (SD 2.2). In 9 FBY (7.7%) and 2 MBY (6.5%), bone age was advanced

more than 2 SD. Mean Tanner stage was 4.4 SD .8 for FBY (B4P4, median 5, mode 5) and 4.0 SD 1.1 for MBY (G4P4, median 4, Mode 5). Baseline blood tests showed no abnormal hormonal results except in one youth with elevated FSH who was subsequently found to have Klinefelter syndrome. In 6 (4.5%) FBY, testosterone levels were slightly high (max value: 2.5 nmol/L) according to sex and Tanner stage norms. Suppression blood tests showed adequate suppression for LH and FSH in all youth. Safety tests did not reveal the development of any clinically significant abnormalities while on sex hormone therapy. However, statistically significant differences in hemoglobin levels (increased in FBY on testosterone $p=.002$, decreased in MBY on estradiol $p=.019$) and in red blood cell count ($p=0.000$; increased in FBY and decreased in MBY) were observed.

Conclusion

Our results need to be corroborated by additional studies. However, the results suggest that much of the routine testing recommended in care guidelines may not be warranted. Reducing unnecessary testing could improve both care for transgender youth and resource utilization.

Abstract (manuscript in preparation):

Adolescents followed at the Transgender Youth Clinic: mood disorders and suicidal risk profile

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Objective

The aim of this project is to improve the quality of care and safety of transgender youth with regards to screening of mood disorders and suicidal risk. We assessed findings from baseline and follow-up screening tests for mood disorders and suicidal risk in order to determine if the mood profile of the youth changes with follow-up by a specialized multidisciplinary team and pubertal blockers.

Methods

Charts from 203 transgender adolescents were reviewed retrospectively to obtain baseline demographic data and results of baseline and follow-up validated psychosocial questionnaires : Beck Depression Index (BDI) for screening of depression, Multidimensional Anxiety Scale for Children (MASC2) for anxiety disorders and Utrecht scale for gender dysphoria. Baseline tests were filled in before the initial visit, and follow-up tests were administered before starting cross-sex hormones. Data was analyzed with descriptive statistics according to natal sex and Tanner stage. Paired t-test was used for comparing baseline and follow-up tests.

Results

156 female bodied youth (FBY) and 47 male bodied youth (MBY) were included. Mean age at presentation was 16.3 years SD 1.63 for FBY and 16.1 years SD 1.70 for MBY.

37.4% of youth self reported a depressive disorder, 28.1% an anxiety disorder, 33% suicidal thoughts, 30.5% self harm, and 64.5% were prescribed medication for a mood disorder, at present or in the past. Baseline BDI scores showed severe depression in 34.4% of MDY and 41.6% of FBY. On follow-up questionnaires, the BDI showed no reduction in scores in MBY, and a non-statistically significant reduction in FBY ($p=.513$, 36.8% severe depression). One item of the BDI screened for suicide risk ; 9.7% of MBY and 9.6% of FBY scored positive on the baseline BDI. However, on the follow-up questionnaire, none of the youth scored positive on this item.

Baseline MASC2 showed abnormal results in 30% of MBY and 44.4% of FBY. On follow-up, there was no statistically significant reduction in scores in MBY or FBY (abnormal MASC2 in 31.6% of FBY). Baseline and follow-up Utrecht scale showed abnormal results in 100% of the youth (Mean score : MBY 50.43 SD 7.37, FBY: 56.13 SD 4.19).

Conclusion (442)

This study shows that mood disorders and suicidal risk are significant in transgender adolescents and should be followed throughout care as no significant reduction in scores between baseline and follow-up test was observed in both MBY and FBY. Suicidal risk should be assessed continuously but seems to be significantly reduced on follow-up ; a larger prospective study should be conducted to corroborate these results.