Health Watch Table — 22q11.2 Deletion Syndrome [a]

Forster-Gibson and Berg 2011

CONSIDERATIONS	RECOMMENDATIONS
1. HEENT (HEAD, EYES, EARS, NOSE, THROAT)	
Children and Adults: ~ 15% have strabismus in addition to other ocular issues (e.g., cataracts, retinal problems) Conductive and/or sensorineural hearing loss (often unilateral) occur in ~ 45% and ~ 10% respectively Most have chronic otitis media There is an increased frequency of velopharyngeal insufficiency (VPI) that is often associated with hyper-nasal speech, some of whom have submucosal cleft palate, and a small minority have overt cleft palate which can lead to nasal regurgitation	☐ Refer to an ophthalmologist for assessment at diagnosis and during preschool years ☐ Refer to an audiologist for evaluation in infancy (or when diagnosed) and every 6 months up to 8 years of age, then annually until adulthood, then according to DD Guideline 11 [1] ☐ Examine the palate in infancy and evaluate for feeding problems and/or nasal regurgitation and, if warranted by clinical findings, refer to a cleft palate team ☐ Refer to a speech and language pathologist for assessment by 1 year of age, sooner if warranted or when diagnosis is made ☐ Evaluate nasal speech quality ☐ Often need regular ear cleaning to remove cerumen
2. DENTAL	
Children and Adults: Retrognathia (over-bite) is common and may cause dental malocclusion Significant dental issues are a recognized part of the syndrome	☐ Refer to a dentist in early childhood ☐ Advocate and ensure for appropriate dental care
3. CARDIOVASCULAR	
Children and Adults: ~ 40% have congenital heart defects, most commonly of the conotruncal type (e.g., Tetralogy of Fallot, Interrupted Aortic Arch, Ventricular Septal Defect)	☐ At the time of diagnosis, complete a cardiovascular assessment, including EKG and echocardiogram ☐ Refer to a cardiologist as warranted by clinical findings
4. RESPIRATORY	
Children: Congenital malformations may lead to upper and/or lower airway obstructions and obstructive sleep apnea (OSA) Most airway concerns resolve spontaneously with time but some require surgical intervention (e.g., Robin sequence)	☐ Refer to an ENT surgeon for evaluation as warranted by clinical findings ☐ Undertake a sleep study in infancy and then as warranted by clinical findings after 3 years of age ☐ Consider a pre-op anesthesia consultation regarding narrow airways prior to the first surgery
Adults: In order of prevalence, there is an increased frequency of recurrent pneumonia, atelectasis, asthma, and chronic obstructive pulmonary disease Those with uncorrected congenital malformations remain at risk for OSA	☐ Consider periodic pulmonary function studies and referral to a respirologist as warranted by clinical findings ☐ Undertake sleep study as warranted by clinical findings

[a] Includes: DiGeorge Syndrome (DGS), Velocardiofacial Syndrome (VCFS), Shprintzen Syndrome, Conotruncal Anomaly Face Syndrome (CTAF), Caylor Cardiofacial Syndrome, and Autosomal Dominant Opitz G/BBB Syndrome

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5. GASTROINTESTINAL	
Children and Adults: Feeding difficulties, related to pharyngeal and gastrointestinal tract hypotonia, commonly lead to failure to thrive Dysphagia and constipation are common ~ 20% develop gallstones	☐ Refer to a gastroenterologist and feeding specialist (e.g., speech-language pathologist) ☐ Treat constipation ☐ If difficulty swallowing pills, adapt medication regime (e.g., provide with liquid medication, crush pills) ☐ Consider obtaining an abdominal ultrasound in adults to assess for gallstones ☐ Follow DD Guideline 15 [1] for recommendations for managing constipation and Gastroesophageal reflux disease (GERD)
6. GENITOURINARY	
Children and Adults: Up to ~ 33% may have renal tract anomalies ~ 10% may develop renal failure in adulthood	☐ Undertake a renal ultrasound at the time of diagnosis ☐ Maintain surveillance for urinary tract infections (UTIs) ☐ Determine creatinine levels at diagnosis and annually thereafter
7. SEXUAL FUNCTION	
Children and Adults: People with the 22q11.2 deletion syndrome are fertile and have a 50% chance of transmitting the 22q11.2 deletion to children	☐ Referral for genetic counseling may be appropriate
8. MUSCULOSKELETAL	
Children and Adults: Many have skeletal abnormalities, most commonly vertebral or rib anomalies A minority have short stature during childhood which improves by adulthood	☐ Undertake cervical spine X-rays after age 4 years to assess for vertebral anomalies and instability on flexion/extension (five views: flexion, extension, AP, lateral, and open mouth) ☐ Arrange chest X-ray to evaluate for thoracic vertebral anomalies ☐ Provide clinical evaluation for scoliosis at diagnosis, during preschool, and periodically thereafter
9. NEUROLOGICAL	
Children and Adults: Impairments due to reduced muscle tone and motor delay are common in children Seizures are frequently associated with hypocalcemia ~ 40% of adults have recurrent (often hypocalcemic) seizures Cord compression may occur related to skeletal anomalies	☐ Undertake a neuro-developmental assessment of infants with particular attention to reduced muscle tone and motor delay ☐ Refer to a physiotherapist (PT) and/or occupational therapist (OT), as needed ☐ Ascertain history with attention to seizures ☐ Following every seizure, check serum ionized calcium and magnesium ☐ Include EEG examination in evaluation if indicated ☐ Symptoms of cord compression are an indication for an emergent referral to a neurologist or neurosurgeon

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10. BEHAVIOURAL / MENTAL HEALTH	
Children and Adults: Conditions such as Autism Spectrum Disorder (ASD), Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), and Obsessive-Compulsive Disorder (OCD) are common Treatable anxiety disorders are common Many of the childhood psychiatric disorders do not necessarily persist, nor do they predict psychiatric illness during adulthood Schizophrenia can become apparent in adolescence and ~ 25% develop schizophrenia or other psychotic disorders in adulthood	☐ Ascertain comprehensive behavioural and mental health history ☐ Refer to a psychiatrist if evidence of ASD, ADD, ADHD, or OCD occurs ☐ Assess for psychiatric illness with attention to changes in behaviour, emotional state and thinking, including hallucinations or delusions and at-risk behaviours (e.g., sexual activity, alcohol/drug use) in teens and adults ☐ Refer to a psychiatrist as warranted by clinical findings ☐ Consider psychiatric assessment at or near puberty with behavioural changes
11. ENDOCRINE	
Children & Adults: ~ 60% have episodic hypocalcemia (often missed when mild or transient) Hypocalcemia is due to hypoparathyroidism in children and adults Long-term calcium supplementation can lead to renal calculi Hypo- and hyperthyroidism have been reported in children and adults ~ 4% have growth hormone deficiency ~ 35% of adults are obese ~ 20% of adults have hypothyroidism ~ 5% of adults have hyperthyroidism	☐ Measure serum ionized calcium concentration in neonates then annually to assess for hypoparathyroidism ☐ Assess calcium levels in infancy, every 3 to 6 months, every 5 years through childhood, and every 1 to 2 years thereafter ☐ Be vigilant regarding risk of hypocalcemia with acute illness and childbirth ☐ All patients should have Vitamin D supplementation; those with documented hypocalcemia and/or relative or absolute hypoparathyroidism may require prescribed hormonal forms supervised by endocrinologist ☐ Refer to an endocrinologist as warranted by clinical and laboratory findings and for initial management of hypocalcemia ☐ Consider densitometry to assess for osteopenia earlier than in general population ☐ Undertake T4 and TSH baseline screening [2] ☐ Treat with standard thyroid replacement or antithyroid therapy where warranted [2] ☐ Monitor growth and growth hormone levels annually and consider endocrinology assessment for poor growth
12. HEMATOLOGY	
Children and Adults: Autoimmune diseases (e.g., thrombocytopenia, juvenile rheumatoid arthritis [JRA], Grave's disease, vitiligo, neutropenia, hemolytic anemia) may be more common than in the general population ~ 10% develop splenomegaly	☐ Monitor with CBC; thyroid function annually or if concerns arise ☐ Investigate arthritis problems for JRA and refer to a rheumatologist as warranted

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13. INFECTIOUS DISEASE/IMMUNIZATION	
Children and Adults: Congenital thymic aplasia is recognizable in infancy [3] Immune function may be impaired (although thymic aplasia is rare, thymic hypoplasia is common); improvement in T-cell production occurs over time ~ 75% have chronic middle ear infections (otitis media) and frequent respiratory infections Irradiated blood products have been used when blood replacement has been necessary Recurrent upper and lower respiratory tract infections are common in adults	☐ In addition to obtaining a CBC with differential in newborns, consider undertaking flow cytometry. At age 9 to 12 months (prior to live vaccines), assess flow cytometry, immunoglobulins and T-cell function ☐ For infants, minimize exposure to infectious diseases and withhold live vaccines initially. Refer infants to an infectious disease specialist to assess regarding influenza vaccines, CMV-negative irradiated blood products and RSV prophylaxis ☐ Measure absolute lymphocyte count following initial diagnosis and refer to an immunologist if count is low ☐ Evaluate immune status before offering any live vaccines ☐ Treat respiratory and other infections aggressively in children and adults
14. OTHER	
Incidence: 1/4000, but more likely higher and many without typical features Huge variability in level of developmental disability and the number and severity of associated features IQ: The majority of affected people with 22q11 deletion fall in the high mild to borderline range; moderate to severe rates and average levels of IQ are less common A selection bias in reported studies may result in over-estimating some prevalence rates	

Resources

11 published 22q11.2 deletion syndrome health care guidelines reviewed and compared. (For full list of references see **www.surreyplace.on.ca/Clinical-Programs/Medical Services/Pages/PrimaryCare.aspx)**

22q11.2 Deletion syndrome websites that may be helpful for families and caregivers
www.c22c.org
www.22q.org

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