# Screening at Birth or Diagnosis of WAGR Spectrum

Children with Predisposition to Wilms Tumor  (2016 AACR Childhood Cancer Workshop¹)  Cancer Workshop¹)  Children with Predisposition to Wilms Tumor  (2016 AACR Childhood Cancer Workshop¹)  Cancer Workshop¹)  Cancer Workshop¹)  Children with Predisposition to Wilms Tumor  (2016 AACR Childhood Cancer Workshop¹)  Cancer Workshop²)	omatosis,					
* These recommendations were designed to offer screening in cases with a 1% or greater risk when early detection is minimally invasive and significantly improves outcome.  * We acknowledge that uniform recommendations may result in some patients being screened more frequently and for a longer duration than some clinicians have previously determined to be necessary. Therefore, these recommendations should be discussed with each family"  * Risk Stratifications by Age for WAGR Spectron of the specific of	omatosis,					
Possible risk (>15 years)						
<ul> <li>Conclusion 1: 'Persons with hypertension, diabetes, or cardiovascular disease should be screened for CKD.'</li> <li>Conclusion 2: 'CKD screening and treatment programs should also be implemented in other high-risk individuals and populations based on comorbidities, environmental exposures, or genetic factors.'</li> <li>Conclusion 3: 'The initiation, frequency, and cessation of CKD screening should be individualized based on kidney and CVD risk profiles and individual preferences.'</li> </ul>	lue to 11p13					
(B) Ultrasonography Screening Recommendations for Patients with WAGR Spectrum						
Birth or Diagnosis  Full Abd US Pelvic US  Initiate WAGR Spectrum Screening Program: (1) Evaluate baseline kidney and organ status; (2) Diagnose CAKUT and/or internal GU anomalies signs of NR, nephroblastomatosis, or WT growth and/or potential early UTI to determine follow-up screening required for patient	s; (3) Look for					
Patient Age Groups Interval and Screening Techniques Tumor Screening Management Aspects General Kidney Health Aspects						
<8 years of age 3-month RUS*  Monitor high risk for WT, nephroblastomatosis, and/or NR; Manage risks for other adverse kidney issues						
Full Abd US Evaluate for other abdominal and/or internal GU tumors or abnormalities; GOAL: EARLY DETECTION AND TREATMENT  Pelvic US Determine follow-up interval for RUS						
8 years - 15 years  3- or 6-month RUS*  Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD (1)Diagnosc and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of	kidney damag					
15 years - 18 years  6-month RUS*  Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR  (3)Monitor CKD status and progression to determine and evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD treatment	valuate					
18th birthday  Full Abd US Pelvic US  Full Abd US Pelvic US  Evaluate for other abdominal and/or internal GU tumors or abnormalities; Pelvic US  Evaluate for other abdominal and/or internal GU tumors or abnormalities; Severe kidney failure and ESRD	ontribute to					
>18 years of age  Annual RUS*  Monitor overall kidney health status and CKD signs; Manage possible lifetime WT risk						
Frequency Intervals Suggested and Considerations for Implementation Purpose of Screening Interval						
1-month and/or 2-month interval  Patients with history of recent UTI or recurrent UTIs to monitor treatment as determined by medical care team Provides shorter duration to evaluate clinical issues or concern for CAKUT, WT, CKD (may provide underlying etiology for clinical signs)  More frequent for patients with clinical signs to enable	arlier detection					
Necessary for national decimpated as think yield for WT heard on age (Supers) and/or clinical abayests with a						
Necessary for patients designated as 'high risk' for WT based on age (<8 years) and/or clinical characteristics  3-month interval (history of previous WT or NR); Can also assist monitoring CAKUT issues and provide early signs of CKD development and/or progression; Preferences of care team and patient/family should be considered  Routine WT screening and UTI monitoring						
3-month interval (history of previous WT or NR); Can also assist monitoring CAKUT issues and provide early signs of CKD Routine WT screening and UTI monitoring						

## **Start Screening Program**

- Full abdominal ultrasound
- Pelvic ultrasound

### **Screening Goals**

- Evaluate kidneys, and genital and urinary organs
- Identify problems present at birth
- Look for signs of Wilms tumor and/or nephrogenic rests, or urinary tract infections
- Develop plan for future screening

Duffy KA, Trout KL, Gunckle JM, Krantz SM, Morris J, Kalish JM. Results From the WAGR Syndrome Patient Registry: Characterization of WAGR Spectrum and Recommendations for Care Management. Front Pediatr. 2021;9:733018. Published 2021 Dec 14. doi:10.3389/fped.2021.733018

## **Screening Guidelines for Kidney Health**

		(A) Summary of General Recommendations for Screening I	Programs
G	eneral Recommendations	s for Screening Programs in Patient Populations	Application to WAGR Population
Children with Predisposition to Wilms Tumor  (2016 AACR Childhood Cancer Workshop¹)	These recommendations detection is minimally invalidation. We acknowledge that unimand for a longer duration recommendations should surveillance can be furnitional.	were designed to offer screening in cases with a 1% or greater risk when early asive and significantly improves outcome. If or mecommendations may result in some patients being screened more frequent than some clinicians have previously determined to be necessary. Therefore, these discussed with each family"	Lifetime risk for WT cannot be estimated in WAGR Spectrum (>1% risk is conceivable)     >50% of patients with WAGR develop WT, nephroblastomatosis, and/or NR during their lifetime     Risk Stratifications by Age for WAGR Spectrum:
Early Identification and Intervention of Chronic Kidney Disease (2019 KDIGO controversics conference <sup>2</sup> )	<ul> <li>Conclusion 2: 'CKD se individuals and population</li> <li>Conclusion 3: 'The initia</li> </ul>	ith <u>hypertension</u> , <u>diabetes</u> , or <u>cardiovascular disease</u> should be screened for CKD,' reening and treatment programs should also be implemented in other high-ris is based on <u>comorbidities</u> , <u>environmental exposures</u> , or <u>genetic factors</u> .' tion, frequency, and cessation of CKD screening should be <u>individualized</u> based of iles and <u>individual preferences</u> .'	There is a high risk for abnormal kidney consequences due to 11n13
<b>V</b> 0VVV	(B) U	trasonography Screening Recommendations for Patients with	WAGR Spectrum
Birth or Diagnosis	Full Abd US Pelvic US	Initiate WAGR Spectrum Screening Program: (1) Evaluate baseline kidney and orga signs of NR, nephroblastomatosis, or WT growth and/or potential early UTI to deter	
Patient Age Groups	Interval and Screening Techniques	Tumor Screening Management Aspects	General Kidney Health Aspects
<8 years of age	3-month RUS*	Monitor high risk for WT, nephroblastomatosis, and/or NR; Manage risks for other adverse kidney issues	
8 <sup>th</sup> birthday	Full Abd US Pelvic US	Evaluate for other abdominal and/or internal GU tumors or abnormalities;	GOAL: EARLY DETECTION AND TREATMENT
		Determine follow-up interval for RUS	COAL EARLY DETECTIONAL TREATMENT
8 years - 15 years	3- or 6-month RUS*	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR	(1)Diagnose and manage CAKUT
8 years - 15 years 15 years - 18 years		Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD	(1)Diagnose and manage CAKUT
	3- or 6-month RUS*	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR Evaluate for other abdominal and/or internal GU tumors or abnormalities; Determine follow-up interval for RUS	(1)Diagnose and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of kidney damag (3)Monitor CKD status and progression to determine and evaluate
15 years - 18 years	3- or 6-month RUS* 6-month RUS* Full Abd US	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR Evaluate for other abdominal and/or internal GU tumors or abnormalities;	(1)Diagnose and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of kidney damag (3)Monitor CKD status and progression to determine and evaluate treatment (4)Prevent or mitigate cardiometabolic consequences that contribute to
15 years - 18 years 18th birthday >18 years of age	3- or 6-month RUS* 6-month RUS* Full Abd US Pelvic US Annual RUS*	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR Evaluate for other abdominal and/or internal GU tumors or abnormalities; Determine follow-up interval for RUS Monitor overall kidney health status and CKD signs; Manage possible lifetime W	(1)Diagnose and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of kidney dama; (3)Monitor CKD status and progression to determine and evaluate treatment (4)Prevent or mitigate cardiometabolic consequences that contribute to
15 years - 18 years 18th birthday >18 years of age	3- or 6-month RUS* 6-month RUS* Full Abd US Pelvic US Annual RUS* Frequency Intervals Sugg	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR Evaluate for other abdominal and/or internal GU tumors or abnormalities; Determine follow-up interval for RUS Monitor overall kidney health status and CKD signs; Manage possible lifetime W risk	(1)Diagnosc and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of kidney dama, (3)Monitor CKD status and progression to determine and evaluate treatment (4)Prevent or mitigate cardiometabolic consequences that contribute to severe kidney failure and ESRD
15 years - 18 years  18th birthday  >18 years of age  1-month and/or	3- or 6-month RUS* 6-month RUS* Full Abd US Pelvic US Annual RUS* Frequency Intervals Sugg Patients with history of recen Provides shorter duration to e etiology for clinical signs) Necessary for patients design (history of previous WT or N	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR Evaluate for other abdominal and/or internal GU tumors or abnormalities; Determine follow-up interval for RUS Monitor overall kidney health status and CKD signs; Manage possible lifetime W risk gested and Considerations for Implementation at UTI or recurrent UTIs to monitor treatment as determined by medical care team	(1)Diagnosc and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of kidney dama (3)Monitor CKD status and progression to determine and evaluate treatment (4)Prevent or mitigate cardiometabolic consequences that contribute to severe kidney failure and ESRD  Purpose of Screening Interval  More frequent for patients with clinical signs to enable earlier detecti
15 years - 18 years  18th birthday  >18 years of age  1-month and/or 2-month interval	3- or 6-month RUS* 6-month RUS* Full Abd US Pelvic US Annual RUS* Frequency Intervals Sugg Patients with history of recen Provides shorter duration to a etiology for clinical signs) Necessary for patients design (history of previous WT or N development and/or progress Interval period for patients be Consider implementing more	Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or potential risk for WT, Nephroblastomatosis and/or NR Evaluate kidney health status and RUS follow-up interval; Monitor risk for CKD and/or possible risk for WT, Nephroblastomatosis and/or NR Evaluate for other abdominal and/or internal GU tumors or abnormalities; Determine follow-up interval for RUS Monitor overall kidney health status and CKD signs; Manage possible lifetime W risk  gested and Considerations for Implementation  If UTI or recurrent UTIs to monitor treatment as determined by medical care team evaluate clinical issues or concern for CAKUT, WT, CKD (may provide underlying thated as 'high risk' for WT based on age (<8 years) and/or clinical characteristics (R); Can also assist monitoring CAKUT issues and provide early signs of CKD	(1)Diagnosc and manage CAKUT (2)Screen/Work-Up potential UTIs, CKD, or other signs of kidney dama (3)Monitor CKD status and progression to determine and evaluate treatment (4)Prevent or mitigate cardiometabolic consequences that contribute to severe kidney failure and ESRD  Purpose of Screening Interval  More frequent for patients with clinical signs to enable earlier detect than 3-month interval

#### **Risks**

- Chronic Kidney Disease (CKD)
- Cardiovascular Disease (CVD)
- Obesity
- Risks are present for patients with and without history of Wilms tumor

### **Screening Goals**

- Diagnose and manage problems present at birth
- Develop personalized screening program to address and manage individual risks
- Monitor for Chronic Kidney Disease (CKD)
- Prevent or treat Cardiovascular Diseases (CVD) such as high blood pressure, high blood cholesterol, diabetes, obesity

## **Screening Guidelines for Wilms tumor**

		(A) Summary of General Recommendations for Screening P	rograms	
G	eneral Recommendations	s for Screening Programs in Patient Populations	Ameliantian to WA CD Donolatian	
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Early Identification and Intervention of Chronic Kidney Disease  (2019 KDIGO controversies conference <sup>2</sup> )	<ul> <li>Conclusion 2: 'CKD see individuals and population</li> <li>Conclusion 3: 'The initial</li> </ul>	rith hypertension, diabetes, or cardiovascular disease should be screened for CKD, breening and treatment programs should also be implemented in other high-risk as based on comorbidities, environmental exposures, or genetic factors. It ion, frequency, and cessation of CKD screening should be individualized based on tiles and individual preferences.	prevalent in patients with and without history of W1  There is a high right for abnormal kidney consequences due to 11n12	
	(B) Ul	trasonography Screening Recommendations for Patients with	WAGR Spectrum	
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Patient Age Groups	Interval and Screening Techniques	Tumor Screening Management Aspects	General Kidney Health Aspects	
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18 <sup>th</sup> birthday	Full Abd US Pelvic US	Evaluate for other abdominal and/or internal GU tumors or abnormalities; Determine follow-up interval for RUS	(4)Prevent or mitigate cardiometabolic consequences that contribute to severe kidney failure and ESRD	
>18 years of age	Annual RUS*	Monitor overall kidney health status and CKD signs; Manage possible lifetime WT risk		
	Frequency Intervals Sug	gested and Considerations for Implementation	Purpose of Screening Interval	
1-month and/or 2-month interval	Patients with history of recent UTI or recurrent UTIs to monitor treatment as determined by medical care team Provides shorter duration to evaluate clinical issues or concern for CAKUT, WT, CKD (may provide underlying etiology for clinical signs)  More frequent for patients with clinical signs to enable earlied than 3-month interval			
3-month interval	Necessary for patients designated as 'high risk' for WT based on age (<8 years) and/or clinical characteristics (history of previous WT or NR); Can also assist monitoring CAKUT issues and provide early signs of CKD development and/or progression; Preferences of care team and patient/family should be considered			
6-month interval	Interval period for patients between 8-18 years that do not meet consideration for 3-month frequency  Consider implementing more frequent interval for those with clinical issues identified at annual screen and/or if  preferences of care team and patient/family direct more frequent screening intervals			
Annual interval	Necessary minimum interval	to screen for CKD and WT in patients >18 years with stable cardiometabolic and sees of care team and patient/family should be considered	Routine CKD monitoring and long-term WT screening	

#### Risk

- More than 50% of individuals develop Wilms tumor, nephroblastomatosis and/or Nephrogenic Rests
- Highest risk occurs before 8 years of age
- Risk is lower after age 8, but continues into adulthood

### Screening

- Birth to age 8 years Ultrasound every 3 months
- 8-15 years Ultrasound every 3 to 6 months
- 15-18 years Ultrasound every 6 months
- After age 18 Ultrasound every year

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