APPENDIX

Supplementary Table 1. Research strategies used for the indexed databases	
A) MEDLINE (PubMed)	
Research	**Strategies**
#1	("Ureteroscopes"[Mesh] OR "ureteroscope"[tiab] OR "ureteroscope"[ot] OR "Ureteroscopy/instrumentation"[Mesh] OR "flexible ureteroscope"[tiab] OR "flexible ureteroscope"[ot] OR "digital ureteroscope"[tiab] OR "digital ureteroscope"[ot] OR "Endoscopes"[Mesh] OR "endoscope"[tiab] OR "endoscope"[ot] OR "Endoscopy/instrumentation"[Mesh] OR "ureterorenoscope"[tiab] OR "ureterorenoscope"[ot] OR "ureteropyeloscope"[tiab] OR "ureteropyeloscope"[ot] OR "Lithovue"[tiab] OR "Lithovue"[ot] OR "Uscope"[tiab] OR "Uscope"[ot] OR "Neoflex"[tiab] OR "Neoflex"[ot] OR "SemiFlex scope"[tiab] OR "SemiFlex scope"[ot] OR "ureteroscopy"[tiab] OR "ureteroscopy"[ot] OR "ureteropyeloscopy"[tiab] OR "ureteropyeloscopy"[ot] OR "ureterorenoscopy"[tiab] OR "ureterorenoscopy"[ot] OR "renoscopy"[tiab] OR "renoscopy"[ot])
#2	("Disposable Equipment"[Mesh] OR "Disposable Equipment"[tiab] OR "Disposable Equipment"[ot] OR "single-use"[tiab] OR "single- use"[ot] OR "disposable"[tiab] OR "disposable"[ot] OR "semi-disposable"[tiab] OR "semi-disposable"[ot] OR "semi disposable"[tiab] OR "semi disposable"[ot])
#3	("Cost and cost analysis"[Mesh] OR "Cost and cost analysis"[tiab] OR "Cost and cost analysis"[ot] OR "Costs"[tiab] OR "Costs"[ot] OR "Cost Comparison"[tiab] OR "Cost Comparison"[ot] OR "Cost Comparisons"[tiab] OR "Cost Comparisons"[ot] OR "Cost- Minimization Analysis"[tiab] OR "Cost-Minimization Analysis"[ot] OR "Cost-Minimization Analyses"[tiab] OR "Cost-Minimization Analyses"[ot] OR "Cost minimization"[tiab] OR "Cost minimization"[ot] OR "Pricing"[tiab] OR "Pricing"[ot] OR "Cost Measure"[tiab] OR "Cost-Measure"[ot] OR "Cost Measures"[tiab] OR "Cost-Measures"[ot] OR "Ureteroscopy/economics"[Mesh] OR "Endoscopy/economics"[Mesh] OR "Ureteroscopes/economics"[Mesh] OR "Endoscopes/economics"[Mesh] OR "Equipment and Supplies/economics"[Mesh] OR "Technology, High-Cost"[Mesh] OR "Endoscopes/economics"[Mesh])
#4	("rigid"[tiab] OR"rigid"[ot] OR "semirigid"[tiab] OR "semirigid"[ot] OR"optic"[tiab] OR "optic"[ot])
#5	(#1 AND #2 AND #3) NOT #4
#6	#5 AND (English[lang] OR French[lang])

146 documents listed; research conducted until September 19th, 2018

B) EMBASE	
Research	**Strategies**
#1	('ureteroscope'/exp OR 'ureteroscopy'/exp OR 'endoscopy'/exp)
#2	('ureteroscope':ab,ti OR 'flexible ureteroscope':ab,ti OR 'digital ureteroscope':ab,ti OR 'endoscope':ab,ti OR 'ureterorenoscope':ab,ti OR 'ureteropyeloscope':ab,ti OR 'lithovue':ab,ti OR 'uscope':ab,ti OR 'neoflex':ab,ti OR 'semiflex scope':ab,ti OR 'ureteroscopy':ab,ti OR 'ureteropyeloscopy':ab,ti OR 'ureterorenoscopy':ab,ti OR 'renoscopy':ab,ti)
#3	(#1 OR #2)
#4	'disposable equipment'/exp
#5	('disposable equipment':ab,ti OR 'single-use':ab,ti OR 'disposable':ab,ti OR 'semi-disposable':ab,ti OR 'semi disposable':ab,ti)
#6	(#4 OR #5)
#7	('cost minimization analysis'/exp OR 'cost effectiveness analysis'/exp OR 'cost benefit analysis'/exp OR 'cost'/exp)
#8	('cost':ab,ti OR 'cost analysis':ab,ti OR 'cost comparison':ab,ti OR 'cost minimization analysis':ab,ti OR 'cost-minimization analysis':ab,ti OR 'cost minimization analyse':ab,ti OR 'cost-minimization analyse':ab,ti OR 'cost minimizations':ab,ti OR 'cost- minimization':ab,ti OR 'cost measures':ab,ti OR 'cost-measure':ab,ti OR 'ureteroscopy economic':ab,ti OR 'endoscopy economic':ab,ti OR 'ureteroscope economic':ab,ti OR 'endoscope economic':ab,ti)
#9	(#7 OR #8)
#10	(#3 AND #6 AND #9) AND ([article]/lim OR [article in press]/lim OR [letter]/lim) AND ([english]/lim OR [french]/lim) AND [embase]/lim)

258 documents listed; research conducted until September 19, 2018.

Supplementary Table 2. List of the main economic websites consulted for the study				
Name	**Organization**	**Country (province)**	**Websites**	**Research results (n)**
Keywords English websites: ureteroscope, endoscope, scope French websites: urétéroscope, endoscope, scope				
THETA	Toronto Health Economics and Technology Assessment Collaborative	Canada (Ontario)	http://theta.utoronto.ca/home	0
PATH	Programs for Assessment of Technology in Health - McMaster University	Canada (Ontario)	https://www.path-hta.ca/	0
ICER	Institute for Clinical and Economic Review	USA	www.icer-review.org	0
IHE	Institute for Health Economics	Canada (Alberta)	www.ihe.ca	0
NHS-EED (CRD)	Centre for Reviews and Dissemination	UK	ihttp://www.crd.york.ac.uk/CRDWeb/	0
Number of listed documents				**0**

Last research conducted on September 20, 2018.

Supplementary Table 3. Interview guide for key stakeholders in CHU de Québec	
Purchasing	Who purchases flURS? – Types and number of flURS in circulation – History of flURS usage (number, clinical indications) Who purchases SUFDU? – Is it a possible option for the operating facility? What is the purchasing process of ureteroscopes? (Call for tenders? Costs? Bundled/hospital?) Funding sources? Once purchased, is there a tracking number attribution?
Treatment	Is there a particular treatment (disinfection, sterilisation) just after purchase (before fist use)? – If yes, what are the steps and duration of this treatment? What are the steps and procedures after each use? Product costs related to reprocessing and sterilization. Microbiological control – Is it done? – If yes, when is it done?
Storage	Who does it? Where is it done? What is the maximum time (expiration date)? Have we thought about a precise location where to store SUFDU? Do SUFDU have an expiration date? – What do we do when the expiration date is passed?
Transport	Who does it? How much time is needed for mobilisation of an ureteroscope? Is a particular preparation needed for a transport surgical tray (hours to days before intervention)?
Use in operating room	What becomes of an unused ureteroscope (stored in operating facility or returned to storage location)? Who handles the ureteroscope once removed from its surgical tray and before intervention? What becomes of a used ureteroscope (procedure before return to the storage location)?
Breakage report	Who notices the breakage? What is the breakage trajectory (what is done before sending)?
Repair	Duration? Once returned, what are the steps before use?

Other concerns	What are the available data to document ureteroscope use and breakages? Have SUFDUs been used yet? Can the monitor break? Are there updates to do? What has been done yet to reduce breakage? Use of semi-reusable ureteroscope? Blue light: Is it usable with SUFDU? What part of SUFDU is disposable for waste?

flURS: flexible ureteroscope; SUFDU: single-use flexible digital ureteroscope.

Supplementary Table 4. Formula used for the calculation of mean cost per intervention

$$\mathrm{Ci} = ((\mathrm{CAa}/(\mathrm{n})) + (\mathrm{CR}/(\mathrm{n})) + \mathrm{CRS})$$

Legend :

- Ci： mean cost per intervention
- CAa： purchase annual cost (total purchase cost considering a 6 − year amortization)
- CR： total repair costs observed over a year
- CRS：costs related to reprocessing and sterilization
- n： number of ureteroscopies performed over a year

Supplementary Table 5. Main characteristics of economic studies comparing SUFDU and flURS								
Author (year)	**Country**	**Study duration**	**SUFDU**		**flURS**			
			Model	**Number of cases**	**Type (n)**	**Number of cases**	**Breakage (%)**	**Mean number of cases before breakage**
Martin et al (2017)[16]	United States	1 year (February 2014 to February 2015)	LithoVue™	N/A	Digital (4)	160	6.9	12.5
Taguchi et al (2018)[18]	United States	2 non-consecutive weeks (July and August 2016)	LithoVue™	9	Optic (12)**	14	N/A	N/A
Ozimek et al (2017)[19]	Germany	4 years (January 2013 to December 2016)	LithoVue™	N/A	Optic (10)	423	7.6	14.4
Mager et al (2018)[15]	Germany	1 year* (December 2015 to December 2016)	LithoVue™	68	Optic or digital (6)	68	13.2	7.5
Hennessey et al (2018)[17]	Australia	2 and a half years (NR)	LithoVue™	N/A	Optic (7)	234	6.4	11

*Six months with a flURS and then six months with a SUFDU. **During the last three years.
flURS: flexible digital reusable ureteroscope; N/A: not applicable; NR: not reported; SUFDU: single-use flexible digital ureteroscope.

Supplementary Table 6. Estimation methods used in the studies for calculation of the mean repair cost per intervention of the flURS	
Author (year)	**Calculation method**
Martin et al (2017)[16]	$\frac{\text{Repair costs per breakage}}{\text{Mean number of cases completed before breakage}}$
Taguchi et al (2018)[18]	$\frac{\text{Total repair costs}}{\text{Total number of cases}}$
Ozimek et al (2017)[19]	$\frac{\text{Mean repair costs} + \text{workforce related costs before and after repair}}{\text{Total number of cases}}$
Mager et al (2018)[15]	$\frac{\text{(Mean repair costs) x (number of breakage implying repair)}}{\text{Number of cases completed before breakage}}$
Hennessey et al (2018)[17]	$\frac{\text{Mean repair costs} > 10\,000\ \$\ \text{US}}{\text{Number of cases completed before breakage}}$

flURS: flexible digital reusable ureteroscope.

Supplementary Table 7. Estimation of the annual number of ureteroscopies performed in CHU de Québec from 2015–2018						
Fiscal years	**Hospitals in CHU de Québec**					**CHU de Québec (total)**
	HSFA	**HDQ**	**HEJ**	**CHUL**		
				Children	**Adults**	
2015–2016	749	9	121	13	1	893
2016–2017	881	11	0	13	2	907
2017–2018	1000	11	0	11	0	1022

Data sources : GIC computer software of CHU de Québec, CIM-9. CHUL: *Centre hospitalier de l'Université Laval*; HDQ: *Hôtel-Dieu de Québec*; HEJ: *Hôpital de l'Enfant-Jésus*; HSFA: *Hôpital St-François d'Assise*.

Supplementary Table 8. Estimation of purchase and amortization costs of flURS in HSFA and mean cost per intervention, between May 28, 2017, and May 27, 2018					
	Available number	**Number of interventions**	**Total purchase cost ($)**	**Total annual cost related to 6-year amortization ($)**	**Mean cost per intervention ($)**
Karl-Storz URS	3	224	44 940	7490	33
Olympus URS	2	104	28 000	4667	45
Transport unit (one by URS)	5	----	4750	791	2
	Total	328	77 690	12 948	39

flURS: flexible digital reusable ureteroscope; HSFA: *Hôpital St-François d'Assise*; URS: ureteroscope.

Supplementary Table 9. Estimation of total annual repair costs and mean repair costs per breakage and intervention of flURS, between May 28, 2017, and May 27, 2018					
	Number of breakages	**Number of interventions**	**Repair costs ($)**		
			Total	**Mean cost per breakage**	**Mean cost per intervention**
Karl-Storz (n=3)	12	224	85 610	7134	382
Olympus (n=2)	9	104	10 025	1114	96
Total (n=5)	21	328	95 635	4554	292

flURS: flexible digital reusable ureteroscope.

Supplementary Table 10. Estimation of limit thresholds where the mean cost per intervention between flURS and SUFDU are equivalent, according to data collection in CHU de Québec				
SUFDU	**Number of flexible ureteroscopies performed per year where SUFDU is cost-effective**			
	Number of flURS available (Karl-Storz)		**Number of flURS available (Olympus)**	
	1	**2**	**1**	**2**
LithoVue™	≤2	≤4	≤2	≤3
Uscope	≤6	≤13	≤3	≤

flURS: flexible digital reusable ureteroscope; SUFDU: single-use flexible digital ureteroscope.