

Pediatric urological surgery readiness condition (PedsUROCON)

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As of March 11, 2020, the World Health Organization declared coronavirus disease 2019 (COVID-19) a pandemic and urged countries to implement protocols to contain the virus spread.¹ It was soon realized that the world was ill-prepared and too few lessons had been learned from previous infectious outbreaks in 2003 and 2009.² As a result, preparation and planning were insufficient to deal with the impact of this strain on the healthcare system.

To deliver the optimal care despite this pervasive and fast-evolving event, healthcare managers must address and adjust four main domains in order to reach optimal surge capacity: maximize use of hospital structure, increase staff capacity, prioritize use of equipment and supplies, and develop an efficient communication system between hospitals.^{3,4} Another key factor in pandemic preparedness is the rapid acquisition of information on pathogen epidemiology. All of this knowledge is essential to make adjustments, which can increase the reliability of the current protocol, in addition to clarifying existing hospital vulnerabilities. More importantly, it can assist in predicting what further measures might be necessary to accommodate the influx of patients.^{3,4}

It is important to recognize that patient flow plays a primary role in organization of hospital resources.⁴ Critically analyzing the needs and requirements of each healthcare component, by identifying a hierarchy of their services, can lead to hospital planning being more efficient, resulting in quicker establishment and mobilization of rapid-response groups.^{3,4} However, accuracy of communication is a major challenge identified when creating a mass protocol, as inconsistent terminology or triggers can generate confusion.⁴ For this reason, assuring optimal communication and networking between local and regional hospitals aids hospital management by allowing patient-tracking, information-sharing, and appropriate distribution of patients and supplies.³⁻⁵

Defense readiness condition (DEFCON) is a system created by the U.S. military to standardize the level of reac-

tion required for a threat level perceived by the military.⁶ DEFCON is graded from 1–5, where 5 represents normal peacetime readiness and 1 represents maximum readiness — nuclear war is imminent.⁶ Each level is detailed with the expected actions and clearly states the trigger to activate the next level. This system establishes a clear and well-defined approach to assess readiness and could be used as a template in healthcare for crisis management. To achieve this, hospital departments should create protocols that prioritize procedures based on hierarchy and formally establish triggers that guide personnel when upgrading or downgrading readiness levels.

The concept of using the DEFCON model to create a crisis standard of care was previously suggested by Dr. Thomas Forbes from the Vascular Surgery Department at the University of Toronto when designing the VASCCON.⁷ Based on this experience, we propose the pediatric urological surgery readiness condition (PedsUROCON). PedsUROCON includes guidance for different alertness levels ranging from a fully functional hospital capacity (level 5) to when maximal hospital capacity has been reached, and even life/limb-threatening surgeries cannot be performed (level 1). The purpose of this decision-making algorithm is to serve as a template for long-term pediatric urology pandemic/emergency preparedness. Fig. 1 describes which procedures should be restricted once each level of alertness is reached.

PedsUROCON alertness levels should be transitioned (i.e., upgraded or downgraded) once hospital capacity reaches predetermined thresholds. We suggest 40%, 60%, 80%, and 100% of hospital capacity (Table 1). Hospital capacity should be determined by hospital administrators when factoring physical space, personnel availability, resources, and supplies. Regional communication and networking are paramount for this system to be effective. Constant communication must be maintained throughout the crisis to coordinate the efficient flow of patients, resources, and information, with the goal of reducing the need to escalate any healthcare institution to the next PedsUROCON level.

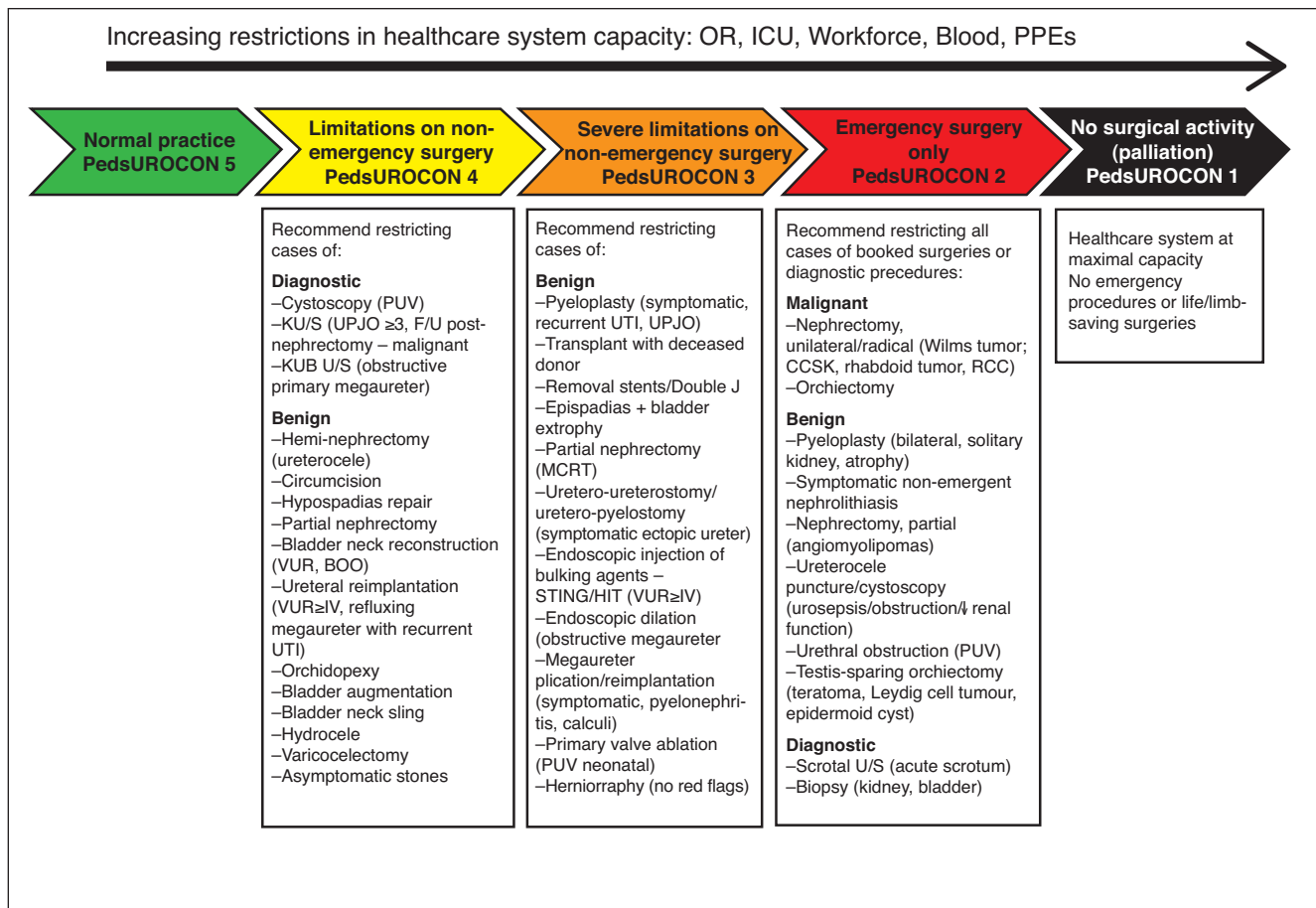


Fig. 1. Pediatric urological surgery readiness condition (PedsUROCON). BOO: bladder outlet obstruction; CCSK: clear-cell sarcoma of the kidney; HIT: hydrodistention implantation technique; ICU: intensive case unit; KU/S: kidney ultrasound; KUBU/S: kidney ureter bladder ultrasound; MCRT: multilocular cystic renal tumor; OR: operating room; PPE: personal protective equipment; PUV: posterior urethral valves; RCC: renal cell carcinoma; RLND: retroperitoneal lymph node dissection; STING: subureteral teflon injection; UTI: urinary tract inflammation; VUR: vesicoureteral reflux.

Each level of PedsUROCON can be implemented on the fast-developing COVID-19 outbreak (Fig. 2). The protocol is based on resources and procedures offered at our institution. We recommend adjusting thresholds for triggers based on regional epidemiological forecasting, hospital programs and specialized care areas, physical capacity, and services offered by the local healthcare system. Lastly, for optimizing functionality and readiness, this system should be updated and tested annually, after a major change in clinical care protocols or major renovations at a hospital — whichever comes first.

In order to achieve maximum preparedness, we advise each hospital to adopt the proposed algorithm on a departmental level (i.e., Urology, Medicine, Emergency, etc.); when integrated, the PedsUROCON decision matrix will clearly outline prioritization requirements for hospital services and procedures. The adoption of this algorithm will further aid in establishing intra-hospital flow by equalizing triggers and aid in anticipated economical challenges by quantifying demand based on the appropriate PedsUROCON level (Table 2). Furthermore, it will assist departments to systematically

triage and, as the pandemic stabilizes, advocate for priority of cases, as well as equitable resource distribution between departments.

Conclusions

Creating a surge capacity mitigation protocol involves a multi-layered level of interconnectivity between local hospitals, regional healthcare services, hospital supplies management, and emergency services infrastructure. Current protocols are lacking and inefficient in being able to deal with events such as the COVID-19 outbreak. Establishing the PedsUROCON protocol will allow hospitals and healthcare infrastructures to be forewarned, thus allowing them to be forearmed.

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Table 1. PedsUROCON levels, thresholds, and clinical significance

Alertness level	Thresholds for action (hospital maximal capacity, % occupancy)	Clinical significance
PedsUROCON 5	<40%	Normal practice
PedsUROCON 4	40–59%	Limitations on non-emergency surgery Booked cases limited to symptomatic stones (pain from renal colic, non-obstructing)
PedsUROCON 3	60–79%	Severe limitations on non-emergency surgery Booked cases limited to obstructing stones (severe hydronephrosis)
PedsUROCON 2	80–99%	Emergency surgeries only No booked cases, emergency cases, including septic stones or increased creatinine (acute kidney injury), consideration for nephrostomy tube insertion
PedsUROCON 1	100%	No surgical activity (palliation) No emergent cases (patients with septic stones are offered palliative care – IV antibiotics and pain medications)

Summary

Purpose: Long-term pediatric urology pandemic plan for patient flow management. PedsUROCON alertness levels should be transitioned once hospital capacity reaches specific thresholds. Hospital should communicate with the network of regional hospitals to organize patient flow. Alertness on patient flow facilitates prioritization of equipment, structure, and services.

Thresholds for action: PedsUROCON 5: <40% occupancy of hospital maximal capacity; PedsUROCON 4: 40–59%; PedsUROCON 3: 60–79%; PedsUROCON 2: 80–99%; and PedsUROCON 1: ≥100% of occupancy.

Maintenance: Based on the current structure of the hospitals and demands, their PedsUROCON should be updated yearly, following a major protocol change or after a major hospital renovation — whichever comes first.

Goals: 1) Organize patient flow in pediatric urology; 2) standardize communication between hospital departments to optimize resource use; 3) promote communication between hospitals to improve pandemic/emergency planning and reduce stress points in regional healthcare services.

Being forewarned is being forearmed.

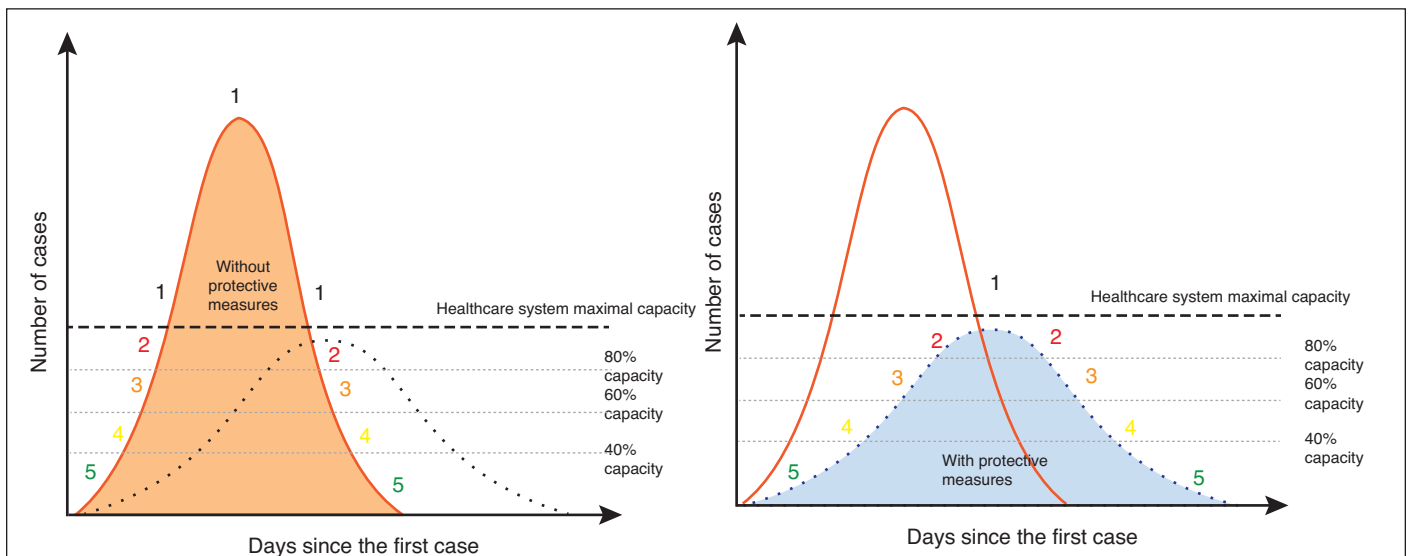


Fig. 2. PedsUROCON application in COVID-19 pandemic situation.

Table 2. PedsUROCON pandemic planning strategies

Areas of planning	Mitigation strategy
Resources (space & supplies)	<p>Reduction of hierarchically less urgent procedures (reduce in OR time and supply use)</p> <p>Descriptive calculation of resources required for each X-CON* level</p> <p>Forecast the number of beds to be allocated to pandemic “surge capacity” within each X-CON level</p> <p>Efficient reduction in supplies and space use, as departments reach minimal state of functionality within levels</p>
Staff	<p>Activation and implementation of appropriate X-CON* level standard of care</p> <p>Reduction of staff overload due to reduction in intra-departmental requirements</p> <p>Cross-training personnel and distributing based on demands</p>
System coordination	<p>Establish communication within hospital departments by:</p> <ol style="list-style-type: none"> Emergency contact information for department and administrative leadership (phone numbers, email addresses, cell phone texting, pagers, etc.) and conference call lines numbers should be listed to secure healthcare websites Communication between hospital leadership should happen on a weekly basis and as needed via teleconference systems (e.g., Zoom) Daily communication with all hospital staff using system wide emergency-coded emails reporting changes in protocol or hospital updates Communication interhospital within a region should happen weekly or as needed via local health integration networks or health agencies Test agreed communication platforms on a schedule basis (similar to upgrading X-CON policies) Leaderships should use institutional websites/social media profiles to communicate official decisions and status to the general public Define consistent communication tools for each level of organizational leadership <p>Patient transferring network:</p> <ol style="list-style-type: none"> Definition of healthcare coalitions within regional areas and potential partners Give priority to traditional referring partners when initial evacuation/transfer of emergency room or inpatient areas are required Intervene regionally the flow of patients requiring transfer to partners with less affected X-CON levels

*X-CON refers to the readiness condition of a given department/specialty. Adapted from Dichter et al.⁵

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- @TL_Forbes (Thomas Forbes). I hope everyone is trying to stay safe (and sane) during these crazy times, no matter where you are on the COVID19 curve or journey. Some have asked me for more info re VASCCON. Feel free to use the attached slides if you find them helpful. 1/2. Twitter, 28 Mar 2020, https://twitter.com/TL_Forbes/status/1243965386250489856?s=20

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