



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

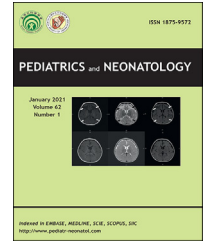
Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Available online at www.sciencedirect.com

ScienceDirect

journal homepage: <http://www.pediatr-neonol.com>



Original Article

Innovations in practice: Adaptation of developmental and behavioral pediatric service in a tertiary center in Singapore during the COVID-19 pandemic



Kalyani Vijaykumar Mulay, Ramkumar Aishworiya, Tammy S.H. Lim*, Mae Yue Tan, Jennifer S.H. Kiing, Shang Chee Chong, Ying Qi Kang

Kho Teck Puat-National University Children's Medical Institute, National University Health System, Singapore

Received May 29, 2020; received in revised form Jul 30, 2020; accepted Sep 2, 2020
Available online 7 September 2020

Key Words

child development;
COVID-19;
DBP;
developmental
delays;
service development

Background: As the coronavirus 2019 pandemic continues, healthcare services need to adapt to continue providing optimal and safe services for patients. We detail our adaptive framework as a large Developmental and Behavioral Pediatrics service in a tertiary academic institution in Singapore.

Methods: The multidisciplinary team at our unit implemented various adaptations and workflow processes during this evolving pandemic in providing continued clinical care tailored to the challenges specific to our patient population. Services were continued via teleconsultation mode during the 'Circuit Breaker' (enhanced movement restriction) period. Specific workflow processes, IT infrastructure, and staff training were put in place to support smooth running of this service. Segregation of services into two teams based at two separate sites and implementation of stringent infection control measures surrounding the clinic visit by providers, patients and their families were incorporated to ensure safety. Measures were also taken to ensure providers' mental wellbeing.

Results: The clinical service was continued for the majority of our patients with a lowest reduction in patient consultations to half of baseline during the 'Circuit Breaker' period. We received positive feedback from families for teleconsultation services provided.

Conclusion: We have been able to continue services in our DBP clinics due to our dynamic re-assessment of workflow processes and their prompt implementation in conjunction with the hospital and national public health response to the pandemic. Given that this pandemic is likely to be long drawn, our unit remains ready to constantly adjust these workflows and make

* Corresponding author. Department of Paediatrics, National University Health System, NUH Tower Block Level 12, 5 Lower Kent Ridge Road, 119074, Singapore. Fax: +65 6665 0158.

E-mail address: tammy_sh_lim@nuhs.edu.sg (T.S.H. Lim).

adaptations as we go along, together with the support for mental health of patients, parents and staff. Continual improvements in workflows will be helpful even beyond the pandemic to ensure good continuity of care for our patients and families.

Copyright © 2020, Taiwan Pediatric Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

The World Health Organization declared coronavirus disease 2019 (COVID-19) a pandemic on 12 March 2020.¹ Singapore reported its first case of COVID-19 on 23 January 2020. By February 2020, Singapore had one of the highest numbers of COVID-19 cases out of China prior to the rapid spread of the disease in South Korea, Europe, USA and the rest of the world.² Across countries, measures were initiated to ensure staff and patient safety, enhance infection control and ensure operational continuity in healthcare. In Singapore, with increasing community spread of COVID-19, the government tightened measures with a 'Circuit Breaker' (CB) from 3 April 2020³ to 1 June 2020, where all 'non-essential' services were asked to cease operations and movement of people was curtailed apart from that for essential purposes. Schools were closed and students received Home-Based Learning (HBL) virtually. Non-acute health services including Developmental Behavioral Pediatrics (DBP) service were required to suspend clinic visits, whenever possible.

There have been numerous reports on adaptation of clinical services to the pandemic,^{4,5} but there is limited information specific to a DBP service in Singapore or elsewhere. This paper aims to illustrate the adaptation of a DBP service in a national center in Singapore and provide an example of how DBP services can be safely and efficiently continued during this pandemic.

1.1. Unique features of a DBP service

The primary role for healthcare organizations in a pandemic is to tend to their patients while ensuring safety of both patients and staff.⁶ There are certain features that are unique to DBP practice that would influence how these aims are prioritized and implemented.

Firstly, early recognition of developmental delay in young children is crucial.^{7,8} Risk of missing the window of opportunity to intervene - particularly during a pandemic, where resources are scarce⁹ - is real. Moreover, the DBP practice relies primarily on close observations and direct interactions with the children.¹⁰ This poses a challenge when telemedicine does not allow physicians to engage a child directly.¹¹

Secondly, the mainstay of treatment of DBP conditions is behavioral therapy. Time-sensitive periods of therapy intervention and stimulation are of essence in very young children, as we know from the neurobiology of early neuronal development and growth.¹² With closure of therapy and early intervention centers during prolonged lockdown, DBP patients lose treatment opportunities and risk regression of skills. Medications can be delivered to patients' homes; however, it is more challenging to deliver

therapy over a telemedicine platform.¹³ The developmental costs and consequences from delayed diagnoses and interventions for patients may only be realized in years to come.^{14,15}

Thirdly, DBP service provides support for the mental and emotional health of patients and their caregivers. Caregivers of children with developmental needs experience immense stress at baseline.¹⁶ Living in enclosed quarters with disruption to their daily routine is most likely to exacerbate this stress.

It is known that there is increased domestic violence and abuse in families of children with disabilities.^{17,18} There have been reports of behavioral disorders in children due to the COVID-19 pandemic¹⁹ further exacerbating the caregiver stress and risk of victimization.

Lastly, the DBP patient population has unique characteristics that render them more susceptible to community-acquired infections. Children with cognitive impairments may be unable to follow public health recommendations, such as hand hygiene measures, wearing masks and physical distancing. These, coupled with prolonged contact time between provider and the patient during consultations, pose an increased infection risk for patients and providers.

It is imperative that there is continuity of care for patients in DBP services, while minimizing the risk of transmission of COVID-19. Continued DBP services would avert extending an already long DBP waitlist²⁰ in most clinics and thus benefit future patients too. As a large DBP service in Singapore, we underwent multiple organizational changes in order to continue our DBP services.

1.2. Features of our DBP service

The Child Development Unit (CDU) at National University Hospital, Singapore is part of a tertiary academic institution. It is one of the two nationally designated organizations for DBP that provides subsidized care for preschool children with a range of learning, behavioral and developmental difficulties. Both institutions function along the same model of care.²¹ We are based at 3 separate sites across the western part of Singapore. We have a multidisciplinary team consisting of about 50 professionals: Developmental Pediatricians, Allied Health Professionals (AHP), Psychologists, Social workers and an operations administrative team. We support around 13,000 outpatient visits annually, accounting for 14% of total pediatric outpatient visits in our hospital.²² This amounts to 35% of the national DBP population served annually in a public institution.²³ We receive referrals from primary care services, community pediatricians from Singapore and from the Southeast Asia region. The majority of our patient population receive government-subsidized care. Our referrals are triaged and first visits are seen within 1–2 months of referral.²¹

2. Methods

Our CDU team's innovative response to this pandemic was in conjunction with the hospital and national public health response as per the 'Disease Outbreak Response System Condition' (DORSCON).²⁴ Fig. 1 summarizes CDU's dynamic changes and implementation of workflow processes. Key elements of this are discussed below.

2.1. Providing continuity of care via teleconsultation

Prior to the pandemic, our Ministry of Health had only approved the use of telemedicine in limited settings but not for routine service delivery.²⁵ Teleconsultations were not previously offered in our DBP services. Within 3 weeks of escalation of our national pandemic alert level from yellow to orange (refer to A Singapore Government Agency Website, gov.sg, for more details on DORSCON and what the alert levels yellow, orange mean),²⁴ CDU offered teleconsultations (phone/video conferencing) in lieu of physical visits to a selected group of patients. Children whose diagnoses were clear, with intervention plans in place and who did not need a direct in-person developmental or physical assessment were deemed suitable for teleconsultation.

The following group of children were deemed unsuitable for teleconsultation; a) children who were being seen for the first time, b) children whose provisional diagnosis was unclear, c) children who required physical examinations, and d) children whose appointments were scheduled to discuss their psychological diagnostic assessment results.

When the 'CB' was implemented, medical services that were not directly involved in caring for acutely ill patients were advised to cease patients' physical appointments. We then established new workflows and provided full services via teleconsultations to all our existing patients. Security protocols were established and teleconsultation practices²⁶ standardized to ensure that patient privacy and security were upheld.²⁷

Detailed workflows were created for each subspecialty as shown in Fig. 2 (developmental pediatricians) and Fig. 3 (allied health professionals, psychologists). We continued to receive referrals to our services at similar rates. We were not able to offer teleconsultation services to new patients referred from community as per our Ministry of Health teleconsultation directive.²⁶ Physical Visits for these patients were put on a priority waitlist and deferred to when in-person consultations were allowed after 'CB' restrictions. Older children (>7 years of age), who would usually transit to school-based programs in the community or to child psychiatry services, continued to be served by us to maintain separation between different services.

2.2. Ensuring safety of staff, patients and their families during the pandemic

We reduced the number of personnel within clinic premises. Non-essential personnel (e.g., students, clinical observers) had to suspend their clinical attachments to the clinic. Staff were encouraged to work from home whenever

possible (e.g., psychologists could write their reports from home). A hospital virtual private network (VPN) account was obtained for all staff to facilitate access to clinical notes at home.

Safe distancing was enforced in the clinic. Measures such as mandatory donning of surgical face masks, logging of staff's temperature twice daily and mandatory reporting of staff sickness were instituted. We split into two teams (one at each community site) and stopped going to the main hospital site to minimize cross-site interaction.

Beyond segregating staff, patients were also only allowed to receive intervention from one site. If patients had to cross over to the other site for clinical reasons, we instituted a mandatory 14-day interval between visiting the two sites for patients. Phone calls were made to patients one week prior to the appointment to obtain information on travel history, fever, respiratory symptoms, and contact with any confirmed case of COVID-19 within the previous 14 days. Appointments were postponed if any risk factors were reported. On the day of their clinic appointment, temperature and questionnaire screening was performed on all patients and visitors. Each child was only allowed to have one accompanying adult during the visit. They were advised to sanitize their hands with alcohol disinfectant and to wear a surgical facemask at all times.

Social distancing measures were implemented in the waiting area. Clinic rooms and premises were cleaned more frequently. Table tops, chairs, assessment tools and surfaces patients contacted were cleaned with alcohol disinfectant after each patient. All communal toys were removed and the playroom was closed. A room in the clinic was designated as an 'isolation' room for patients with symptoms suspicious of COVID-19. Patients would remain in this room while awaiting transfer to the designated hospital.

2.3. Maintaining research and education as part of a tertiary institution

In line with official institution-level advisories, only research studies that would directly impact clinical care were allowed.²⁸ Apart from one study examining different modalities of early intervention in children with Autism Spectrum Disorder, the rest of our studies were on hold but the team continued work on non-physical aspects of research such as data analysis. We continued teaching sessions for fellows via video conferencing.

2.4. Additional support for patient and families

During the CB period, schools, preschools, childcare and early intervention centers ceased operations temporarily.²⁹ Through our clinic consultations, parents gave feedback about the stress they experienced during this period. Parents had difficulties working from home while managing children with additional needs. Home Based Learning (HBL) delivered online by schools was also a source of stress for parents as children with additional needs required parents to facilitate these sessions at home.

Children with additional needs are at increased risk of abuse and neglect.¹⁷ With the pandemic, this risk is stated

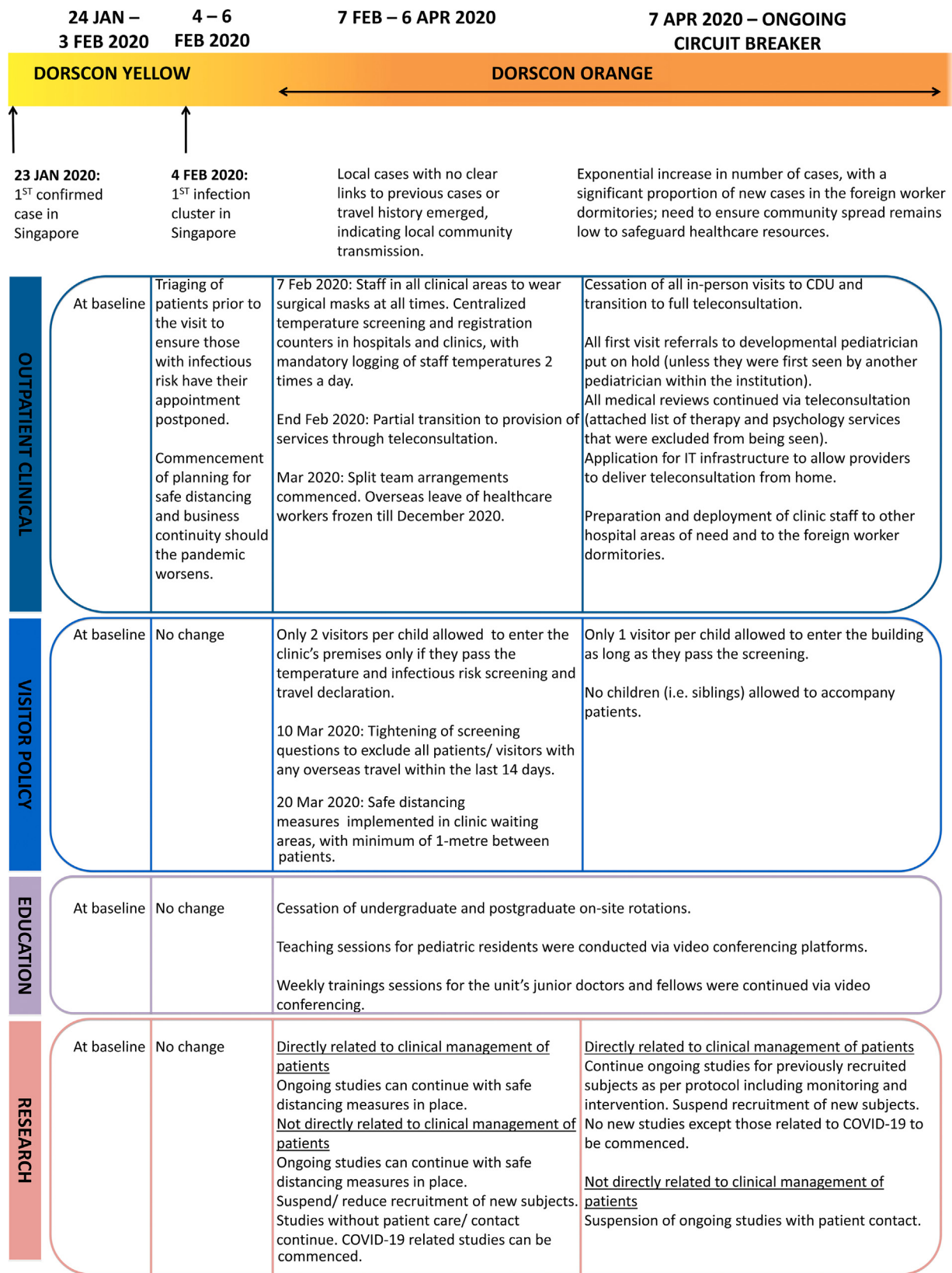


Figure 1 Child development unit's response to the change in DORSCON status.

First Visits

1. First visit/ new patients were seen via teleconsultation, only if they were referred from our hospital.
2. Parents self-completed a developmental questionnaire (e.g. Ages and Stages Questionnaire) prior to the visit. This served to give physicians a better idea of the patient's developmental abilities in the absence of an opportunity for direct observation.
3. Screening questions were given to parents whenever appropriate, for example:
 - For clinical suspicion of autism spectrum disorder: social responsiveness scale (SRS) or modified checklist for autism in toddlers (revised) (MCHAT-R).
 - For attention deficit hyperactivity disorder: NICHQ Vanderbilt Assessment Scale
4. Exchange of questionnaires between parents and clinic were conducted over email and facilitated by our administrative team.
5. Patients were offered a consultation over a secure video conferencing platform (e.g. corporate Zoom or Webex). If the parent/ caregiver declined, a telephone consultation was offered.
6. Patients referred from other sources (e.g. primary care practitioners or pediatricians in private practice) were sent phone messages (SMS) assuring them that we had received their referrals. We informed parents regarding the longer waiting time and that they could still contact us if any support was required in the interim.

Review Visits

*** Doctors continued full services via teleconsultation over phone or secure video conferencing platform. All review appointments to be offered teleconsultations.**

If parents decline, the patient was placed on the waiting list until in-person visits are allowed again.

Explanation of psychological report results to parents/ caregivers

This was conducted over a visual interface (e.g. corporate Zoom or Webex).

This was deemed to be more appropriate for both the doctor and the parents/ caregivers to be able to see each other's non-verbal cues and facial expressions, especially when we could be informing parents of diagnoses like developmental delay, intellectual disability or autism spectrum disorder.

For parents who prefer a phone call to a video call, the reasons for this was documented in our case notes.

Clinic administrative staff would e-mail the report to parents prior to the teleconsultation, using an encrypted file.

Medication Reviews For Patients On Stimulant Medication

- A. Patients who require repeat prescriptions of medications were offered telephone consultations. Repeat prescriptions were sent electronically to the hospital pharmacy for patients who were tolerating the medications well.
- B. For patients who required commencement of stimulant medication (e.g. Methylphenidate), the physician makes the decision as to whether it is safe to commence the medication without a recent physical examination and blood pressure measurement.

Details of these patients will be recorded by our nurses. As the waiting time for a doctor might be long, these patients will be recalled for a blood pressure measurement visit with the nurse after in-person visits are allowed.

Patients who have blood pressure monitoring machines at home were encouraged to use that and report the blood pressure measurement back to the clinic.

Developmental Assessment & Physical Examination

Developmental assessment and physical examinations were deferred till when in-person visits are allowed. For children with complex medical needs (e.g. cardiac, children born extremely preterm, etc.), the Vineland Adaptive Behavioral Scale was administered by the psychologist over a secure video conferencing platform.

Figure 2 Child development unit doctor workflow during 'Circuit Breaker'.

Allied Health Professional Workflow

First Visits (Initial Assessments)

All patients were offered initial assessments, which included understanding parents' and teachers' concerns and structured parent interview (routines based assessment).

* Conducted over secure video conferencing platform

Available Interventions

1. Early Language and Language for Learning
2. Speech Fluency
3. Fine Motor and Handwriting Difficulties (for children 5 years and above)
4. Literacy Difficulties
5. Foundation Skills Program (for children with autism)

* Conducted over secure video conferencing platform

Parent Education Talks/ Workshops

Conducted as webinars

Telephone Call Check-ins

Therapists made phone calls to 'check in' with parents of patients identified to be 'vulnerable' (e.g. single parent household, low socioeconomic status, more than one child with special needs) to find out how they are coping and provide support as needed.

Suspended Group Programs

Referrals can continue to be made. Patients will be placed on waiting list for booking in after Circuit Breaker.

Psychologist Workflow

Available Psychological Assessments

1. Autism diagnostic assessment
 - Autism Diagnostic Interview – Revised (ADI-R)
2. Vineland Adaptive Behavior Scales (VABS)
 - Part of autism assessment, school readiness assessment or routine psychological assessment for children born extremely preterm

* Conducted over secure video conferencing platform

Available Psychological Interventions

1. Internalizing behaviors
 2. Externalizing behaviors
- * Fast track for urgent behavioral or emotional issues during COVID-19 pandemic

Suspended Assessments

1. School observations (due to school closure)
2. Play observations

Waitlisted Psychological Assessments

1. Autism Diagnostic Observation Schedule (ADOS)
2. Learning disability assessments
3. IQ assessments (e.g. Wechsler Preschool and Primary Scale of Intelligence, Wechsler Intelligence Scale for Children)

* Referrals can continue to be made. Patients will be placed on waiting list for booking in after Circuit Breaker.

Waitlisted Group Programs

1. Successful Transition Adaptation Readiness Skills (STARS) Program (to prepare children with autism for transition to mainstream school)

Figure 3 Child development unit allied health professional and psychologist workflow during 'Circuit Breaker'.

to be even higher.^{30,31} Beyond providing routine clinical care, we actively reached out to our patients via weekly emails and mobile phone messages, providing them with the strategies to help them cope. For a selected group of especially vulnerable families, (e.g., financial difficulties, multiple children with special needs) we initiated an outreach program with targeted phone calls. As per routine practice, our clinic hotlines and email were open so patients could contact us with any concerns or queries. We also set up an urgent referral process to fast-track referrals from the pediatric clinics at the main hospital, to address mood and behavioral problems resulting from or exacerbated by the COVID-19 pandemic.

2.5. Outreach to the community

We collaborated with the Ministry of Health and other public health institutions to create visual supports³² to help children prepare themselves for COVID-19 related health-care encounters. We created web resources based on needs highlighted by parents. These were suitable for neuro-typical and neuro-atypical children. These resources were housed on a dedicated COVID-19 page on the hospital website³³ and made available for free to the general public. They were also published on our hospital intranet for use by any clinician within the hospital.

2.6. Taking care of staff welfare

We recognized that staff welfare and morale were essential.^{34,35} Staff in our unit experienced stress in these areas: constant changes to clinic operations, supporting distressed parents, anxiety about the risks of being infected with COVID-19 and home stressors, e.g., supporting their children with HBL. A social worker was designated as CDU's 'mental health champion'. She actively approached team members to find out how they were coping and provided support. Our bimonthly virtual team meetings also served as an opportunity for social interaction and mutual support.

3. Results

3.1. Patient numbers and responses to changes in our clinical workflows

Fig. 4 shows the number of patients seen in January–April 2020, compared to the same period last year. While there was a significant drop in April after the 'CB' was announced, the total number of patients seen between January and March was comparable despite shifting to teleconsultation services. The 50% drop in consultations corresponded to 50% of medical staff being deployed to acute hospital settings, together with inability to undertake teleconsultations for new patients referred as per our Ministry of Health guidelines. Other contributors to the reduction in AHP and psychology patient numbers included: a 2-week break for designing a detailed workflow for tele-intervention, suspension of group therapy sessions and inability to perform certain psychological assessments.

It is too early to determine the full extent of the long-term mental health and psychosocial impact of COVID-19 and lockdown measures. Much of it is still speculative.³⁶ In the same vein, it is difficult to determine the real benefit of adaptive measures to stay in touch with families and their children served by our DBP service. We believe that continuing our services to support our families will help them during these unprecedented times.

Teleconsultations were, overall, well received by parents. Informal feedback on parents' perceptions showed that the vast majority of caregivers felt that their concerns were well addressed by the providers during the teleconsultations and they were open to continuing teleconsultations for their child even after the pandemic.

4. Discussion

The COVID-19 pandemic has required a collective and swift response from our team. Despite cutting back on physical visits, we continued to deliver clinical services. Preliminary analysis of results of a study looking at the experiences of parents and providers suggests overall positive results.

4.1. Challenges faced

4.1.1. Virtual access and IT devices

Prior to the pandemic, our electronic medical records could only be accessed within the clinic premises. To allow effective teleconsultations from home, we had to obtain VPN access and supporting devices (hospital laptops) for our staff. Due to resource constraints, we were only partially successful in obtaining devices even though VPN access was obtained for all. The rest of the staff had to travel to CDU to deliver the teleconsultations.

4.1.2. Inter-team communications and navigating change

Another challenge was coordinating the changes across the sub-divisions (pediatricians, psychologists, allied health, social workers, operational staff) within the clinic. The sub-division heads communicated frequently to alter clinical workflows in tandem with national pandemic response. The whole team met virtually fortnightly instead of monthly to discuss changes in clinical processes. Communicating the relevant operational changes to parents also involved calling or messaging individual patients due to the lack of a means of mass-dissemination of information for the parents we serve. This was labor and time intensive.

4.1.3. Rapid change from physical to teleconsultations

The acceptability and adoption of teleconsultations was difficult for some patients and health professionals alike. In fact, many health professionals felt that the practice of DBP requires a "soft touch" and face-to-face consultations allowed better emotional connection with families. It was also harder to assess family support and welfare of children, especially in the context of potential neglect and harm via teleconsultation. There were sporadic cases where children were found to be at risk of potential neglect and harm during teleconsultation. These families were linked to intensive community support. Parents who struggled with technology access or had poor literacy were not

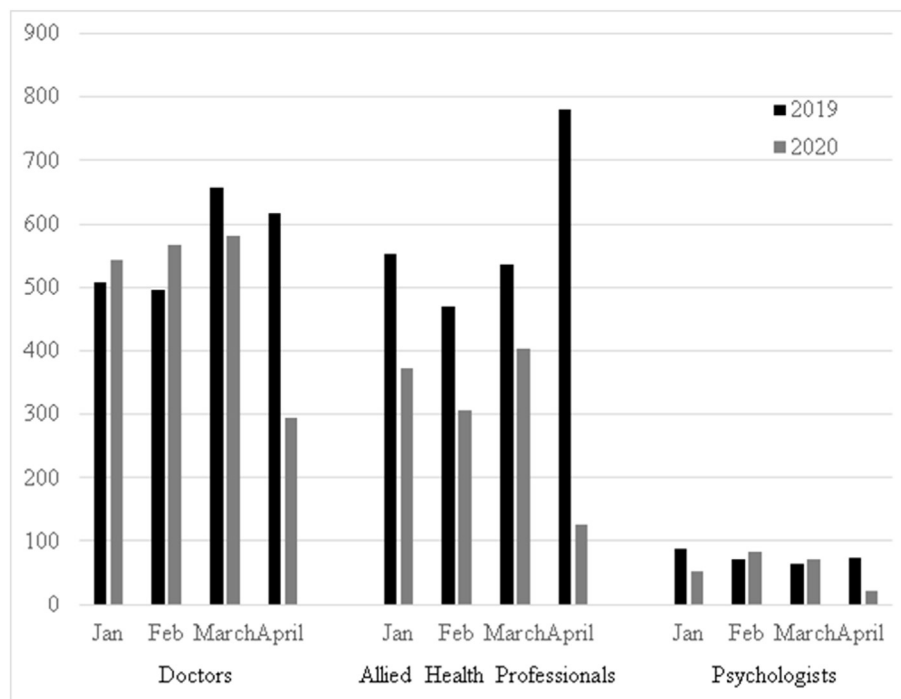


Figure 4 Patients numbers in our DPB Clinic from January to April 2020 (COVID-19 pandemic) compared to a similar period in 2019 (non-pandemic period).

able to access teleconsultations. This is also reported by Nittari et al.³⁷ We feel there is a need to look at financial and technology support grants for low-income families. Shared health-social-education service databases would be useful to understand which families and children are most vulnerable and require most assistance.

5. Future plans

This unprecedented pandemic has revealed a few significant learning points and shifts in the way we think about the systems around children with developmental disabilities. With the COVID-19 pandemic being prolonged, new norms of practice will be necessary even when ‘CB’ restrictions are eased. In the upcoming months, teleconsultations are likely to continue for the subset of patients who are suitable for it. Face-to-face consultations may be prioritized for patients who need psychological or developmental assessments, and families who need significant support (e.g., low income, technologically illiterate, multiple kids with special needs, etc.). We are exploring the possibility of conducting diagnostic assessment for autism using video-based observations and other validated forms of symptom-based scoring.³⁸ Additionally, we have also become a first adopter site of telehealth under the Ministry of Health Singapore.

Early intervention services may need to be innovative, and likely to offer a combination of some clinic visits alternating with some web-based coaching. A community of early interventionists could combine expertise in sharing and making widely available web-based intervention coaching and curriculum based on highest and best standards.³⁹ Making these resources accessible for free would benefit countries that struggle to put together such

material for their most needy families. In fact, our experience with non-English speaking families has taught us that most of the currently available web-based resources are not beneficial for these patients due to the language barrier. We will need to continue to adapt and refine our workflow processes as we learn together with our patients and their families during this pandemic journey.

6. Conclusion

We are able to continue our DBP services during this pandemic. Teleconsultation services, IT infrastructure, targeted staff training and parent education via video interface has played a key role in this process so far. We hope that this adaptive workflow (Figs. 1–3) could provide a model that could be replicable to other similar DBP centers globally with center-specific modifications in order to continue their DBP services. We believe it is essential to continue our advocacy and support for families with children with special needs even during the pandemic when public health and safety needs outweigh the less urgent intervention needs of children with developmental disabilities. Given that this pandemic is likely to be long drawn, our unit remains robust and ready to constantly adjust these workflows and make adaptations as we go along to best serve our patients and their families.

Funding statement

None.

Ethical information

Ethical approval was not required as per local institutional review board guidelines.

Declaration of competing interest

None.

Acknowledgement

No funding was required for this study. All authors contributed to the design and implementation of the research into clinical practice and writing of the manuscript. The author would like to thank the team at the NUH CDU for the contributions to the workflows implemented and Dr Dimple Rajgor formatting and submission of the manuscript for publication. The authors have declared that they have no competing or potential conflicts of interest.

References

- World Health Organization. *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. 2020. Available at <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020>. Accessed July 2, 2020.
- Chia RG, Moynihan R. *This alarming map shows where the coronavirus has spread in Singapore, one of the worst-hit areas outside of China*. 2020. Feb 14th 2020 Available at <https://www.businessinsider.com/coronavirus-singapore-map-shows-spread-worst-hit-outside-china-2020-2?IR=T>. Accessed July 2, 2020.
- Ministry of Health Singapore. *Circuit breaker to minimise further spread of COVID-19*. April 3rd 2020. Available at <https://www.moh.gov.sg/news-highlights/details/circuit-breaker-to-minimise-further-spread-of-covid-19>. Accessed July 2, 2020.
- Philips K, Uong A, Buckenmyer T, Cabana MD, Hsu D, Katyal C, et al. Rapid implementation of an adult Coronavirus disease 2019 unit in a children's hospital. *J Pediatr* 2020;222:22–7.
- Tan RMR, Ong GY, Chong SL, Ganapathy S, Tyebally A, Lee KP. Dynamic adaptation to COVID-19 in a Singapore paediatric emergency department. *Emerg Med J* 2020;37:252–4.
- Government of Canada. *COVID-19 pandemic guidance for the health care sector*. 22 Apr 2020. Available at <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/covid-19-pandemic-guidance-health-care-sector.html>. Accessed July 2, 2020.
- Scherzer AL, Chhagan M, Kauchali S, Susser E. Global perspective on early diagnosis and intervention for children with developmental delays and disabilities. *Dev Med Child Neurol* 2012;54:1079–84.
- Dawson G, Rogers S, Munson J, Smith M, Winter J, Greenson J, et al. Randomized, controlled trial of an intervention for toddlers with autism: the Early Start Denver Model. *Pediatrics* 2010;125:e17–23.
- Emanuel EJ, Persad G, Upshur R, Thome B, Parker M, Glickman A, et al. Fair allocation of scarce medical resources in the time of Covid-19. *N Engl J Med* 2020;382:2049–55.
- O'Keefe M, Macaulay C. Diagnosis in developmental–behavioural paediatrics: the art of diagnostic formulation. *J Paediatr Child Health* 2012;48:E15–26.
- Wade VA, Elliott JA, Hiller JE. Clinician acceptance is the key factor for sustainable telehealth services. *Qual Health Res* 2014;24:682–94.
- Lake A, Chan M. Putting science into practice for early child development. *Lancet* 2015;385:1816–7.
- Soares NS, Langkamp DL. Telehealth in developmental-behavioral pediatrics. *J Dev Behav Pediatr* 2012;33:656–65.
- Barnett WS, Escobar CM. Research on the cost effectiveness of early educational intervention: implications for research and policy. *Am J Community Psychol* 1989;17:677–704.
- Conroy K, Rea C, Kovacicova GI, Sprecher E, Reisinger E, Durant H, et al. Ensuring timely connection to early intervention for young children with developmental delays. *Pediatrics* 2018;142:e20174017.
- Bonis S. Stress and parents of children with autism: a review of literature. *Issues Ment Health Nurs* 2016;37:153–63.
- Perrigo JL, Berkovits LD, Cederbaum JA, Williams ME, Hurlburt MS. Child abuse and neglect re-report rates for young children with developmental delays. *Child Abuse Negl* 2018;83:1–9.
- Centers for Disease Control and Prevention. *Childhood maltreatment among children with disabilities*. September 18, 2019. Available at <https://www.cdc.gov/ncbddd/disabilityandsafety/abuse.html>. Accessed July 2, 2020.
- Jiao WY, Wang LN, Liu J, Fang SF, Jiao FY, Pettoello-Mantovani M, et al. Behavioral and emotional disorders in children during the COVID-19 epidemic. *J Pediatr* 2020;221:264–6.
- Schieve LA, Gonzalez V, Boulet SL, Visser SN, Rice CE, Van Naarden Braun K, et al. Concurrent medical conditions and health care use and needs among children with learning and behavioral developmental disabilities, National Health Interview Survey, 2006–2010. *Res Dev Disabil* 2012;33:467–76.
- Ho LY. Child development programme in Singapore 1988 to 2007. *Ann Acad Med Singap* 2007;36:898–910.
- The Straits Times Singapore. *New NUH paediatric centre houses all outpatient services for children under one roof*. 2019. Available at <https://www.straitstimes.com/singapore/health/new-nuh-paediatric-centre-houses-all-outpatient-services-for-children-under-one>. Accessed July 2, 2020.
- Lourdes MD. *Helping children with developmental needs have a better tomorrow*. 2020. SingHealth Medical News. Available at <https://www.singhealth.com.sg/news/medical-news/helping-children-with-developmental-needs>. Accessed July 2, 2020.
- A Singapore Government Agency Website. *What do the different DORSCON levels mean*. Published on 06 Feb 2020. Available at <https://www.gov.sg/article/what-do-the-different-dorscon-levels-mean>. Accessed July 6, 2020.
- Ministry of Health Singapore. *Licensing experimentation and adaptation programme (Leap) - a MOH regulatory sandbox*. 2018. Available at <https://www.moh.gov.sg/home/our-healthcare-system/licensing-experimentation-and-adaptation-programme-leap-a-moh-regulatory-sandbox>. Accessed July 2, 2020.
- Ministry of Health Singapore. *Telemedicine and issuance of online medical certificates*. SMC circular NO. 2/2018. 18 April 2018. Available at <https://www.moh.gov.sg/docs/librariesprovider5/default-document-library/joint-smc-and-moh-circular-on-teleconsultation-and-mcs.pdf>. Accessed July 2, 2020.
- National telemedicine guidelines. Jan 2015. Available at <https://www.moh.gov.sg/docs/librariesprovider5/resources-statistics/>

- guidelines/moh-cir-06_2015_30jan15_telemedicine-guidelines-rev.pdf. Accessed July 2, 2020.
28. Health Sciences Authority (HSA) Singapore. *Guidance on the conduct of clinical trials in relation to the COVID-19 situation*. 27 Mar 2020. Available at https://www.hsa.gov.sg/docs/default-source/hprg-io-ctb/hsa_ctb_covid-19_guidance_for_clinical_trials_27mar2020.pdf. Accessed July 2, 2020.
 29. Ministry of Education Singapore. *Schools and institutes of higher learning to shift to full home-based learning; preschools and student care centres to suspend general services*. April 03, 2020. Available at <https://www.moe.gov.sg/news/press-releases/schools-and-institutes-of-higher-learning-to-shift-to-full-home-based-learning-preschools-and-student-care-centres-to-suspend-general-services>. Accessed August 26, 2020.
 30. Humphreys KL, Myint MT, Zeanah CH. Increased risk for family violence during the COVID-19 pandemic. *Pediatrics* 2020;**145**:e20200982.
 31. The Straits Times Singapore. *Coronavirus: more cases of family violence during circuit breaker; police to proactively help victims*. May 14 2020. Available at <https://www.straitstimes.com/singapore/courts-crime/coronavirus-more-cases-of-family-violence-during-circuit-breaker-police-to>. Accessed July 2, 2020.
 32. Ministry of Health Singapore. Infographics. Available at <https://www.moh.gov.sg/covid-19/resources>. Accessed July 2 2020.
 33. National University Hospital. COVID-19 resources for parents and caregivers. Available at <https://www.nuh.com.sg/our-services/Specialties/Paediatrics/pages/covid-19-resources-for-parents-and-caregivers.aspx>. Accessed July 2, 2020.
 34. Schulte EE, Bernstein CA, Cabana MD. Addressing faculty emotional responses during the Coronavirus 2019 pandemic. *J Pediatr* 2020;**222**:13–4.
 35. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry* 2020;**7**:e15–6.
 36. Kumar A, Nayar KR. COVID 19 and its mental health consequences. *J Ment Health* 2020:1–2.
 37. Nittari G, Khuman R, Baldoni S, Pallotta G, Battineni G, Sirignano A, et al. Telemedicine practice: review of the current ethical and legal challenges. *Telemed J E Health* 2020;**26**:1427–37.
 38. Juárez AP, Weitlauf AS, Nicholson A, Pasternak A, Broderick N, Hine J, et al. Early identification of ASD through telemedicine: potential value for underserved populations. *J Autism Dev Disord* 2018;**48**:2601–10.
 39. Parsons D, Cordier R, Vaz S, Lee HC. Parent-mediated intervention training delivered remotely for children with autism spectrum disorder living outside of urban areas: systematic review. *J Med Internet Res* 2017;**19**:e198.