

acceptability, simplicity, flexibility, and stability. Sensitivity, specificity and positive predictive value were assessed by comparing the classification of weekly influenza epidemic status (epidemic/non-epidemic) using the gold-standard composite index (sentinel general practitioner influenza-like illness consultation rate \times influenza isolation rate, both from the Centre for Health Protection), with a threshold of 30% of its annual peak rate,³ and by the school absenteeism data with a threshold exceeding the 50 percentile (the median), using a standard two-by-two contingency table. Survey questionnaires were used to collect feedback on attitude, acceptability, and user experience from teachers and parents.

Results

Data were collected from November 2016 to June 2018. Our surveillance covered a total of 7711 students in 13 schools. All their absence episode were captured through the eAttendance system. For the seven schools adopting the Hong Kong University Disease Surveillance (S1-S7), 24.1% (975/4042) of parents consented for their app-based data to be used for informing disease surveillance in the present study.

A total of 95 412 person-days of absence was registered over the study period. Data completeness of absence episode data reported through the Hong Kong University Disease Surveillance (2621 person-days) and Teacher's Module (4162 person-days) were 100%, with full capturing of nature, cause, and symptoms. Among data submitted through the Hong Kong University Disease Surveillance, 67% were reported when the leave application was made by the parent through the app, and 33% were reported through reminder push message. Five rounds of holiday push messages were issued during the study period, with the response rate increased from 0.04% in the first round to 7.96% in the last round, and up to 27.23% in individual schools. A total of 55 alert signals had been issued to the corresponding schools, with 15 alerts for upper respiratory tract infection and 15 for hand, foot and mouth disease.

The temporal pattern of influenza-like illness activity was much better delineated by the all-cause absence rate (calculated as the number of absence / total number of students) than the reference gold standard of the Influenza virus activity in Hong Kong. For the peak in summer epidemic season of 2017 and winter season of 2018, the pattern of the epidemic peaks shown by the Hong Kong University Disease Surveillance preceded the peaks shown by the influenza virus activity in Hong Kong by 2 to 3 weeks (Fig 1). Rescaling of all-cause absent rate by the percentage of sick leave caused by upper respiratory tract infection (upper respiratory tract infection / sick leave) improved the performance of the surveillance system in terms of sensitivity

(from 68.4% to 73.7%), specificity (from 55.8% to 57.7%), and positive predictive value (36.1% to 38.9%), and more accurately reflected the epidemic status compared with the gold-standard data (Fig 2). When using additional symptom data to define and estimate the percentage of influenza-related sick leave, including adding influenza-like illness (fever and cough) or respiratory infections (≥ 2 respiratory symptoms) to upper respiratory tract infection, gave the same amount of improvement in surveillance performance.

Most teachers and parents found the surveillance system stable, simple, and easy to use, and it is useful for monitoring absenteeism, understanding increased influenza activity, and

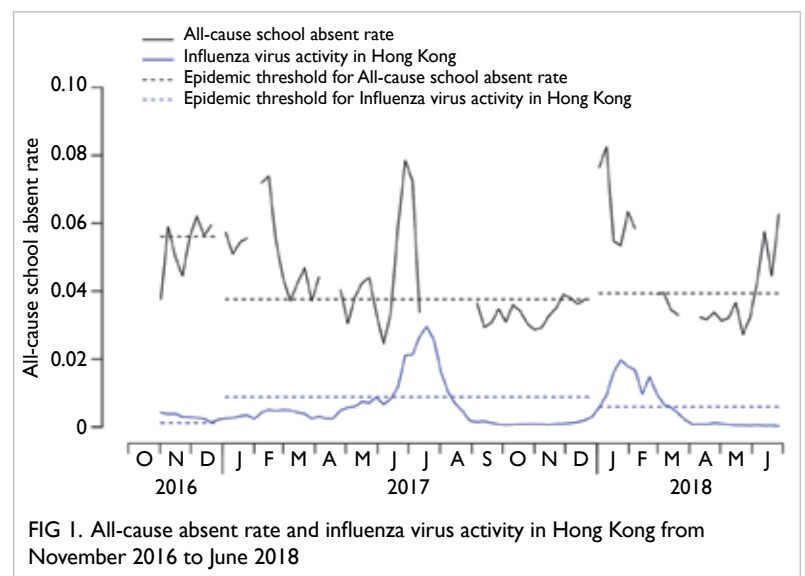


FIG 1. All-cause absent rate and influenza virus activity in Hong Kong from November 2016 to June 2018

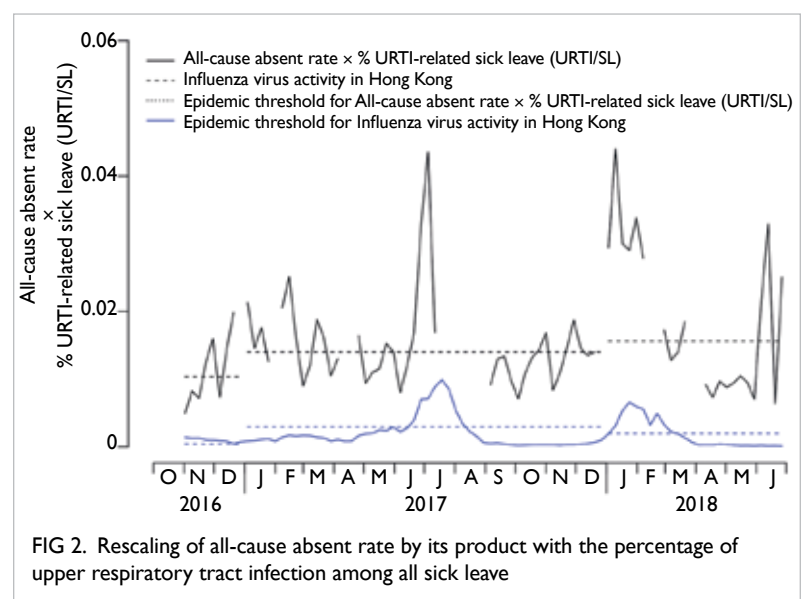


FIG 2. Rescaling of all-cause absent rate by its product with the percentage of upper respiratory tract infection among all sick leave

detecting influenza outbreaks among students. Most teachers and parents opined that using a mobile app-based approach for sick leave application is a trend, and that the app-based surveillance system should be introduced to more schools in Hong Kong.

Regarding the use of app-based platform for sick leave application and submitting surveillance data, 62.8% of parents had no particular concern but 20.7% expressed concern about privacy. 52.9% of teachers regarded the traditional paper-based method to be more reliable, and 11.8% regarded app-based technology may not be mature enough, but none expressed concern about data privacy.

Discussion

This project is the first school-based disease surveillance system using smartphone application technology in the world. There are benefits to using an app-based platform for capturing school absenteeism data for community disease surveillance. There is no trade-off between data specificity and timeliness. Our approach achieved an improvement in both data specificity and timeliness. The shifting of reporting duty from teachers to parents helped to reduce workload of teachers and avoided the usual problem of surveillance fatigue from data reporters. As parents have the best knowledge and incentive to strive for data precision, this contributes to better data accuracy and system sustainability.

The app-based influenza-like illness surveillance system was stable, giving good quality and timely data for prospective disease surveillance. It is feasible for capturing nature, cause, and symptom data of absence for informing prospective disease surveillance.

Collection of more specific data is useful for refining the existing system of monitoring the trend of influenza diseases activity. The improvement in sensitivity, specificity, and positive predictive value suggested that simple rescaling of a general and non-specific data (all-cause absent rate) by a more specific data (percentage of influenza-related sick leave), even if available only from a limited sample size, may improve the surveillance performance of the system. This observation is compatible with our previous finding in the smartcard-based system that symptom-specific data gave a better surveillance performance when compared with less-specific data.

Currently most schools are trying to familiarise with the usage and working out solutions for different technical and logistical issues. None is ready to rely exclusively on app-based platform for handling absence application. The usage pattern is expected to be improved once more schools have

passed the initial phase of learning. Other potential areas for improvement include the concerns about reliability by teachers and privacy by parents. A more comprehensive assessment is needed after the system is implemented on a larger scale for a longer time.

Conclusions

The app-based surveillance system provided good quality and timely data by capturing nature, cause, and symptom data of absence for informing prospective disease surveillance. Most teachers and parents found the system simple and easy to use and learn. Simple rescaling of the non-specific all-cause absent rate by the specific percentage of influenza-related sick leave considerably improved the sensitivity, specificity, and positive predictive value of the system. Epidemic peaks of influenza season as reflected by the rescaled school absenteeism data preceded those shown by traditional surveillance data by 2 to 3 weeks. The system achieved an improvement of both data specificity and timeliness. It helped to reduce the workload of teachers and avoid the usual problem of surveillance fatigue.

Acknowledgements

We thank all research staff and students of the School of Public Health, The University of Hong Kong, staff of the BoardLearning, as well as staff, parents, and students of all participating primary and secondary schools who had contributed to the surveillance programme.

Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#15141522). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

References

1. Centre for Health Protection, Department of Health, The Government of the Hong Kong Special Administrative Region. Guidelines on Prevention of Communicable Diseases in Schools / Kindergartens / Kindergartens-cum-Child Care Centres / Child Care Centres 2014.
2. Ip DKM, Cowling BJ, Lau EHY, Ho LM. Development and evaluation of an electronic school absenteeism system for influenza-like-illness surveillance in Hong Kong. Final report for the Health and Medical Research Fund (Report No.: 11101092); 2015.
3. Cowling BJ, Wong IO, Ho LM, Riley S, Leung GM. Methods for monitoring influenza surveillance data. *Int J Epidemiol* 2006;35:1314-21.

Physical activity and fundamental movement skills in children with developmental coordination disorder: abridged secondary publication

CHP Sit *, JJ Yu, CM Capio, R Masters, B Abernethy

KEY MESSAGES

1. Children with developmental coordination disorder had higher body mass index and poorer fundamental movement skills (FMS) proficiency and were less likely to participate in leisure time activities, compared with their peers with typical development.
2. There was a positive association between FMS and physical activity, which was stronger in children with typical development.
3. Using an error-reduced learning paradigm, FMS training was effective in improving FMS proficiency, facilitating active behaviour, and promoting enjoyment in activity participation of children. Some effects were even sustained for 12-months.
4. The school-based FMS training has potential

in promoting physical and psychological health in children with developmental coordination disorder in the long run.

Hong Kong Med J 2022;28(Suppl 3):S37-40

HMRF project number: 11120781

¹ CHP Sit, ² JJ Yu, ³ CM Capio, ⁴ R Masters, ⁵ B Abernethy

¹ Department of Sports Science and Physical Education, The Chinese University of Hong Kong

² Department of Sport and Exercise Science, Zhejiang University, China

³ Department of Early Childhood Education, The Education University of Hong Kong

⁴ Te Huataki Waiora School of Health, University of Waikato, New Zealand

⁵ Faculty of Health and Behavioural Sciences, The University of Queensland, Australia

* Principal applicant and corresponding author: sithp@cuhk.edu.hk

Introduction

Children with developmental coordination disorder (DCD) have poor motor coordination, which interferes with activities of daily living, academic performance, and health.¹ Compared with children with typical development (TD), children with DCD are more obese, less physically active, and at higher risk for obesity-related chronic diseases.

Children's physical activity is associated with their surrounding environments. The common correlates of physical activity in children are enjoyment and mastery of movement skills such as fundamental movement skills (FMS).² FMS are building blocks for developing specific sporting skills and forming lifetime physical activity patterns. Based on the International Classification of Functioning, Disability, and Health Model for Children and Youth framework,³ this study aimed to examine the relationship between FMS and physical activity, and the immediate-, shorter-, and longer-term effects of FMS training on motor skills proficiency, physical activity, and other psychological health effects such as enjoyment. The information gained is useful in identifying effective interventions that promote physical activity and health among children with DCD.

Methods

This study was approved by the Research Ethics Committee of the Chinese University of Hong Kong. It consisted of a cross-sectional study (study 1) and a randomised controlled trial (study 2). Hong Kong Chinese children aged 6 to 10 years from three primary schools were invited to participate. With parental consent, they were screened for DCD according to the Diagnostic and Statistical Manual of Mental Disorder diagnostic criteria. Motor difficulties were confirmed by teachers and/or parents using the Movement Assessment Battery for Children-2; and the score of ≤ 5 th percentile was defined as the cut-off for DCD.

In study 1, based on power calculation, 88 (59 boys, 29 girls) children with DCD and 100 (49 boys, 51 girls) children with TD were included. Their body height, weight, and body mass index (BMI) were measured. Proficiency of five FMS (running, jumping, catching, kicking, and throwing) was assessed using the process-oriented measures of movement form and product-oriented measures of movement outcomes (speed of running, distance of jumping, successful catching, successful goal shooting, and successful throwing). Physical activity was assessed using an ActiGraph activity monitor, and the time

spent in sedentary, light, moderate, and vigorous physical activity were calculated and then converted to percentages of monitored time. Enjoyment and diversity in each of the five activities (recreational, physical, social, skill-based, and self-improvement activities) were assessed using the Children's Assessment of Participation and Enjoyment. Higher scores indicated greater enjoyment and diversity.

In study 2, based on power calculation, 69 children with DCD and 62 age-matched children with TD from study 1 were randomly allocated to either the FMS training group or conventional physical education lessons (control) group, with four subgroups formed: FMS-DCD, FMS-TD, control-DCD, and control-TD. The same outcome measures were used. The intervention period was 8 weeks, 40 minutes per week during physical education classes at schools. The FMS training used an approach to motor learning that reduces the occurrence of errors during practice.⁴ Participants were assessed at baseline, prior to intervention, and at 1 week, 3 months, and 12 months after intervention.

Generalised linear (mixed) analyses were performed with controlling for confounders. Statistical significance was set at $P < 0.05$ for all tests.

Results

In study 1, compared with children with TD, children with DCD had higher BMI and poorer scores in both process-oriented measures (locomotor skills and jumping, both $P < 0.001$) and product-oriented measures (speed of running, $P < 0.05$; distance of jumping, $P < 0.001$; successful catching, $P < 0.01$;

successful goal shooting, $P < 0.05$) of FMS proficiency. Children with DCD also spent less % sedentary ($P < 0.05$) and were less likely to participate in leisure-time activities ($P < 0.05$), especially in social ($P < 0.01$) and self-improvement ($P < 0.01$) activities.

The DCD status was a predictor for % sedentary and % light physical activity; children with DCD tended to spend less time in sedentary and more time in light physical activity (Table 1). Sex was also a predictor, with boys having less % sedentary and higher % light physical activity and % moderate physical activity. Object control skills proficiency was a predictor for % vigorous physical activity, whereas speed of running was a predictor for % moderate physical activity.

FMS proficiency (object control skills, speed of running, and successful goal shooting) was positively associated with % moderate physical activity and/or % vigorous physical activity in children with TD only. For sex, better object control skills were positively associated with higher % moderate physical activity and % vigorous physical activity in boys, whereas better locomotor skills proficiency (faster running) was associated with higher % vigorous physical activity and less % sedentary in girls (data not shown).

In study 2, compared with baseline, the FMS training group showed significant improvements in FMS outcomes over time, with significant group \times time interaction effects for jumping ($B = 0.759$, $P < 0.05$), locomotor skills ($B = 1.069$, $P < 0.001$) at 1 week after intervention, and successful throwing ($B = 0.955$, $P < 0.05$) at 12 months after intervention. The control group also showed similar improvements

TABLE 1. Association of physical activity levels with variables after controlling for age and body mass index in generalised linear models

Variable	Physical activity, β (95% CI)			
	% sedentary	% light	% moderate	% vigorous
Developmental coordination disorder status (children with typical development as reference)	-0.49 (-0.95 to -0.02)*	0.51 (0.04 to 0.97)*	0.10 (-0.20 to 0.40)	-0.08 (-0.38 to 0.22)
Sex (girls as reference)	-0.63 (-1.01 to -0.25)†	0.60 (0.23 to 0.98)†	0.35 (0.06 to 0.65)*	0.16 (-0.14 to 0.46)
Fundamental movement skills proficiency				
Process-oriented measure				
Locomotor skills	-0.05 (-0.20 to 0.10)	0.03 (-0.12 to 0.18)	0.08 (-0.07 to 0.23)	0.13 (-0.03 to 0.28)
Object control skills	-0.02 (-0.18 to 0.13)	-0.03 (-0.18 to 0.12)	0.13 (-0.03 to 0.28)	0.19 (0.04 to 0.34)*
Product-oriented measure				
Speed of running, s	0.01 (-0.14 to 0.15)	0.05 (-0.10 to 0.19)	-0.18 (-0.32 to -0.03)*	-0.14 (-0.29 to 0.01)
Distance of jumping, m	-0.02 (-0.17 to 0.13)	0.01 (-0.14 to 0.16)	0.05 (-0.10 to 0.20)	0.09 (-0.07 to 0.24)
Successful catching, n	0.06 (-0.09 to 0.21)	-0.08 (-0.23 to 0.07)	0.05 (-0.10 to 0.20)	0.07 (-0.08 to 0.22)
Successful goal shooting, n	-0.05 (-0.20 to 0.10)	0.02 (-0.13 to 0.17)	0.13 (-0.02 to 0.28)	0.10 (-0.05 to 0.25)
Successful throwing, n	0.10 (-0.05 to 0.26)	-0.14 (-0.30 to 0.01)	0.09 (-0.07 to 0.24)	0.07 (-0.09 to 0.22)

* $P < 0.05$

† $P < 0.01$

TABLE 2. Comparisons of physical activity levels across the study groups (mean coefficient)

Effects	Physical activity							
	Weekdays				Weekend days			
	% sedentary	% light	% moderate	% vigorous [‡]	% sedentary	% light	% moderate	% vigorous
Intervention								
Conventional physical education lessons	0	0	0	0	0	0	0	0
Fundamental movement skills training	-1.516	1.079	0.043	0.216	-1.807	1.752	-0.230	0.222
Participant								
Children with typical development	0	0	0	0	0	0	0	0
Children with developmental coordination disorder	0.519	-0.592	0.096	-0.097	-2.391	1.762	0.504	0.105
Group × time interaction								
Fundamental movement skills training								
Baseline	0	0	0	0	0	0	0	0
1 week after intervention	-1.741	0.626	1.133 [†]	0.050	-2.047	1.467	0.623	0.126
3 months after intervention	0.980	-2.075	1.156 [*]	0.082	-1.096	-1.066	1.828 [†]	0.269
12 months after intervention	-1.107	-0.920	1.920 [†]	0.218	-4.134	2.925	1.036	0.158
Conventional physical education lessons								
Baseline	0	0	0	0	0	0	0	0
1 week after intervention	-2.694	2.256	0.456	-0.011	-3.699	3.449	0.115	0.051
3 months after intervention	-1.025	0.009	0.938 [*]	0.254	-0.589	0.210	0.151	0.162
12 months after intervention	-2.143	1.023	1.213 [*]	0.182	2.905	-2.810	-0.144	0.088

* P<0.05

† P<0.01

‡ Compared with baseline, children with developmental coordination disorder in the control group had a mean coefficient of 0.441 (P<0.01) at 1 week after intervention and 0.497 (P<0.05) at 12 months after intervention

in FMS outcomes over time, with significant interaction effects for jumping (B=0.890, P<0.05), throwing (B=1.280, P<0.05), and speed of running (B=0.255, P<0.05), with the control-DCD group having significantly higher scores at 1 week after intervention than at baseline (data not shown).

Significant group × time interaction effects were found in both groups (Table 2). The FMS training group had higher % moderate physical activity on weekdays at 1 week, 3 months, and 12 months after intervention; and weekend days at 3 months after intervention. The control groups also had higher % moderate physical activity on weekdays at 3 months and 12 months after intervention. There was a significant interaction effect for % vigorous physical activity at weekdays, in which the control-DCD group spending more % vigorous physical activity at 1 week and 12 months after intervention than at baseline.

All FMS and control groups showed a decrease in overall diversity of participation over time. There was an interaction effect for enjoyment of activity participation; the FMS-DCD subgroup had greater enjoyment at 1 week after intervention (B=0.514, P<0.05), 3 months after intervention (B=0.583,

P<0.05), and 12 months after intervention (B=0.837, P<0.01) [data not shown].

Discussion

FMS are the building blocks of future specific skills and play an important role in the lives of children with DCD. Based on the International Classification of Functioning, Disability, and Health Model for Children and Youth framework, our findings confirmed those reporting that children with DCD had higher BMI and poorer FMS proficiency, and were less likely to participate in leisure time activities than their peers with TD. FMS were associated with physical activity, but the association was stronger in children with TD. FMS skills, such as object control skills and locomotor skills (eg, running), were predictors for physical activity. These skills should be considered when designing and implementing motor skills interventions to facilitate active behaviour.

In children with DCD, FMS training was effective in improving FMS proficiency, facilitating active behaviour, and promoting enjoyment in participation during leisure time. The errorless motor learning model, which constraints the environment to minimise errors during practice,

enables children to experience a sense of mastery and success.⁵ This suggests that this type of learning model can accommodate variations of motor ability and promote feelings of success and enjoyment in physical activity participation. Some of these gains were even sustained over a 12-month period, supporting promotion of physical and psychological health in children with DCD in the long run.

Conclusions

Children with DCD have higher BMI and poorer FMS proficiency than children with TD. FMS were associated with physical activity, but the association was stronger in children with TD. FMS training appears to be an effective school-based intervention for children with DCD. The error-reduced learning paradigm appears to be a promising approach for FMS training for educators and rehabilitation professionals working with children with DCD.

Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#11120781). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

Disclosure

The results of this research have been previously published in:

1. Sit CH, Yu JJ, Wong SH, Capio CM, Masters R. A school-based physical activity intervention for children with developmental coordination disorder: a randomized controlled trial. *Res Dev Disabil* 2019;89:1-9.

References

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. Washington, DC; 2013.
2. Lubans DR, Morgan PJ, Cliff DP, Barnett LM, Okely AD. Fundamental movement skills in children and adolescents: review of associated health benefits. *Sports Med* 2010;40:1019-35.
3. World Health Organization. *International Classification of Functioning, Disability and Health: Children and Youth Version*. Geneva; 2007.
4. Capio CM, Poolton JM, Sit CH, Holmstrom M, Masters RS. Reducing errors benefits the field-based learning of a fundamental movement skill in children. *Scand J Med Sci Sports* 2013;23:181-8.
5. Yu J, Sit CH, Burnett A, Capio CM, Ha AS, Huang WY. Effects of fundamental movement skills training on children with developmental coordination disorder. *Adapt Phys Activ Q* 2016;33:134-55.

Five-step hand hygiene programme for students with mild intellectual disability: abridged secondary publication

RLT Lee *, C Leung, H Chen, WK Tong, PH Lee

KEY MESSAGE

The simplified five-step hand-washing procedure is more effective than the World Health Organization seven-step hand-washing procedure in terms of improvement in hand-washing quality and absenteeism rate in children with mild intellectual disabilities.

Hong Kong Med J 2022;28(Suppl 3):S41-2

HMRF project number: 13121452

¹ RLT Lee, ² C Leung, ³ H Chen, ⁴ WK Tong, ⁵ PH Lee

¹ The Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong

² Victoria University, Melbourne, Australia

³ Centre for Health Protection, Department of Health, Hong Kong

⁴ Hospital Authority, Hong Kong

⁵ Department of Health Science, University of Leicester, United Kingdom

* Principal applicant and corresponding author: reginalee@cuhk.edu.hk

Introduction

School-age children with intellectual disabilities (ID) are more vulnerable to infectious diseases because of difficulties to follow procedures involving proper hand washing.^{1,2} Frequent hand-to-mouth and close contact activities without proper hand washing place school-age children with ID at greater risk of acquiring infection.³ Most school-age children with ID have limited cognitive ability to recognise their health problems, describe their symptoms, and express their needs to others. The Centre for Health Protection recommends that targeted hand hygiene programmes be implemented in special schools for children with ID to prevent the spread of infection in the early stages of an outbreak.³

Children in school settings are 18 times more likely to contract pathogens than those staying at home.⁴ School-based hand-washing programmes are an important strategy to reduce the spread of illness.⁵ The World Health Organization seven-step hand-washing procedure is commonly used in special education school settings.⁶ We simplified it to a five-step procedure by rubbing palms and fingers at the same time and by eliminating the wrist-rubbing procedure. Thus, the five steps are rubbing (1) between fingers, (2) backs of hands, (3) backs of fingers, (4) fingertips, and (5) thumbs. We aimed to evaluate the simplified five-step procedure in terms of improvement in the quality of hand washing and reduction in school absenteeism in students with mild ID.

Methods

This quasi-experimental pilot study used a pre-test and post-test design, with a control group and a sustainability test. It was conducted over 12 weeks from 26 February to 30 May 2014 and consisted of four phases: (1) programme development, (2) programme validation, (3) feasibility testing,

and (4) sustainability assessment (4 weeks post-intervention).

The simplified five-step hand-washing programme used multimedia visualisation teaching strategies. The World Health Organization seven-step hand-washing programme with standard teaching strategies was used as the control group.

Two special schools were selected based on convenience sampling. The schools were similar in terms of characteristics and socioeconomics. Neither school had ever participated in any simplified hand-washing programme. Both schools had full-time school nurses and only enrolled children with mild ID without any physical challenges. A total of 140 students with mild ID (70 students per school) was the recruitment target. The inclusion criteria were those aged 6 to 15 years with mild ID (IQ score of 50–69) who were able to follow simple instructions and understand the training materials. Exclusion criteria were moderate-to-severe ID (IQ score of ≤ 49) and inability to comprehend and remember the instructions and training materials.

A validated fluorescent stain rating test was used to quantitatively assess the quality of hand washing, with scores ranging from 0 to 3.⁷ Direct observation of hand-washing practices was conducted by school nurses using a validated checklist. A sustainability assessment was conducted at 4 weeks after the completion of the programme. The 12-month absenteeism rate was acquired.

The Mann-Whitney *U* test was used to compare the outcomes between the intervention and control groups from pre-test to immediately post-test. For the sustainability assessment, the fluorescent stain ratings at immediately post-test and at 4 weeks after the completion of the programme were compared using the Wilcoxon Signed Ranks test. The efficacy of the programme in reducing school absenteeism was evaluated by comparing the one-year averaged sickness-related school absenteeism before and after

the intervention.

Results

A total of 155 students (112 boys and 39 girls) aged 6 to 16 years with mild ID were recruited in the intervention (n=78) and control (n=73) schools. Both samples were matched.

In direct observation, by the end of the first 2 weeks, more students in the intervention school than in the control school (45% vs. 18%) were able to wash their hands spontaneously without prompting.

In the fluorescent stain rating test, students in the intervention school had a significant increase in the hand-washing quality from pre-test to post-test in terms of the dorsum and palm aspects in both hands: left dorsum (+1.05, $P<0.001$), right dorsum (+1.00, $P<0.001$), left palm (+0.98, $P<0.001$), and right palm (+1.09, $P<0.001$), with a greater overall increase compared with students in the control school (+1.03 vs +0.34, $P<0.001$). Older students (secondary school form 1 to 3) performed hand washing better than younger students (primary school year 1 to 6) in the three time points.

In the sustainability test, 25 (32%) students in the intervention school were randomly selected at 4 weeks after the completion of the programme, the fluorescent staining rating of the 25 students at 4 weeks was not significantly different from that of the intervention group at immediately post-test in terms of the left dorsum (-0.04, $P=0.82$), right dorsum (-0.06, $P=0.67$), left palm (-0.08, $P=0.72$), and right palm (-0.04, $P=0.73$).

The intervention school had a significantly lower absenteeism rate than the control school in the same year (0.0167 ± 0.033 vs 0.028 ± 0.034 , $P=0.04$).

Discussion

Multimedia visualisation teaching strategies such as video modelling with visual prompts including lyrics and posters have been integrated into our simplified hand-washing programme.^{8,9} Both the intervention and control groups had a significant increase in the hand washing quality from pre-test to post-test, with a greater increase in the intervention group ($P<0.001$). This indicates that the programme is effective in enabling students with mild ID to learn proper hand-washing procedures. Our findings support the use of the simplified five-step hand-washing programme in students with mild ID in special school settings. Our findings have important implications for the prevention of infectious disease outbreaks in the early stages that are of concern to the public health sector.¹⁰ Quantitative estimates of the efficacy of hand hygiene interventions and feedbacks from school nurse and teachers for programme implementation may inform resource allocation for infection prevention and control plans for the target schools, eventually benefiting the school community.

Conclusions

The simplified five-step hand-washing procedure is more effective than the World Health Organization seven-step hand-washing procedure in terms of improvement in hand-washing quality and absenteeism rate in children with mild ID.

Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#13121452). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

Disclosure

The results of this research have been previously published in:

1. Lee RL, Leung C, Tong WK, Chen H, Lee PH. Comparative efficacy of a simplified handwashing program for improvement in hand hygiene and reduction of school absenteeism among children with intellectual disability. *Am J Infect Control* 2015;43:907-12.

References

1. Cannella-Malone HI, Fleming C, Chung YC, Wheeler GM, Basbagill AR, Singh AH. Teaching daily living skills to seven individuals with severe intellectual disabilities: a comparison of video prompting to video modeling. *J Posit Behav Interv* 2011;13:144-53.
2. Choi KS, Wong PK, Chung WY. Using computer-assisted method to teach children with intellectual disabilities handwashing skills. *Disabil Rehabil Assist Technol* 2012;7:507-16.
3. Wong VW, Cowling BJ, Aiello AE. Hand hygiene and risk of influenza virus infections in the community: a systematic review and meta-analysis. *Epidemiol Infect* 2014;142:922-32.
4. Bylinsky G. The new fight against killer microbes. *Fortune* 1994;130:74-80.
5. Centre for Health Protection. Centre for Health Protection advises special school with influenza A outbreak to suspend classes. Available from: <http://www.chp.gov.hk/en/content/568/32914.html>. Accessed 9 November 2014.
6. World Health Organization. Clean Care is Safe Care. 'Based on the 'How to Hand Wash'. Available from: http://www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf
7. Lee RL, Lee PH. To evaluate the effects of a simplified hand washing improvement program in schoolchildren with mild intellectual disability: a pilot study. *Res Dev Disabil* 2014;35:3014-25.
8. Decker MM, Buggie T. Using video self- and peer modeling to facilitate reading fluency in children with learning disabilities. *J Learn Disabil* 2014;47:167-77.
9. Colyer SP, Collins BC. Using natural cues within prompt levels to teach the next dollar strategy to students with disabilities. *J Spec Educ* 1996;30:305-18.
10. Centre for Health Protection. Scientific Committee on Infection Control. Available from: http://www.chp.gov.hk/files/pdf/grp_recommend_integrating_gloves_20050128.pdf. Accessed 9 November 2014.

Electrocoagulation versus gelatine-thrombin matrix sealant for haemostasis after laparoscopic surgery of ovarian endometriomas: a randomised control trial (abridged secondary publication)

PW Chung, TC Li

KEY MESSAGES

1. The use of haemostatic sealant after laparoscopic cystectomy for ovarian endometriomas achieved a greater increase in antral follicle count at 6 months, compared with bipolar coagulation.
2. FloSeal seems to provide greater ovarian protection. It is an alternative to bipolar coagulation for haemostasis during laparoscopic ovarian cystectomy for ovarian endometriomas, especially in those with fertility wish and

compromised ovarian reserve.

Hong Kong Med J 2022;28(Suppl 3):S43-4

HMRF project number: 04152656

PW Chung, TC Li

The Department of Obstetrics and Gynaecology, Prince of Wales Hospital

* Principal applicant: jacquelinechung@cuhk.edu.hk

Corresponding author: tinchiu.li@cuhk.edu.hk

Introduction

Up to 44% of women with endometriosis have ovarian endometrioma.¹ Laparoscopic cystectomy, by the stripping method, is the most common technique. However, the procedure may reduce ovarian reserve, which may be further reduced when bipolar coagulation is used for haemostasis on the residual ovarian tissue.^{1,2} The concern on bipolar coagulation and its impact on ovarian reserve has led to the use of non-thermal haemostasis approaches such as suturing or topical haemostatic agents. FloSeal (Baxter Healthcare, Deerfield [IL], USA) is a haemostatic sealant. It could be an alternative to bipolar coagulation during ovarian surgery. We aimed to determine the post-surgical ovarian reserve in women who achieved haemostasis using FloSeal or bipolar coagulation after laparoscopic cystectomy for ovarian endometriomas.

Methods

The study was approved by the Joint Chinese University of Hong Kong – New Territories East Clinical Research Ethics Committee (CRE 2011.296-T). This was a patient-blinded, randomised controlled trial conducted at the Prince of Wales Hospital between February 2013 and December 2017. Women aged 18 to 40 years with unilateral or bilateral ovarian endometrioma (measuring 3 to 8 cm) and with no history of ovarian surgery or hormonal therapy who underwent laparoscopic ovarian cystectomy (by the stripping method) were invited to participate.

Participants were asked to return to the hospital on day 3±1 of the menstrual cycle preoperatively

and day 3±1 of her 1st, 3rd, and 6th menstrual cycles after laparoscopic ovarian cystectomy for measurement of levels of follicular-stimulating hormone (FSH) and anti-mullerian hormone (AMH) and for ultrasonographic scanning of the ovaries to determine the antral follicle count (AFC) of each ovary. FSH, AMH, and AFC are markers for ovarian reserve. Particularly, AFC reflects the impact of any surgical treatment on the operated ovary. Perioperative outcomes including the success of haemostasis, complications, postoperative recovery, and pain and satisfaction scores (assessed using the Chinese version of the validated Client Satisfaction Questionnaire-8) were also analysed.

According to the preliminary result of an earlier study,³ the postoperative AFC in bipolar diathermy group was reduced to ~27% of preoperative level, whereas the postoperative AFC in FloSeal group was reduced to ~57%, similar to the suture group. Thus, the sample size required for an alpha value of 0.05 and 80% power would be 42 cases in each group. Assuming that 10% of the patients were excluded owing to incomplete data or dropouts, 47 cases in each group were needed.

Results

A total of 94 patients were randomised to the FloSeal group (n=47) or the bipolar coagulation group (n=47). 38 patients in each group completed the 6-month follow-up. The two groups were comparable in terms of patient age, follow-up rate, operative details, and postoperative complications. The successful haemostasis rate was 95.7% in the FloSeal group and 97.9% in the bipolar coagulation

group. Histopathology examination confirmed endometrioma in all cases. The two groups were comparable in terms of postoperative outcomes and pain and satisfaction scores.

Repeated measures ANOVA revealed a significant time effect ($P < 0.001$) and significant group \times time interaction effect ($P = 0.028$) on the AFC of the affected ovary. In both groups, the mean AFC at 1st, 3rd, and 6th months were all higher (but not significantly) than that before surgery. The change of mean AFC of the affected ovaries was significantly higher in the FloSeal group than in the bipolar coagulation group ($P = 0.018$).

Repeated measures ANOVA revealed a significant time effect ($P < 0.001$) but no group effect ($P = 0.320$) or group \times time effect ($P = 0.563$) on the AMH level. In both groups, the mean AMH level at 1st, 3rd, and 6th months was lower (but not significantly) than that before surgery. The change of AMH levels between the two groups was not significant.

Repeated measures ANOVA revealed no significant time effect ($P = 0.740$), group effect ($P = 0.473$), or group \times time effect ($P = 0.052$) on the FSH level. The change in FSH level between 1st month and baseline was greater in the bipolar coagulation group than in the FloSeal group ($p = 0.041$).

Discussion

Ovarian endometrioma is a common gynaecological condition and its surgical treatment may impair future fertility.^{3,4} Our results suggested that applying haemostatic sealant after laparoscopic cystectomy for ovarian endometriomas achieved a greater increase in AFC at follow-up, compared with bipolar coagulation. The protective effect of FloSeal may be particularly important to patients with an already compromised ovarian reserve. Therefore, FloSeal is a viable alternative to bipolar coagulation in achieving haemostasis after laparoscopic cystectomy for endometrioma, particularly in women who wish to preserve fertility.²

There is no consensus on a single test or measurement that accurately reflects reserve of an operated ovary. In the present study, three common ovarian reserve markers were used: AFC, AMH, and FSH. AFC was the primary outcome measure as it reflects the ovarian reserve of each ovary, whereas AMH and FSH reflect the combined reserve of both ovaries. It is likely that normal function of the unoperated ovary may mask any adverse effect of the operation of the operated ovary. Therefore, AFC of the affected ovary is a more sensitive measurement. Not surprisingly, a significant difference between the two groups was noted in the change of AFC but not in other markers. The AFC was measured by a single

sonographer who was blinded to the treatment modality to reduce inter and intra-observer bias.

Conclusion

The improvement in AFC of the operated ovary was greater in the FloSeal group than in the bipolar coagulation group at 6-month post-operation. FloSeal is an alternative to bipolar coagulation for haemostasis after laparoscopic cystectomy for endometrioma, particularly for women who wish to preserve fertility.

Acknowledgements

We thank Dr Irene Cheung Mei Ling, Jennifer Tsang Sau Fung, Tse Lai Yiu, and Jason Leung Chi Shun for assistance in implementation of this study. We are grateful to all patients for their participation.

Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#04152656). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>). The Hong Kong Obstetrical and Gynecological Trust Fund (#MD13951) was provided by the Hong Kong Obstetrical and Gynecological Society.

Disclosure

The results of this research have been previously published in:

1. Chung J, Law T, Chung C, Mak J, Sahota DS, Li TC. Impact of haemostatic sealant versus electrocoagulation on ovarian reserve after laparoscopic ovarian cystectomy of ovarian endometriomas: a randomised controlled trial. *BJOG* 2019;126:1267-75.

References

1. Jones KD, Sutton CJ. Laparoscopic management of ovarian endometriomas: a critical review of current practice. *Curr Opin Obstet Gynecol* 2000;12:309-15.
2. Angioli R, Muzii L, Montera R, et al. Feasibility of the use of novel matrix hemostatic sealant (FloSeal) to achieve hemostasis during laparoscopic excision of endometrioma. *J Minim Invasive Gynecol* 2009;16:153-6.
3. Coric M, Barisic D, Pavicic D, Karadza M, Banovic M. Electrocoagulation versus suture after laparoscopic stripping of ovarian endometriomas assessed by antral follicle count: preliminary results of randomized clinical trial. *Arch Gynecol Obstet* 2011;283:373-8.
4. Celik HG, Dogan E, Okyay E, et al. Effect of laparoscopic excision of endometriomas on ovarian reserve: serial changes in the serum antimullerian hormone levels. *Fertil Steril* 2012;97:1472-8.

Effectiveness and safety of acupuncture for overactive bladder: a randomised controlled trial (abridged secondary publication)

ZX Lin *, NHT Chan, YK Kwan, H Zhang, YT Chan, KYS Tam

KEY MESSAGE

Both active and sham acupuncture had a beneficial effect on improving overactive bladder symptoms. Both significantly reduced the incontinence frequency, the daytime and night urinary frequency, as well as scores of Urinary Distress Inventory, Incontinence Impact questionnaire, and Overactive Bladder Symptom Score. The treatment effects could last for at least 3 months. The night urinary frequency decreased more significantly in the active acupuncture group than in the sham control group after controlling for baseline nocturnal micturitions. Adverse effects were mild. Further research is needed

to investigate the placebo effect of acupuncture for overactive bladder.

Hong Kong Med J 2022;28(Suppl 3):S45-7

HMRF project number: 13141941

¹ ZX Lin, ² NHT Chan, ² YK Kwan, ¹ H Zhang, ¹ YT Chan, ³ KYS Tam

¹ School of Chinese Medicine, Faculty of Medicine, The Chinese University of Hong Kong

² Department of Medicine and Geriatrics, Tuen Mun Hospital

³ Yan Oi Tong – The Chinese University of Hong Kong Chinese Medicine Centre for Training and Research

* Principal applicant and corresponding author: linzx@cuhk.edu.hk

Introduction

Overactive bladder (OAB) is characterised by urgency, frequency, and nocturia and has negative impact on the quality of life of patients.¹ In Hong Kong, it is estimated that 15% of the population have OAB.² Treatment methods for OAB include pharmacological therapy, behavioural therapy, and physical therapy; all are largely unsatisfactory owing to the adverse effects of medication and limited efficacy of behavioural or physical therapies.³ Acupuncture may have clinical meaningful effect on urge incontinence⁴ and may improve OAB symptoms.⁵ The present study aimed to determine the effectiveness and safety of acupuncture for OAB.

Methods

Patients aged 60 to 90 years who were diagnosed with OAB and were able to complete the 3-day voiding diary, Urinary Distress Inventory (UDI-6), Incontinence Impact questionnaire (IIQ-7), and Overactive Bladder Symptom Score (OABSS) were invited to participate. Those were excluded who had OAB symptoms caused by stroke or spinal injury, life-threatening infection, unconsciousness or severe cognition deficits, dementia caused by Alzheimer disease or other neurodegenerative diseases, previous incontinence surgery, short-term active diuretic treatment or diuretic medication, previous acupuncture for OAB within 2 months, pregnancy, or diseases such as untreated urinary tract infection, urogenital tumours, prostate tumour, benign prostatic hyperplasia, or chronic urinary retention.

Participants were randomly assigned to active or sham acupuncture for OAB. Treatments were administered twice per week for 8 consecutive weeks by registered Chinese medicine practitioners with ≥ 3 years of clinical experience. The active acupuncture group received a standardised 30-minute acupuncture session, in addition to standard care. Based on traditional Chinese medicine theory, the pathogenesis of OAB symptoms is mainly attributed to insecurity of kidney qi (腎氣不固).⁶ The following acupuncture points were used: BL32 (Ciliao 次髎) [bilateral], BL33 (Zhongliao 中髎) [bilateral], BL40 (Weizhong 委中) [bilateral], BL23 (Shenshu 腎俞) [bilateral], SP6 (Sanyinjiao 三陰交) [bilateral], KI3 (Taixi 太溪) [bilateral], BL28 (Pangguangshu 膀胱俞) [bilateral], CV4 (Guanyuan 關元), and CV 3 (Zhongji 中極). The sham acupuncture group received sham acupuncture treatment in the same acupuncture points using blunt needles, with no penetration through the skin.

The primary outcome measure was the reduction in the frequency of incontinence episodes³ as derived from the 3-day voiding diary. Secondary outcome measures included the scores of IIQ-7, UDI-6, and OABSS, as well as the level of nerve growth factor (NGF), which is a biologic marker related to OAB symptoms, at the baseline, week 8, and week 20. Adverse events were also recorded.

Between-group differences were tested by the independent *t* test for continuous data, the Chi-square test for frequency data, or the Mann-Whitney *U* test for incontinence episodes. The generalised linear model was used to compare primary and

secondary outcomes between two groups after controlling baseline night urine frequency. All tests were two-sided. A P value of <0.05 was considered statistically significant.

Results

A total of 55 female and 45 male patients (mean age, 68.5 years) with OAB were recruited between June 2016 and September 2019 through post advertisement. They were randomly assigned to receive active acupuncture (n=51) or sham acupuncture (n=49). Two participants in each group withdrew from the study. The two groups were comparable in terms of baseline characteristics, except that the mean number of nocturnal micturitions was higher in the active acupuncture group than in the sham acupuncture group (8.08 ± 4.66 vs 5.73 ± 3.54).

In both groups, incontinence frequency and daytime and night urinary frequency decreased significantly after treatment and at follow-ups. The decrease in the night urinary frequency was greater in the active acupuncture group than in the sham acupuncture group after controlling for baseline nocturnal micturitions ($P=0.0288$). However, between-group differences in the decrease in incontinence frequency and daytime urinary frequency were not significant after controlling for baseline nocturnal micturitions.

Scores of IIQ-7, UDI-6, and OABSS decreased significantly after treatment and at follow-up in both groups, but there was no significant difference between groups. The level of NGF in urine samples was too low to be measured. Two patients reported mild adverse reactions such as mild uncomfortable feeling towards acupuncture treatment and skin allergic to the adhesive tape.

Discussion

Our study suggests a beneficial effect of acupuncture on improving OAB symptoms (in terms of reduction of the incontinence frequency and the daytime and night urinary frequency). The effect could last for at least 3 months. Active acupuncture achieved more pronounced improvement in the night urinary frequency than sham acupuncture did. The reduction in OAB symptoms was largely attributable to the acupuncture treatment. Nonetheless, sham acupuncture also produced treatment effect. Sham acupuncture can produce about 33% to 56% placebo effect for patients with OAB.^{3,7} We applied sham acupuncture needles to the true acupuncture points. It is plausible that the sham acupuncture could elicit treatment effects. In addition, the possible specific acupuncture treatment effect may be too small to be differentiated from the placebo effect. OAB is a chronic disease with fluctuating symptoms affected

by lifestyle, diet (alcohol and caffeine intake), mood, and sex (especially those with natural delivery of baby). It is difficult to measure all variables in the clinical trial. All these confounding factors render it difficult to test the effectiveness of acupuncture for the treatment of OAB.

This study has limitations. Like all acupuncture trials, it is difficult to keep the patients blinded to their treatment group, especially when the needles were on the acupuncture points for 30 minutes. Some patients had received previous acupuncture treatment for other disorders. The concentration of the NGF in the urine samples was too low to measure. In future trial, different sham acupuncture design that presses blunt needles outside true acupuncture points can be used. Those with no prior experience in acupuncture can be recruited. Objective outcome measures should be used to minimise the expectation of the acupuncture treatment.

Conclusions

Acupuncture treatment (both active and sham needling) could decrease the OAB symptoms in terms of the incontinence frequency and the daytime and night urinary frequency. Active acupuncture resulted in more significant improvement in night urinary frequency than sham acupuncture. Acupuncture may be a safe treatment option for patients with OAB.

Acknowledgements

We thank Mr Chun-Kam Lee, Mr Kit Ngan, Miss Lai Mei Kwan for conducting the acupuncture treatments and outcome assessments, Prof Lisa Xian for assisting in performing NGF experiments, and Prof Yuanqi Guo for advice on acupuncture techniques.

Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#13141941). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

Disclosure

The results of this research have been previously published in:

1. Chan YT, Zhang HW, Guo YQ, et al. Effectiveness and safety of acupuncture for elderly overactive bladder population in Hong Kong: study protocol for a randomized controlled trial. *Trials* 2018;19:376.
2. Lin ZX, Chan NHT, Kwan YK, et al. A randomized controlled trial to assess the effectiveness and safety of acupuncture for overactive bladder: a study in Hong Kong population. *Chin Med* 2020;15:108.

References

1. Wang L, Wang L, Shi G, et al. Efficacy and safety of ginger-salt-indirect moxibustion for urge urinary incontinence after stroke: protocol for a pilot multicenter randomised controlled trial. *BMJ Open* 2014;4:e006326.
2. Siu JY. The illness experiences of women with overactive bladder in Hong Kong. *Qual Health Res* 2014;24:801-10.
3. Emmons SL, Otto L. Acupuncture for overactive bladder: a randomized controlled trial. *Obstet Gynecol* 2005;106:138-43.
4. Engberg S, Cohen S, Sereika SM. The efficacy of acupuncture in treating urge and mixed incontinence in women: a pilot study. *J Wound Ostomy Continence Nurs* 2009;36:661-70.
5. Kitakoji H, Terasaki T, Honjo H, et al. Effect of acupuncture on the overactive bladder [in Japanese]. *Nihon Hinyokika Gakkai Zasshi* 1995;86:1514-9.
6. World Health Organization Western Pacific Region. WHO international standard terminologies on traditional medicine in the western pacific region. Available from: http://myweb.polyu.edu.hk/~hswhoccc/resource/PCH/WHOIST_traditional_medicine.pdf. Accessed 6 February 2015.
7. Dincer F, Linde K. Sham interventions in randomized clinical trials of acupuncture: a review. *Complement Ther Med* 2003;11:235-42.

AUTHOR INDEX

Abernethy B	37	Lee JSW	28
Au A	21	Lee PH	41
Capio CM	37	Lee RLT	41
Chair SY	17	Lee S	28
Chan AWK	17	Leung C	41
Chan KW	12	Leung DYP	17
Chan NHT	45	Leung LYL	17
Chan WC	28	Li TC	43
Chan YT	45	Lin ZX	45
Chen H	41	Low LPL	24
Cheng JCY	31	Ma SL	28
Cheng ST	28	Masters R	37
Cheung YF	12	Nan H	21
Chow PC	12	Ng F	21
Chung PW	43	Seto WK	8
Cowling BJ	34	Sit CHP	37
Fung LCW	17	Sit JWH	17
Hui SSC	31	So EKF	12
Ip DKMI	34	Sum R	21
Kwan YK	45	Tam KYS	45
Kwok TCY	28	Tong WK	41
Kwong A	21	Tse HF	8
Lam LCW	28	Wong S	21
Lam LW	24	Yiu KH	8
Lam TP	31	Yu BML	28
Lau EYC	34	Yu JJ	37
Lau RWL	31	Yuen MF	8
Lee ATC	28	Zhang H	45
Lee DTF	17, 24		

Disclaimer

The reports contained in this publication are for reference only and should not be regarded as a substitute for professional advice. The Government shall not be liable for any loss or damage, howsoever caused, arising from any information contained in these reports. The Government shall not be liable for any inaccuracies, incompleteness, omissions, mistakes or errors in these reports, or for any loss or damage arising from information presented herein. The opinions, findings, conclusions and recommendations expressed in this publication are those of the authors of the reports, and do not necessarily reflect the views of the Government. Nothing herein shall affect the copyright and other intellectual property rights in the information and material contained in these reports. All intellectual property rights and any other rights, if any, in relation to the contents of these reports are hereby reserved. The material herein may be reproduced for personal use but may not be reproduced or distributed for commercial purposes or any other exploitation without the prior written consent of the Government. Nothing contained in these reports shall constitute any of the authors of these reports an employer, employee, servant, agent or partner of the Government.

Published by the Hong Kong Academy of Medicine Press for the Government of the Hong Kong Special Administrative Region. The opinions expressed in the *Hong Kong Medical Journal* and its supplements are those of the authors and do not reflect the official policies of the Hong Kong Academy of Medicine, the Hong Kong Medical Association, the institutions to which the authors are affiliated, or those of the publisher.