Research

School Health Service: Championing the health of students in Singapore

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Abstract

Objectives: This is a descriptive study which tracks the history of the School Health Service (SHS), describes the current services and shares future improvements to its services and programmes.

Methods: The methods used in this narrative review involve studying related past and current literature online, statistics (mainly for Singapore students), evaluating screening, immunisation, intervention and educational programmes.

Results: The primary prevention in school-going children had improved the health and well-being of this age group and its transition to young adulthood. Together with the Singapore's National Childhood Immunisation Programme (NCIP), SHS has contributed towards the eradication of vaccine-related communicable diseases such as tuberculosis among school children and has greatly improved the public health in general.

Conclusion: SHS attributes its success with these critical success factors -- dedicated and passionate staff, dynamic and strong leadership, supportive schools' staff and parents. SHS will continue to forge the strong bonds formed over the years with the stakeholders and uphold their trust by improving their services and implementing innovative ideas.

keywords: *School Health Services, Preventive Health Services, Early Intervention (Education), Health Education, Immunisation Programmes*

Introduction

In Singapore, the School Health Service (SHS) began in 1921 with two doctors appointed to screen about 5,000 school children. The history of SHS can be divided into pre-war, post-war, post-independence and current periods. Programmes and services varied during these periods to meet the health needs of the school-going population. For example, during the pre-independence periods, the health conditions that were prevalent among school children included communicable diseases, malnutrition, anaemia and skin diseases (Table 1). Currently, there is a shift towards health conditions that relates to affluence and sedentary life-style, such as obesity, myopia and scoliosis. Screening programmes were implemented to detect and manage these conditions early.

Youth Preventive Services (YPS), a division under the Health Promotion Board (HPB) of Singapore, provides preventive programmes and services. The YPS comprises School Health Service (SHS), Student Health Centre (SHC), Nursing and Clinical Standards (NCS) and School Dental Services (SDS). The main activities involve health screening and immunisation of school children, school health promotion and clinical standards, quality and dental services. The SHS conducts annual age-appropriate medical checkups and immunisation for children in national schools as well as health education and promotion programmes to inculcate a healthy lifestyle in the young. Health screening in primary

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school comprises height and weight measurements, vision test, audiometry test, medical screening by doctors and immunisation. Secondary school students are screened for scoliosis, vision, hearing impairment and other health issues. A referral centre, SHC, provides follow up for students with medical conditions identified by field teams during medical screenings at schools. Immunisation is also administered to students who were unwell and had missed their immunisation in schools. When required, students are referred to visiting specialists at SHC or specialists in hospitals for further management. Preschoolers and primary one students who have been identified with defective vision are referred to the refraction clinic at the SHC and provided with prescription for their spectacles. An important department, the NCS, is involved in the training of nurses, conducting supervisory checks and auditing clinical services to ensure clinical standards are upheld.

Current health status of our students

Annually, about half a million of school children are screened and their health status in 2019 is as follows:

(i) Myopia - Number of students with visual acuity (VA (Snellen) ≥ 6/12 or VA (LogMAR) ≥ 0.30) for male students is 4702 per 10,000 examined and for female students is 5131 per 10,000 examined (1).

(ii) Obesity - Number of students who are overweight (BMI-for-age ≥ 90th percentile) for males who are in Primary 1 is 1094 per 10,000 examined and for females who are in Primary 1 is 897 per 10,000 examined. And for males who are in Primary 5 is 1739 per 10,000 examined and for females for who are in Primary 5 is 1307 per 10,000 examined (2).

Methods

The methods used in this narrative review involve studying related past and current literature online, statistics (mainly for Singapore students), evaluating screening, immunisation, intervention and educational programmes.

Results

Screenings and immunisations done in the past

Since the mid-1980s, schools were grouped into zones and each zone would comprise teams of doctors and nurses who conducted screenings and immunisation in schools (3). To date, the screening coverage achieved by SHS is more than 98% and that for immunisation is more than 95%. Nearly half a million school children are screened annually.

In the past, the health problems detected were mainly dental caries, visual defects, anaemia, malnutrition, skin diseases and communicable diseases (4). With modernisation and economic development, the type of medical conditions of school children has evolved to one that reflects affluence and sedentary lifestyle. Since early 1980s, more children were detected with visual defects, obesity and dental caries (5).

Enhancement of services

Based on the new disease trends and with the core functions of the SHS remaining unchanged, its services are constantly being reviewed and enhanced to benefit all students. Besides primary and secondary school children, SHS now extends its services to all preschools and post-secondary institutions (Institutes of Technological Education and polytechnics). In order to better manage the students after screening, the Lifestyle Clinic was set up to address those with chronic conditions.

Enhancement of SHS immunisation programme

Over the years, SHS immunisation programme has developed in line with Singapore's National Childhood Immunisation Programme (NCIP). Together with the NCIP, SHS has contributed towards the eradication of vaccine-related communicable diseases such as tuberculosis among school children and has greatly improved the public health in general (6).

Effectiveness of the SHS immunisation programme

Since 1921 to the present, SHS has contributed to the prevention of vaccine-related communicable diseases through immunisation (Table 1). In 2019, SHS has also offered human papillomavirus (HPV) as part of the school-based immunisation programme for all secondary one, four and five female students. The coverage of all immunisation remains high at more than 95% of the school population for relevant immunisation.

Table 1. A brief history of SHS

Health problems			
Before World War II	**After World War II**	**Post Independence**	**Current**
Dental caries, visual defects, anaemia among girls, malnutrition, skin diseases. Communicable diseases such as measles and typhoid.	An increase in malnutrition (including anaemia due to worm infestation and malaria).	Visual defects, obesity and dental caries.	Obesity, visual defects, scoliosis and dental caries.
SHS Screening Services			
Before World War II	**After World War II**	**Post Independence**	**Current**
In 1927, home visits to check home conditions, distribution of milk powder, eggs and medicine and health education was conducted. In 1928, Travelling Dispensary to overcome transportation difficulties was introduced in rural areas.	Undernourished students were put on Feeding Scheme. Food such as groundnuts, ikan bilis, eggs and milk powder were included. In mid 1946, North Canal Road School Clinic became the first clinic for school children. Health screening were conducted on Mobile Bus in schools. In 1959, SHC in Institute of Health (IOH) was set up as the referral centre for field teams to refer students identified with medical conditions.	In 1975, cessation of School Travelling Dispensary. Also in 1975, audiometric screening was included. In 1977, trained school nurse practitioners (SNP) conducted screening in national schools. In 1981, the SHS commenced backbone screening for scoliosis	In 2002, preschool visual screening began. In 2008, Student Health Advisor (SHA) Programme was introduced in secondary schools. SHA coaches the obese students and/or youth smokers on healthy lifestyle practices. As of 2009, primary and secondary school health teams, comprise doctors and nurses delivered school health services in four zones. In 2013, nutritional assessment for preschoolers, using height/weight and BMI assessment was introduced.

SHS Immunisation Programme			
Before World War II	**After World War II**	**Post Independence**	**Current**
In 1869, smallpox vaccination was made compulsory. In 1913, smallpox vaccination was included in SHS. In 1926, Diphtheria was introduced. In 1926, Oral Polio was introduced.	In 1948, "Mantoux tests" was conducted for tuberculosis (TB). In 1951, Bacillus Calmette-Guerin (BCG) was introduced. In 1959, mass inoculation campaign against TB, small pox, diphtheria and poliomyelitis was conducted.	In 2001, a four-year Hepatitis B programme for students born before 1987 was conducted. Bacillus Calmette-Guerin was discontinued as it is included in NCIP. At end of 2013, OPV was discontinued for Primary one. In 1985, Measles, mumps and rubella (MMR) was made compulsory. In 1997, the SHS included measles vaccination, as a booster for primary school students due to concern over resurgence of measles. In 2013, SHS continued to follow up on those students who have missed the injection before two years old.	Since 2008, second booster against diphtheria and tetanus was introduced for ten to 11 years old (primary five students). And a third booster oral polio vaccine (OPV) was also introduced to the same age group. In 2019, Human Papillomavirus (HPV) programme for all Secondary one, four and five female students was introduced.

Addressing obesity

The prevalence of childhood obesity has increased from 10% in 2010 to 13% in 2017 (7). To control this trend, the Lifestyle Clinic, formerly known as the Nutrition Clinic, was set up in 2001. It has been educating children and their parents to take ownership of their health by promoting a healthy and active lifestyle.

Primary, secondary schools and junior colleges are encouraged to send their overweight and severely overweight students in groups to the Lifestyle Clinic for a medical assessment which includes blood pressure measurement and blood test to assess blood lipids and glucose level. Those identified in schools as severely underweight students are also referred to the Lifestyle Clinic for a medical assessment and dietary counselling. One-third of obese students screened were found to have either elevated blood pressure or abnormal fasting lipids and were referred to the Lifestyle Clinic for lifestyle coaching and monitoring and if necessary, referred to an endocrinologist. Students with normal blood tests results are referred to Student Health Advisors (SHA) and HPB's school and community-based programmes. Since 2018, these medical assessments have also been offered onsite at schools.

Effectiveness of Lifestyle coaching programme

In 2017, out of 1,129 students who participated in the lifestyle coaching programme, about 54% reduced their Body Mass Index-for-age to a healthier level (8).

Healthier Meals in Schools Programme

Apart from the life coaching programme, in 2017, the "Healthier Meals in Schools Programme" was launched to introduce healthy eating in preschools, primary, secondary schools and junior colleges.

Effectiveness of Healthier Meals in Schools Programme

In 2019, 1,040 preschools have started serving healthier meals and 79,040 preschool children have benefitted from the programme (8). All the other primary and secondary schools also serve balanced and healthy meals.

Addressing smoking

Besides helping students to lose weight and improve their lifestyle, SHAs in schools also help smokers quit smoking and manage other chronic illnesses. These SHAs, stationed in schools, Institutes of Technological Education and polytechnics, offer lifestyle coaching and group counselling programmes such as the "school-based mental well-being programmes" aims to help to achieve the national target reduction of adult smoking in Singapore to 12 per cent by 2020 (11). National Population Health Survey of 2019 shows a drop in the population of smokers from 13.9% in 2010 to 10.6% in 2019 (12).

Effectiveness of SHA and HPB's school and community-based programme

In 2017, 44% of the students who participated in the SHA programme achieved weight loss or maintained their weight and for smokers who participated in the coaching programme, 11% of the students reduced or quit smoking after the three months post intervention period (9).

Addressing myopia

Another health issue observed among students is myopia. The rate of myopia is among the highest in the world, in 2011, with 65 percent among primary six students having defective vision (8). The National Myopia Prevention Programme (NMPP) was introduced in 2001 to prevent myopia among primary school children. It was then extended to preschools in 2002 and provided vision screening and promoted good eye care habits. In 2017, a total of 354,188 school children in preschools, primary and secondary schools had their vision screened (8).

Since 2006, SHS has been offering vouchers to subsidise free lenses through participating optical shops to underprivileged school children with myopia, who are on the government's Financial Assistance Scheme (FAS). In addition, over the years, SHS has been improving the accessibility of these services by partnering optometrists to provide refraction, prescription and the fitting of spectacles at schools. To date, through these "Roving Optical Shops", around 2,600 children have redeemed their spectacles with the vouchers.

Effectiveness of National Myopia Prevention Programme

The promotion of good eye habits has contributed towards a reduction in the rate of myopia by 5% among primary school students, from 38% (in 2004) to 33% (in 2009) (10).

Embracing technology and its effectiveness

Prior to 2006, screening and immunisation data were recorded on cards. With technological advancement, these data were then captured on computer systems. The SHS computer systems have evolved from the mainframe system to the current online system, which allows entry, sharing and easy retrieval of health-screening and immunisation data.

To improve the interactive process with parents, in 2015, the Child Consent Portal (CCP) was introduced for parents to submit consent for their child's immunisation online. Reminders are also sent to parents via mobile phones for students who are referred and default their appointments for follow-up consultation. In 2017, the eHealthbook (electronic health booklet) was launched to allow parents to view the health records of their children online at their convenience.

To increase efficiency in screening, electronic weighing scales are used by our screening teams to measure and capture children's weight and height measurements directly into our computerised systems and calculate their Body Mass Index electronically. By using electronic weighing scales, nurses are allowed to focus on their core function of health screening and immunisation.

Improved cold chain management system

Over the years, SHS has improved its vaccine cold chain management by instituting a 24-hour monitoring system to ensure vaccines do not lose their immunogenicity/potency from the point of storage at warehouse chillers, transportation and delivery to schools.

Developing framework and its impact

The clinical quality and safety framework developed in the 1990s, reviewed regularly, monitors the clinical standards and processes to ensure safety and quality of the services. With the healthy child being our ultimate goal, SHS's focus, comprises the following seven areas:

- Standards setting of clinical operating procedures and guidelines
- Skills assessment of all nursing staff
- Monthly supervisory checks
- Risk management to address identified areas and issues
- Annual audit to identify potential gaps
- Assess service delivery to ensure customers' satisfaction
- Service provider monitoring to ensure service level agreement and meeting of Key Performance Indicator (KPI) targets.

Discussion

SHS attributes its success with these critical success factors -- dedicated and passionate staff, dynamic and strong leadership, supportive parents, Ministry of Education and schools' staff. SHS will continue to forge the strong bonds formed over the years with the stakeholders and uphold their trust by improving its services and implementing innovative ideas. Tapping on technology and providing alternatives in the delivery of services, have enabled nurses to focus on their core expertise in screening and immunisation. Work processes are reorganised more efficiently by reducing manpower, paper based-documentation and manual processes. More automation is planned for the future by using self-check kiosks that allow older school children to check their height, weight, vision and hearing and capturing the test results automatically into computer systems. SHS continues to remain relevant by analysing emergent disease trends among students such as obesity and hearing loss in older children and early detection and management of common medical conditions such as obesity, myopia and scoliosis.

Conclusion

From the perspective of public health, the future goals of the school health programs in Singapore is still to screen and conduct intervention for all the students and the focus upstream on younger preschool students and even influencing and ensuring the health of mothers during their pregnancies and the first 1000 days of their ba-

bies. This focus would require collaboration and partnership with multiple agencies such as maternal hospitals, preschools, parenting groups, community agencies and parents themselves.

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Conflict of interest

The author(s) declare(s) that there is no conflict of interest.

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