

Communicable Diseases

WATCH



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FEATURE IN FOCUS

A local outbreak of invasive infection of Group B Streptococcus ST283 related to freshwater fish, September – October 2024

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Background

Streptococcus agalactiae, commonly known as Group B Streptococcus (GBS), is a bacterium widely distributed among diverse species including humans, mammals, amphibians, reptiles, and fish. GBS colonises the gastrointestinal and genitourinary tracts of about 20% to 40% of healthy adults as commensal.¹

A specific strain of GBS, known as sequence type 283 (ST283), is among the more virulent strains and has been associated with invasive diseases in otherwise healthy adults or those with relatively few underlying co-morbidities. The presence of ST283 has been reported in freshwater fish, in particular farmed fish, in Southeast Asian countries, with prevalence ranging from 12.5% to 100%.² Although the exact mode of transmission remains unclear, literature suggests that invasive GBS infection is related to consumption of raw or undercooked freshwater fish contaminated with ST283 or improper handling of freshwater fish.

This article aims to describe the investigation and findings of a recent outbreak of invasive GBS ST283 infections in Hong Kong and the control measures taken.

Global situation and previous local outbreaks

The first confirmed human case of ST283 infection could be traced back to 1995. A major outbreak was reported in Singapore in 2015³, involving at least 146 cases. Epidemiological investigations revealed a strong linkage with the consumption of raw freshwater fish, leading to the banning of sales of dishes made with raw freshwater fish in Singapore since December 2015.

Following the Singapore outbreak, invasive ST283 disease continued to be reported, mainly in Southeast Asia. Affected areas included Mainland China, Hong Kong, Laos, Singapore, Thailand, Vietnam and Myanmar.⁴

In the summer of 2021 (during September and October), Hong Kong recorded a cluster of more than 50 cases of ST283 infection. Investigations by the Centre for Health Protection (CHP) of the Department of Health revealed an association with contact with raw freshwater fish especially when having hand wounds. The CHP subsequently enhanced surveillance on invasive GBS cases in collaboration with the Hospital Authority (HA).

Local outbreak in summer of 2024

Ongoing enhanced surveillance on invasive GBS cases conducted by the CHP and the HA showed an upward trend in the number of in-patients tested positive for GBS from sterile sites including blood, joint fluid and cerebrospinal fluid (CSF) since late August 2024. Upon recognising the surge in cases, the CHP promptly initiated epidemiological investigations and performed genetic analyses on patient specimens. Whole genome sequencing conducted by the CHP's Public Health Laboratory Services Branch confirmed that the increase in invasive GBS cases was attributable to the ST283 strain.

Genetic analyses of specimens collected from invasive GBS cases admitted to public hospitals from August to early October detected a total of 131 ST283 cases. The patients comprised 61 males and 70 females, aged between 29 and 97 years (median: 69). They had onset of symptoms from August 8 to September 30, 2024 (Figure 1). Their clinical presentations mainly included sepsis (68; 52%), joint abscesses (39; 30%) and meningitis (10; 8%). Among them, 100 (76%) had underlying illnesses. Four (3%) had died of invasive GBS infection.

The CHP promptly collected detailed information from the cases, including demographic data, medical history, food and travel history, and exposure to freshwater fish. The patients included both retirees and individuals from various occupations. Among the 131 ST283 cases, 106 (81%) reported handling or contact with raw freshwater fish before onset of symptoms, with some reporting frequent handling. We inquired in detail about how the fish was handled, including purchasing, washing/rinsing, rubbing, descaling, chopping, cooking processes, and whether gloves were worn. They either visited freshwater fish stalls in wet markets to buy freshwater fish or prepared raw freshwater fish at home. Among those who prepared fish at home, nearly three fourths handled the fish with bare hands without wearing gloves. Fifteen of these 106 cases reported having wounds on their hands during handling. For another 18 patients, they could not confirm whether the freshwater fish consumed had been thoroughly cooked.

None of the 131 patients were fishmongers or individuals engaged in fish culture-related jobs, likely because they were equipped with proper protective gear during work. A single common source was ruled out. The patients resided in all 18 districts throughout the territory with no geographical clustering. The freshwater fish concerned were bought from 58 different markets across 18 districts and there were no common food premises patronised by the cases.

In-depth analysis was performed using logistic regression, with invasive GBS cases of other sequence types as controls. The multivariable model that controlled for age, sex, occupation, medical conditions, locations of residence and consumption, and other exposures showed that handling raw freshwater fish was a highly significant risk factor with adjusted odds ratio 9.2 (95% confidence interval 1.5 – 56.9), indicating a strong association with ST283 infection.

In light of the epidemiological findings, the CHP carried out environmental sampling at the Freshwater Fish Market in Cheung Sha Wan Wholesale Food Market (CSWWFM), four wet markets including Shek Wu Hui Market (Figure 2), Shek Wu Hui Farmers' Produce Retailing Point, Yeung Uk Road Market and Pei Ho Street Market, and three local fish farms in Yuen Long. Two freshwater fish samples and three environmental swabs collected from a freshwater retail stall in Shek Wu Hui Market were tested positive for ST283 while the other freshwater fish samples and environmental swabs taken were tested negative for ST283 (Table 1). Genome sequencing showed that the positive samples matched those from the human cases, indicating that they might share the same origin. Relevant sales and supply documents were inspected by the investigation teams, and the information suggested that the concerned batch of fish was supplied by a wholesaler in CSWWFM.

The Agriculture, Fisheries and Conservation Department (AFCD) and the Food and Environmental Hygiene Department (FEHD) carried out immediate cleansing and thorough disinfection in the relevant markets. The FEHD inspected all fish stalls, licensed Fresh Provision Shops and Permitted Premises selling freshwater fish in Hong Kong, provided education on hygiene to relevant operators and advised them to carry out deep cleaning and disinfection work at their premises after business hours. Furthermore, the FEHD has also stepped up the publicity and health education work by advising the public via different channels (e.g. social media, pamphlets, short videos, webpage) not to eat raw or undercooked freshwater fish, and to pay attention to personal and environmental hygiene when handling fresh water fish. The CHP stepped up territory-wide publicity and health education to raise public awareness of invasive GBS ST283 infection through various channels, including press releases, social media posts and media interviews. Additionally, the CHP advised the public to consult a doctor immediately if

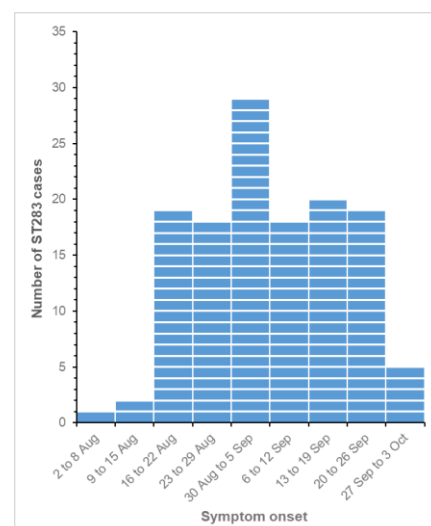


Figure 1 – Epidemic curve of the outbreak of ST283.



Figure 2 – A freshwater fish stall in Shek Wu Hui Market.

Table 1 – Result of environmental sampling.

	Number of freshwater fish samples (number positive for ST283)	Number of environmental swabs (number positive for ST283)	Total (number positive for ST283)
Fish farms	9 (0)	0 (0)	9 (0)
Wholesale market	12 (0)	15 (0)	27 (0)
Retail markets	30 (2*)	37 (3*)	67 (5*)
Total (number positive for ST283)	51 (2*)	52 (3*)	103 (5*)

* Collected from Shek Wu Hui Market.

they experienced relevant symptoms. We also alerted medical practitioners to stay vigilant against invasive GBS ST283 infection and collaborated with the HA to monitor new cases daily to identify as many patients as possible.

With these rapid and effective measures and the concerted efforts of the Government, the trend of invasive GBS cases has been decreasing stepwise after the peak in early September. The number of GBS cases has now largely returned to the level observed in early August, prior to the outbreak.

Conclusion

This outbreak of ST283 was strongly associated with handling of raw freshwater fish based on the epidemiological findings and statistical analysis. The outbreak demonstrated effective interdepartmental coordination between the CHP, FEHD and AFCD in implementing various measures to control the outbreak. The existing surveillance system swiftly detected the surge in cases, prompting an immediate epidemiological investigation to identify associated factors. Intensive publicity and public education carried out in September effectively changed the behaviour of the general public, resulting in reduced exposure and a rapid decline in the number of cases.

The scientific literature on GBS ST283 remains relatively limited, with significant data gaps. Some overseas studies suggest that the proliferation of GBS ST283 may be influenced by environmental conditions such as elevated temperature. GBS isolates from freshwater fish have been observed to exhibit optimal growth at 30°C, and invasive GBS ST283 cases are predominantly reported from Southeast Asia, where the climate is hot. Coupled with large local outbreaks that occurred in Hong Kong during the summer months of 2021 and 2024, it remains uncertain whether similar increases in GBS ST283 activity associated with freshwater fish would recur during future summer months.

Therefore, it is imperative to enhance interdepartmental collaboration to raise public awareness about related preventive measures (see the box below), as well as to continue strengthening surveillance to detect abnormal or unusual signals before the summer season. This proactive approach will enable the timely implementation of specific preventive measures modelled from the effective practices employed during the recent outbreak response.



Health advice on GBS ST283

To prevent invasive GBS ST283 infection, members of the public are reminded to maintain personal, food and environmental hygiene and should keep their hands clean and practise good wound care at all times. The public should wear gloves when touching or handling raw freshwater fish. If symptoms such as an inflamed wound and fever develop, medical attention should be sought promptly. Freshwater fish sashimi has been banned in Hong Kong. The public should refrain from consuming raw or undercooked freshwater fish.

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A Knowledge, Attitudes, and Practice (KAP) survey on prevention of mosquito-borne diseases in Hong Kong

Reported by Dr LI Wang-kit, Senior Medical and Health Officer and Ms Virginia TAO Wing-yan, Scientific Officer, Health Promotion Branch; and Dr Sam LI Wing-sum, Medical and Health Officer, Field Epidemiology Training Programme Section, Communicable Disease Branch, CHP

Introduction

Globally, over 17% of human infectious diseases were acquired from vectors (e.g. mosquitoes), causing more than 700 000 deaths yearly.¹ Mosquito-borne diseases (MBD) such as malaria, dengue, and Zika are of major public health concerns.

One example is dengue fever. Since early 2023, increased number of dengue outbreaks have been reported worldwide including some popular travel destinations for Hong Kong people.² There is a continuous risk of disease importation. As one of the vectors

Aedes albopictus is widely distributed in Hong Kong especially during summer season, imported cases may potentially lead to local transmission. Public health efforts and behavioural changes are crucial in combating these threats.¹

The previous survey encompassing Knowledge, Attitudes, and Practice (KAP) of vector-borne diseases prevention was conducted in 2014. A new round of survey was conducted in 2024 to inform the strategy of health education and publicity programme planning.

Method

A telephone survey with dual sampling approach involving both landline and mobile phone numbers was conducted between January to February 2024 among Hong Kong residents aged 18 or above. Socio-demographic data, as well as KAP regarding the transmission and prevention of MBD were collected. The data were weighted to align with the sex and age distribution of the Hong Kong population. Bivariate analysis was used for identifying the associated factors which were then put into multivariable logistic regression to identify socio-demographic factors associated with KAP on MBD.

Results

A total of 2 002 eligible respondents were successfully interviewed (response rate: 21.3%). About 5% respondents did not know any MBD. For the rest, the awareness was higher for dengue fever (97.4%), Japanese encephalitis (87.3%), and malaria (72.1%); while lower for Zika virus infection (52.9%) and chikungunya fever (12.6%) (Figure 1). 63.9% of all respondents correctly identified dengue, Japanese encephalitis and malaria as MBD, which is higher than the corresponding finding in the previous survey (41.3%) conducted in 2014. Only 29.9% recognised that asymptomatic individuals infected with dengue fever can transmit the virus to mosquitoes, and 17.7% knew that sexual contact is one of the transmission routes of Zika virus infection.

Regarding the knowledge and attitude on the use of insect repellents, 64.7% of the respondents believed that insect repellents can protect them against mosquito bites and MBD, but 77.6% and 98.8% were unaware of the effective ingredients (Figure 2) and the recommended concentration of DEET, respectively. Multivariable analysis found that those with primary or below education level (adjusted OR: 2.34, 95% CI: 1.49 – 3.66) and those who were living in public rental housing (adjusted OR: 1.50, 95% CI: 1.14 – 1.98) were less likely to be aware of any effective insect repellent ingredients.

For the practice of using insect repellents, 70.0% of the respondents would not check the ingredients when purchasing insect repellents, and 49.8% never applied it to exposed body parts and clothing to prevent mosquito bites. The proportion of respondents who would (always / often / sometimes) apply insect repellent to exposed body parts and clothing (50.2%) is slightly higher than the corresponding finding (45.9%) of the previous survey conducted in 2014.

Besides, multivariable analysis found that respondents of age 65 or above, with household income below HK\$10 000, with negative attitude on the protective effect of insect repellent, and those who are working were shown to be significantly associated with the practice of NOT using insect repellent to the exposed parts of the body and clothing to prevent insect bites (Table 1).

Limitation

This is a cross-sectional observational study and causal relationship could not be established. Reliance on self-reported data might result in response bias including under-reporting socially undesirable behaviours and over-reporting desirable ones. Moreover, the study was conducted between January to February 2024 when mosquitoes were less active and hence awareness may be lower.

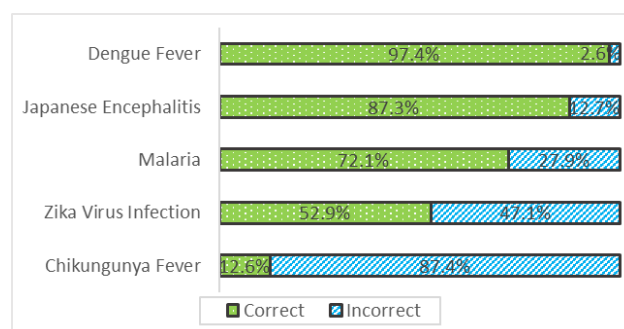


Figure 1 – Percentage of respondents correctly identifying diseases being transmitted by mosquitoes (excluding those answered “don’t know”).

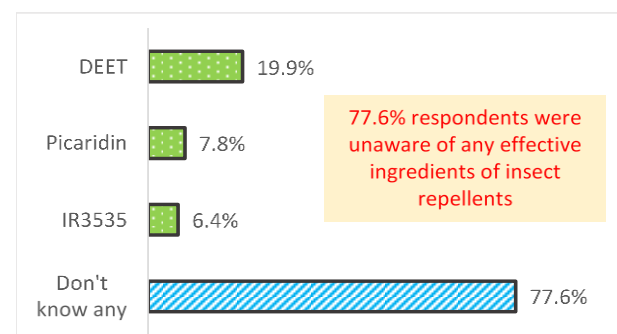


Figure 2 – Awareness of effective ingredients in insect repellents among respondents.

Table 1 – Predictors of using insect repellents to exposed parts of the body and clothing to prevent insect bites.

Predictors	Adjusted OR (95% C.I.)	p-value
Age (65 or above)	1.38 (1.01-1.90)	<0.05
Household income < \$10 000	2.00 (1.32-3.01)	<0.01
Work status (working)	1.32 (1.00-1.74)	<0.05
Negative attitude on protective effect of insect repellent *	1.48 (1.04-2.10)	0.03

* Responded “disagree” to the statement: “I think insect repellent can protect me from mosquito bites and diseases transmitted by mosquitoes.”

Conclusion and recommendations

While there is a satisfactory awareness of MBD and a positive attitude towards the use of insect repellents among the public, a gap exists between their knowledge/attitude, and the utilisation of insect repellents. These findings highlight the need of enhancing education on appropriate use of insect repellents in future MBD health promotion activities.

To enhance public health preparedness, the Centre for Health Protection (CHP) of the Department of Health will continue to develop targeted educational initiatives to clarify misconceptions and boost public awareness about various MBD with a focus on accurate information regarding disease transmission, symptoms, and prevention, and reach out to those living in public rental housing in liaison with community networks.

Additionally, it is crucial to raise public awareness on insect repellents and stress the importance of understanding the effective ingredients and recommended DEET concentrations. The CHP will continue to promulgate guidelines on choosing and using insect repellents for optimal protection against mosquito bites and associated diseases.

Furthermore, CHP has collaborated with the Food and Environmental Hygiene Department (FEHD) on targeted educational activities, such as tailoring health education materials to bridge knowledge gaps on insect repellents and chikungunya fever, and conducting roving exhibitions in wet markets to reach residents living in public rental housing (Figure 3-6).



Figure 3 – New infographic of “Proper use of insect repellents” highlighting the need to check for the effective ingredient of insect repellents and the recommended concentration.



Figure 4 – Roving exhibition on mosquito-borne diseases in a wet market.



Figure 5 – Press conference held on July 18, 2024 on the prevention against mosquito-borne diseases together with FEHD.

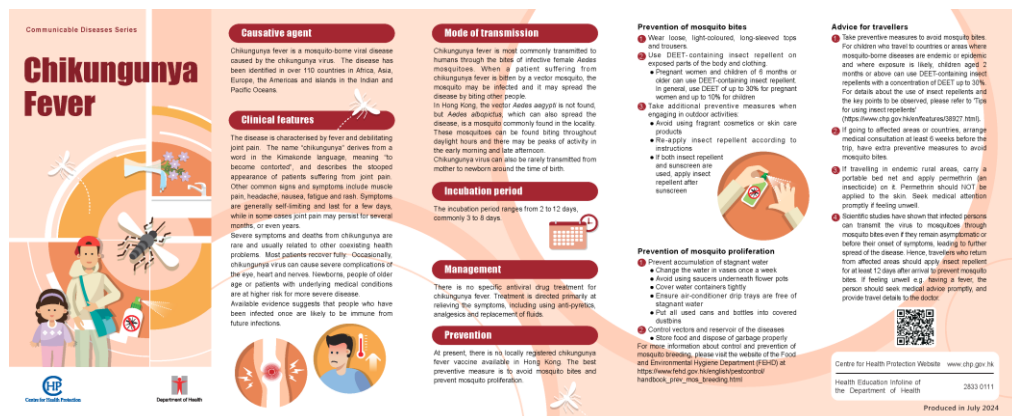


Figure 6 – New pamphlet on chikungunya fever.

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NEWS IN BRIEF

Infectious Disease and Infection Control (IDIC) Forum: Invasive Group B Streptococcus Infection

The Infection Control Branch (ICB) of the Centre for Health Protection (CHP) and Infectious Diseases Control Training Centre (DICTC) of the Hospital Authority (HA) jointly organised an IDIC training forum on Invasive Group B Streptococcus (GBS) Infection. The forum was conducted as a Zoom webinar on September 24, 2024.

The objective of the IDIC forum was to update the latest situation and epidemiology of invasive GBS infection, its clinical and microbiological features, management and prevention, thereby aiming hoping to raise the audience's awareness to this infection and its treatment. The topics covered included: 1) Update on the Latest Situation and Epidemiology by Dr Albert AU from the Emergency Response and Programme Management Branch (ER&PMB) of the CHP; 2) Clinical Presentation, Management and Prevention by Dr David LUNG from the Queen Elizabeth Hospital (QEH) and Dr Kristine LUK from the Princess Margaret Hospital (PMH) of the HA. The question-and-answer (Q&A) session was moderated by Dr Leo LUI from the ICB of the CHP.

The forum was well received by an attendance of over 460 healthcare professionals across public and private sectors. Details of the forum and available training materials can be accessed on the IDCTC training portal at <https://icidportal.ha.org.hk/Trainings/View/190>.



Photo 1 – From left to right: Dr. David LUNG, Consultant Microbiologist, Queen Elizabeth Hospital, HA; Dr Kristine LUK, Chief-of-Service (Pathology), PMH, HA; Dr Leo LUI, Associate Consultant, ICB, CHP; Dr. Albert AU, Head of ER&PMB, CHP)

Two local sporadic confirmed cases of listeriosis

The CHP recorded two local sporadic cases of listeriosis on September 27 and September 28, 2024 respectively.

The first case involved a 66-year-old man residing in Tuen Mun. He had end-stage renal failure requiring continuous ambulatory peritoneal dialysis. He noted cloudy dialysis effluent on September 23. He attended the Accident and Emergency Department of a public hospital and was admitted on September 23. His peritoneal dialysate collected on September 23 grew *Listeria monocytogenes*. He was treated with antibiotics and his condition remained stable. He had no travel history during incubation period. There was no known high-risk exposure. His household contact remained asymptomatic.

The second case involved a 68-year-old woman on chemotherapy for cancer residing in Southern. She presented with fever, shortness of breath and malaise on September 26 and was admitted to a public hospital on the same day. Her blood sample collected on September 27 grew *Listeria monocytogenes*. She was treated with antibiotics and was in stable condition. She had no travel history during incubation period. There was no high risk exposure identified. Her household contact remained asymptomatic.

A probable case of sporadic Creutzfeldt-Jakob disease

On October 5, 2024, the CHP recorded a probable case of sporadic Creutzfeldt-Jakob disease (CJD) affecting a 75-year-old female with underlying illnesses. She presented with cognitive impairment, blurred vision, dysphagia, myoclonus and right sided weakness since August 20, and was admitted to a public on August 23. Findings of electroencephalogram were compatible with CJD. Her condition was stable. She had no known family history of CJD. No risk factors for iatrogenic or variant CJD were identified. She was classified as a probable case of sporadic CJD.

A sporadic case of *Streptococcus suis* infection

On September 27, 2024, the CHP recorded a sporadic case of *Streptococcus suis* infection affecting a 80-year-old man with underlying illnesses. He presented with fever, headache, confusion and right lower limb weakness on September 25, and was admitted to a public hospital on the same day. His blood was cultured positive for *Streptococcus suis*. His condition remained stable upon treatment. He could not recall high-risk exposure nor had recent wound. His home contact was asymptomatic.