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## 貝類中毒 Shellfish Poisoning

Reported by Dr. John LUM, Scientific Officer,  
Risk Assessment Section, Centre for Food Safety

食物安全中心(食安中心)在二零二三年四月接獲衛生防護中心轉介一宗懷疑下痢性貝類中毒個案,患者在一家餐廳進食花蛤後一小時內出現腹瀉、噁心、嘔吐和腹痛。本文將對貝類中毒作一簡介。

### 貝類中毒是什麼？

貝類中毒由貝類毒素引致,這組毒素由藻類產生。貝類吃下產生毒素的藻類後,毒素可積聚在其組織內。人類在進食含貝類毒素的貝類海產後,可患上多種腸胃及神經系統疾病,稱為貝類中毒。部分曾涉及貝類中毒的貝類包括青口、蜆、蠔、扇貝和象拔蚌等。

世界各地已發現多種不同的貝類毒素,可引致不同類別的貝類中毒。以下將討論貝類中毒的五大類別:

- 麻痹性貝類中毒 -- 由麻痹性貝類毒素引致。麻痹性貝類毒素是一組包括石房蛤毒素在內的水溶性生物鹼神經毒素。
- 下痢性貝類中毒 -- 由下痢性貝類毒素引致。下痢性貝類毒素是一組包括岡田酸在內的脂溶性聚醚毒素。
- 神經性貝類中毒 -- 由神經性貝類毒素引致。神經性貝類毒素是一組包括短裸甲藻毒素在內的脂溶性聚醚毒素。
- 失憶性貝類中毒 -- 由包括水溶性胺基酸軟骨藻酸在內的失憶性貝類毒素引致。
- 原多甲藻酸貝類中毒 -- 由包括脂溶性毒素原多甲藻酸在內的原多甲藻酸貝類毒素引致。

The Centre for Food Safety (CFS) received a referral from the Centre for Health Protection in April 2023 of a suspected case of diarrhoeic shellfish poisoning (DSP) presented with diarrhoea, nausea, vomiting and abdominal pain within an hour after consuming venus clams from a restaurant. This article will give a brief introduction on shellfish poisoning.

### What is Shellfish Poisoning?

Shellfish poisoning is caused by a group of toxins, known as shellfish toxins, produced by certain species of algae. When shellfish eat toxins producing algae, the toxins can accumulate in their tissue. Consumption of shellfish with shellfish toxins by humans can cause a variety of gastrointestinal and neurological illnesses, known as shellfish poisoning. Examples of shellfish that have been involved in shellfish poisoning include mussels, clams, oysters, scallops and geoducks.

Many shellfish toxins have been described around the world; they could cause different types of shellfish poisoning. Five important shellfish poisonings will be discussed below:

- Paralytic shellfish poisoning (PSP) - caused by paralytic shellfish toxins (PSTs), which are a group of water-soluble alkaloid neurotoxins including saxitoxin (STX).
- Diarrhoeic shellfish poisoning (DSP) - caused by diarrhoeic shellfish toxins (DSTs), which are a group of lipid-soluble polyether toxins including okadaic acid (OA).
- Neurotoxic shellfish poisoning (NSP) - caused by neurotoxic shellfish toxins (NSTs), a group of lipid-soluble polyether toxins including brevetoxins (BTX).
- Amnesic shellfish poisoning (ASP) - caused by amnesic shellfish toxins (ASTs), including the water-soluble amino acid domoic acid (DA).
- Azaspiracid shellfish poisoning (AZP) - caused by azapiracid shellfish toxins (AZTs), including the lipid-soluble toxin azapiracid (AZA).

### Characteristics of Different Shellfish Toxins

Different groups of shellfish toxins display a wide range of chemical diversity, which can be broadly classified into amino acids (DA), alkaloids (STX) and polyketides (OA, BTX and AZA).

It is not clear why some algae produce these toxins. These toxins are secondary metabolites with no explicit role in the algae. They are probably used by the algae as a way to compete for space, fight predation or as a defence against the overgrowth of other organisms.

In general, shellfish toxins are heat stable, odourless, tasteless and not destroyed by cooking, freezing or other food preparation procedures. Toxic shellfish cannot be distinguished from non-toxic ones visually.

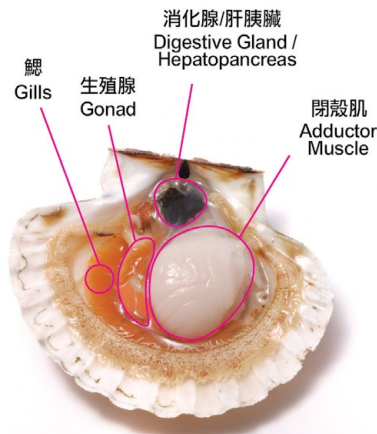


圖1：扇貝的內臟  
Figure 1: Internal parts of a scallop

## 各種貝類毒素的特質

不同的貝類毒素擁有不同的化學結構類別，大致可分為氨基酸（軟骨藻酸）、生物鹼（石房蛤毒素）和聚酮（岡田酸、短裸甲藻毒素及原多甲藻酸）。

藻類產生貝類毒素的原因不明。這些毒素是二次代謝物，在藻類中沒有明顯作用。貝類毒素或許被藻類用來爭奪生長的空間、抵禦捕食者或防止其他生物大量繁殖。

一般來說，貝類毒素耐熱、無臭無味，烹煮、冷藏或其他配製食物的程序均不能破壞這些毒素，肉眼也不能區分有毒和無毒的貝類。

## 貝類毒素在雙殼貝類軟體動物內積聚

產生貝類毒素的海藻，是雙殼貝類軟體動物的天然食物。貝類進食有毒海藻後會把貝類毒素集中積聚在其內臟，如雙貝類的肝臟。圖1一般來說，閉殼肌只含少量貝類毒素。

## 貝類中毒的病徵

貝類毒素可引起多種不同的病徵，視乎毒素的類別和分量而定。不同類別的貝類中毒症狀綜述如下：

貝類中毒	病發期	症狀	死亡風險
麻痹性貝類中毒	一般在30分鐘內	主要為神經系統症狀如嘴唇、口腔和舌頭刺痛；四肢麻痺及呼吸癱瘓	可致命
下痢性貝類中毒	由30分鐘至3小時	輕微腸胃不適如腹瀉、嘔吐和腹痛	一般不會致命
神經性貝類中毒	由數分鐘至數小時	腸胃不適症狀如腹瀉和嘔吐；神經系統不適症狀如嘴唇、口腔和舌頭刺痛	一般不會致命
失憶性貝類中毒	腸胃不適症狀在24小時內；神經系統不適症狀在48小時內	腸胃不適症狀如腹瀉和嘔吐；神經系統不適症狀如神志不清和短暫喪失記憶力	年老患者曾出現死亡個案
原多甲藻酸貝類中毒	在數小時內	主要為腸胃不適症狀如腹瀉和嘔吐	一般不會致命

## 不同貝類毒素的安全水平

一個由聯合國糧食及農業組織、世界衛生組織和聯合國教科文組織政府間海洋學委員會共同成立的專家工作組曾在二零零四年就多種貝類毒素的毒性進行評估，並為這些貝類毒素訂定了急性毒性參考劑量，即在24小時內可攝入該等毒素而不致對健康帶來明顯風險的分量。食品法典委員會也訂定了雙殼貝類軟體動物的可食用部分（擬供分開食用的全部或任何部分）中貝類毒素的最大限量。急性毒性參考劑量對評估食物中貝類毒素含量的安全性十分重要，而食品法典委員會訂立的最大限量則是食品法典委員會所建議貝類水產中貝類毒素的允許含量。

貝類毒素	急性毒性參考劑量	食品法典委員會的最大限量 (每公斤貝類肉)
生物鹼神經毒素組	每公斤體重0.7微克	≤0.8毫克生物鹼神經毒素當量
下痢性貝類毒素組	每公斤體重0.33微克	≤0.16毫克岡田酸當量
軟骨藻酸組	每公斤體重100微克	≤20毫克軟骨藻酸
短裸甲藻毒素組	訂定急性毒性參考劑量的數據不足	≤200小鼠單位*或等量
原多甲藻酸組	每公斤體重0.04微克	≤0.16毫克

\*利用小鼠進行生物分析所釐定的毒素分量。

## 注意事項

- 貝類毒素耐熱、無臭無味，烹煮、冷藏或其他配製食物的程序均不能破壞這些毒素。
- 肉眼不能區分有毒和無毒的貝類水產。
- 一般而言，貝類毒素集中積聚在雙貝類的內臟。

## 給消費者的建議

- 向可靠來源購買貝類水產。
- 為減低貝類中毒對健康帶來的風險，在進食前應盡量除去並棄置所有內臟。
- 進食貝類後若感到不適，應立即求醫。

## 給業界的建議

- 在已建立貝類毒素監察計劃的地區採購貝類。
- 不要接收來歷不明的貝類水產。

## Accumulation of Shellfish Toxins in Bivalve Molluscs

Shellfish toxins are produced by algae that are consumed by bivalve molluscs as part of their natural diet. After ingestion, shellfish toxins are accumulated actively by shellfish and concentrated in the internal organs such as the hepatopancreas of bivalves. (Figure 1) The adductor muscle contains only a low level of shellfish toxins in general.

## Clinical Presentation of Shellfish Poisoning

Shellfish toxins can cause a wide variety of symptoms in humans, depending on the type of toxin present and the amount of toxins ingested. Symptoms of different types of shellfish poisoning are summarised below:

Shellfish poisoning	Onset time	Symptoms	Mortality
Paralytic Shellfish Poisoning (PSP)	Generally within 30 minutes	Predominantly neurological symptoms, such as tingling of the lips, mouth and tongue; numbness of extremities and respiratory paralysis	Can be lethal
Diarrhoeic Shellfish Poisoning (DSP)	From 30 minutes to 3 hours	Mild gastrointestinal disorder, such as diarrhoea, vomiting and abdominal pain	Generally not life-threatening
Neurotoxic Shellfish Poisoning (NSP)	From a few minutes to a few hours	Gastrological symptoms such as diarrhoea and vomiting; neurological symptoms such as tingling of the lips, mouth and tongue	Generally not life-threatening
Amnesic Shellfish Poisoning (ASP)	Within 24 hours for gastrointestinal symptoms; within 48 hours for neurologic symptoms	Gastrological symptoms such as diarrhoea and vomiting; neurological symptoms such as confusion and short-term memory loss	Fatalities occurred in elderly patients
Azaspiracid Shellfish Poisoning (AZA)	Within hours	Predominantly gastrointestinal symptoms, such as diarrhoea and vomiting	Generally not life-threatening

## Safety Levels of Different Shellfish Toxins

The toxicity of various shellfish toxins was evaluated by a joint expert working group of the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO) and the Intergovernmental Oceanographic Commission of UNESCO (IOC) in 2004. An acute reference dose (ARfD), which is the amount of toxins that can be ingested in a period of 24 hours without appreciable health risk, has been established for these shellfish toxins. The Codex Alimentarius Commission (Codex) has also established maximum levels (MLs) for shellfish toxins in edible parts (the whole part or any part intended to be eaten separately) of live bivalve molluscs. While the ARfD is critical in assessing the safety of the amount of shellfish toxins in food, the Codex MLs are the levels recommended by Codex to be permitted in shellfish.

Shellfish toxins	Provisional acute reference dose	Codex maximum level (per kg of mollusc flesh)
Saxitoxin (STX) group	0.7 µg/kg bw	≤0.8 mg of saxitoxin equivalent
Okadaic acid (OA) group	0.33 µg/kg bw	≤0.16 mg of okadaic equivalent
Domoic acid (DA) group	100 µg/kg bw	≤20 mg domoic acid
Brevetoxin (BTX) group	Insufficient data to establish ARfD	≤200 mouse units* or equivalent
Azaspiracid (AZA) group	0.04 µg/kg bw	≤0.16 mg

\*An estimate of the toxicity of a toxin determined by a mouse bioassay.

## Key Points to Note

- Shellfish toxins are heat stable, odourless, tasteless and not destroyed by cooking, freezing or other food preparation procedures.
- Toxic shellfish cannot be distinguished from non-toxic ones visually.
- In general, shellfish toxins are accumulated actively by shellfish and concentrated in the internal organs of bivalves.

## Advice to Consumers

- Purchase shellfish from reliable sources.
- To reduce the health risk of shellfish poisoning, remove and discard all internal organs of shellfish where possible before consumption.
- Anyone who feels ill after eating shellfish should immediately seek medical attention.

## Advice to the Trade

- Source shellfish from places where monitoring programmes for shellfish toxins have been established.
- Do not accept shellfish from dubious sources.

# 札幌病毒 – 致病近似諾如病毒

## Sapovirus – Virus causing illness similar to Norovirus

食物安全中心風險傳達組  
科學主任莊梓傑博士報告

Reported by Dr. Ken CHONG, Scientific Officer,  
Risk Assessment Section, Centre for Food Safety

最近一宗涉及生蠔的食物中毒個案中，一名受影響顧客及一名曾處理生蠔的食物處理人員糞便樣本驗出札幌病毒。分類上來說，札幌病毒與諾如病毒屬同科病毒。兩種病毒均可引致急性胃腸炎，所引起的臨床病徵並無分別。在本文中，我們將加深對食物中的札幌病毒以及相關預防方法的認識。

### 札幌病毒

札幌病毒的命名源於1977年在日本札幌一家孤兒院爆發的急性腸道傳染病(急性腹瀉)，此前也曾稱為「類札幌病毒」。無論在本港以至世界各地，涉及札幌病毒的腸胃炎個案均沒有諾如病毒引起的個案常見。[衛生防護中心](#)在回顧中指出，2017年院舍及學校自願呈報的182宗急性腸胃炎個案中，涉及札幌病毒的個案僅佔2宗(1.1%)。

札幌病毒與諾如病毒相似，主要通過糞口途徑及經由人與人接觸(例如接觸糞便、嘔吐物或受污染的物質/表面)、或由受污染的食物或食水傳播。因此，在院舍環境中出現感染個案的情況並非鮮見。雖然目前並無有關札幌病毒的劑量反應研究，但相信與諾如病毒的感染劑量相約，只需少量病毒即可造成感染。

### 札幌病毒引致的腸胃炎

札幌病毒的病徵通常會自行消退，患者會在兩天內康復；病徵、嚴重程度及持續時間視乎個人健康狀況而定。症狀包括腹瀉和嘔吐、胃痙攣/腹痛、發冷、頭痛、肌肉痛或疲倦。潛伏期通常為少於一天至四天。札幌病毒可以在症狀消失後持續從體內經由糞便排放。

不同年齡人士全年均有可能感染札幌病毒引致的腸胃炎，但零星個案主要在寒冷的季節發生。此外，比起較大兒童和成人，較年幼兒童感染札幌病毒的個案似乎較為常見。另一方面，札幌病毒引發的腸胃炎曾在多種高危人士聚集的場合如幼兒中心、幼稚園、護養院及學校發生，大多涉及人傳人。

### 食物中的札幌病毒

札幌病毒可存在於貝類水產或水中環境，源自排放到環境中的人類糞便。蜆和蠔隻以及河水和廢水中皆曾檢測到基因與臨床分離菌株完全一樣的札幌病毒，相信札幌病毒可經由貝類水產傳播，跟諾如病毒的傳播途徑相似。因此，預防諾如病毒的措施對札幌病毒同樣適用。

由於蠔隻以過濾大量海水來進食，因此若生長於受污染水域，便容易受到污染。要減低感染札幌病毒的風險，蠔隻與其他雙貝類海產應徹底煮熟，即烹煮至中心溫度達攝氏90度並維持90秒。

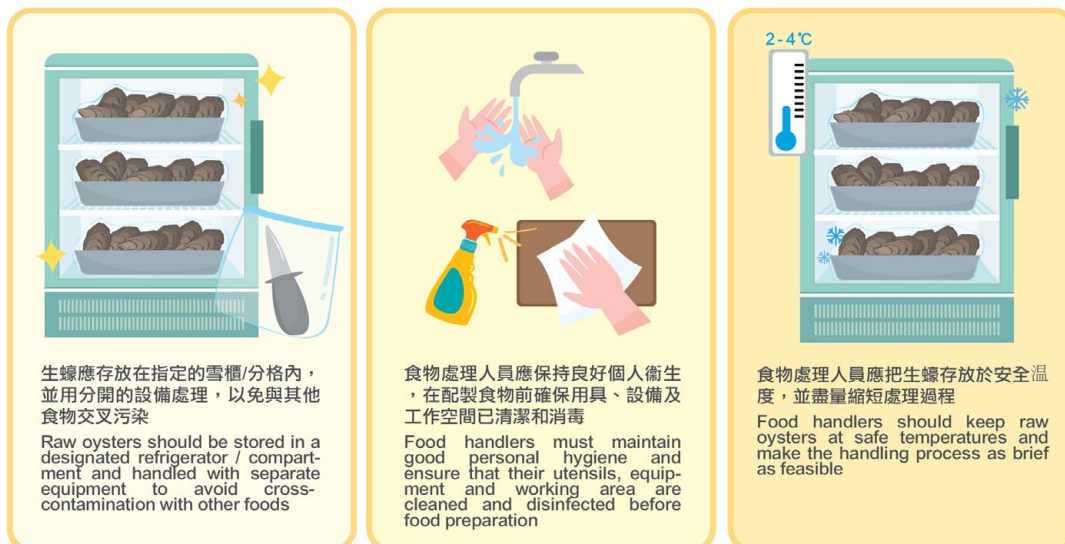


圖2: 生蠔受病原體污染的高風險，食物處理人員應採取相應的食物安全措施。

Figure 2: Raw oysters are at high risk for contamination with pathogens and food handlers should adopt relevant food safety measures.

In a recent local food poisoning outbreak involving raw oysters, Sapovirus was detected in the stool samples of an affected consumer and a food handler who had handled the oysters. Sapovirus taxonomically belongs to the same family as Norovirus. Both viruses can cause acute gastroenteritis where clinical symptoms caused by these viruses are indistinguishable. In this article, we will get to know more about sapoviruses in food and relevant preventive measures.

### Sapoviruses

Sapoviruses were named after an outbreak of acute infectious diarrhoea that occurred in an infant home in Sapporo, Japan in 1977. Previously the viruses had also been called "Sapporo-like viruses." Gastroenteritis outbreaks associated with sapoviruses are less common than those caused by noroviruses, both globally and locally. According to a review by the [Centre for Health Protection](#), among 182 outbreaks of acute gastroenteritis voluntarily reported by institutions and schools in 2017, sapoviruses were associated with only 2 outbreaks (1.1%).

Similar to noroviruses, sapoviruses are primarily transmitted by the faecal-oral route and person-to-person contact (e.g. contact with faeces, vomitus or contaminated materials/surfaces) or via contaminated food and drinking water. As such, outbreaks in institutional settings are not uncommon. Although dose-response study for sapoviruses is not available, it is believed that their infectious dose is low, comparable to that of noroviruses.

### Gastroenteritis Caused by Sapoviruses

Sapovirus gastroenteritis symptoms are usually self-limiting, and patients usually recover within a couple of days; the symptoms, severity and duration of the disease depend on an individual's health status. Symptoms include diarrhoea and vomiting, nausea, stomach/abdominal cramps, chills, headache, myalgia or malaise. The incubation period ranges from less than 1 day to 4 days. Sapoviruses shedding in faeces may continue after symptoms disappear.

Sapovirus gastroenteritis occurs throughout the year in people of all ages, while sporadic cases occur mainly in the cold seasons. In addition, sapovirus cases appear to be [more frequent](#) in younger children than in older children and adults. On the other hand, sapovirus-related gastroenteritis outbreaks have been reported in various settings such as child care centres, kindergartens, nursing homes and schools, where susceptible individuals gathered and where person-to-person transmission was likely involved.

### Sapoviruses in Foods

Sapoviruses may be present in shellfish or water environment, as a result of human faecal discharge to the environment. Oysters and clams as well as river water and wastewater have been detected with sapoviruses which are genetically indistinguishable from those clinical isolates. It is believed that sapoviruses can be spread by contaminated shellfish in a way similar to noroviruses. Hence, the preventive measures for noroviruses are also applicable to sapoviruses.

Since oysters feed by filtering a large amount of water through their gills, they are susceptible to contamination if grown in contaminated water. To reduce the risk of contracting sapoviruses, oysters and other bivalves should be cooked thoroughly, i.e. to an internal temperature of 90°C for 90 seconds.

以下是一些蠔隻烹製方法所需時間的建議：

- 在攝氏100度煮3至5分鐘
- 在攝氏190度炸最少3分鐘
- 在攝氏100度蒸4至9分鐘
- 在攝氏230度焗最少10分鐘

高風險人士(長者、幼童、孕婦和免疫力較弱的人)應避免進食生蠔。

食物處理人員也有可能成為污染源頭，因此個人衛生很重要。如廁後及處理食物前應以流動的自來水使用肥皂徹底洗手20秒。此外，有嘔吐或腹瀉徵狀的食物處理人員不應處理食物，直至症狀消失至少兩天後，並應該求醫。

Here are some suggestions for cooking time for various preparation methods:

- Boil for 3-5 minutes at 100°C
- Fry for at least 3 minutes at 190°C
- Steam for 4-9 minutes at 100°C
- Bake for at least 10 minutes at 230°C

Susceptible populations (the elderly, young children, pregnant women and people with weakened immune systems) should avoid taking raw oysters.

Food handlers can also be the source of contamination, so personal hygiene is important. They should wash their hands thoroughly with clean running water and soap for 20 seconds after using the toilet and before handling food. Moreover, food handlers with symptoms of vomiting or diarrhoea should not handle food until they are symptom-free for at least two days, and should seek medical advice.

## 冷藏加工食品 — 解凍後可直接食用嗎？

### Frozen Processed Foods - Can I Eat Them Directly After Defrosting?

最近，有人在網上討論羣組提出，冷藏薄餅在解凍後不經翻熱直接食用會更美味。

冷藏加工食品在解凍後不一定能立即進食。雖然部分冷藏薄餅的餅皮呈棕色、冷藏肉餅有烤焗的痕迹或其他食物看來有熟食的特徵，但單憑冷藏食物的外觀不能保證可以即食。縱使這些食物製品或已在製造廠煮至半熟以縮短在家烹製的時間，但配製過程也不一定會加熱至能把食物徹底煮熟並消滅所有致病菌的溫度。部分在煮至半熟的過程中沒有被殺死的細菌經過冷藏後可以存活，而只有徹底煮熟才可以殺死這些細菌。

因此，購買及烹製冷藏加工食品時，應仔細閱讀標籤，並遵從烹煮時間及溫度等配製指示，讓食物可以安全食用。

Recently, it was suggested in an online discussion group that frozen pizzas tasted better when eaten defrosted without reheating.

Frozen processed foods are not necessarily ready to eat after defrosting. Even though some frozen pizzas have browned crust, frozen meat patties have grill marks, or others have traits that are visually associated with cooked food, the sheer look of the frozen products cannot guarantee that they are ready to serve after defrosting. While these food products might have been partially cooked in factories to shorten preparation time at home, the process might not be hot enough to thoroughly cook the foods and eliminate all disease-causing bacteria. Some bacteria not killed by the partial cooking process can survive freezing, and only thorough cooking can kill them.

Therefore, when purchasing and preparing frozen processed food, one should read the labels and follow the preparation instructions closely, including cooking time and temperature, in order to make the food safe to eat.

## 跨境餐飲配送的食物安全風險

### Food Safety Risks of Cross-Boundary Meal Delivery

隨着經濟和社會活動復常，更多人改為使用跨境餐飲配送服務作為另一種便利的食物選擇。然而，如餐飲配送的路程遙遠，若在控制食物的貯存溫度和運送時間方面有欠妥善，細菌便可在食物中大量繁殖，令食物容易在運送過程中變壞。造成食物中毒的細菌在攝氏4度至60度的危險溫度範圍內會迅速生長及繁殖。進食受污染的食物能引致食物中毒。

為確保食物安全，熱食應保持於攝氏60度以上，冷食於攝氏4度或以下。如食物置於危險溫度範圍，則須遵從兩小時及四小時原則（即烹製好的食物如置於室溫不超過兩小時，可放入雪櫃待用；熟食如置於室溫超過四小時，便須棄掉）以防止細菌生長。

With the resumption of normal economic and social activities, more people are turning to cross-boundary meal delivery services as a convenient and alternative food option. However, meals that need to be delivered over long distances are prone to spoilage and bacterial overgrowth if there is no proper control over food storage temperature and delivery time. Bacteria that cause food poisoning thrive and multiply rapidly at the temperature danger zone between 4°C and 60°C. Consuming contaminated food can lead to food poisoning.

To ensure food safety, hot food and cold food should be kept above 60°C and at or below 4°C respectively. If meals are kept within the temperature danger zone, the two-hour and four-hour principle should be followed (i.e. if prepared food is kept at room temperature for less than two hours, it can be refrigerated for later use; if cooked food has been held at room temperature for more than four hours, it should be discarded) to prevent bacterial growth.



## 風險傳達工作一覽 (二零二三年四月)

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