INTERNATIONAL SKATING UNION

# ISU Injury and Illness Statistical Report 2021/2022 to 2023/2024 Seasons

March 2025

ISU Medical

# Table of Contents

# Introduction

This injury and illness surveillance report aims to identify the statistics and trends of injuries and illnesses among skaters in figure skating, speed skating, and short track over the last three seasons. The report also aims to identify patterns and risk factors contributing to the cases by analyzing the data. The insights gained through the survey will be valuable for developing medical measures and preventive strategies to improve skaters' health and welfare, leading to enhance their performance.

DISCLAIMER:

- These injury statistics are based solely on data collected via the ISU online medical form. It is the responsibility of the skater's medical staff or chief medical officer to complete it. These data may not reflect a complete picture of injuries and illnesses.
- A widely accepted definition of sport-related injury considers a concept of an athlete-exposure (AE). An injury, for example, may be reported as rate per 1,000 athlete-exposures. This is considered to be a more accurate measure to define an injury. An athlete-exposure is defined as one skater participating in one practice or competition segment, in which there is the possibility of sustaining an injury.
  However, since it is not realistic to track participation in all the practices, only participation in the competitions was considered. In this report, the AE in each discipline was calculated based on the average number of races/programs that one skater competed in Beijing 2022 Winter Olympic Games and the World Championships 2023/2024.
  - FS: 1.65 - 2.40 programs per skater per event
  - SS: 2.30 - 3.20 races per skater per event
  - ST: 5.70 - 6.93 races per skater per event

# Figure Skating (FS)

## Overview

***Table 1. Reported cases and frequencies***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Total cases | **34** | **58** | **59** |
| Injury | 25 | 41 | 45 |
| Illness | 9 | 17 | 14 |
| No. of events (ISU/International) | 51 | 41 | 49 |
| Injury/FS event | 0.49 | 1.00 | 0.92 |

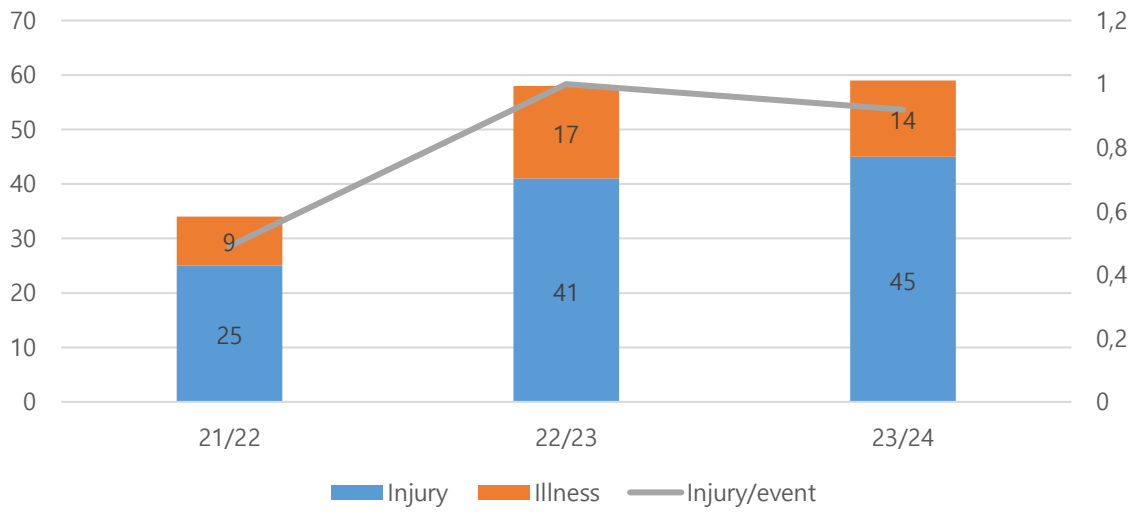


***Figure 1. Reported cases and frequencies***

The share of FS related injury cases per each event rose in the 2022/2023 season (0.49→1.00), and it remained almost the same in the 2023/2024 season (0.92).

The Incidence Rate (IR) is calculated as follows: number of injuries (diagnosis) multiplied by 1,000 and then divided by the estimated athlete-exposures (AEs), which means the number of injuries expected to develop if the skater would have competed in 1,000 competitions. For the 2023/2024 season, the IR was 7.35 - 10.70 in FS.

The Injury Proportion (IP) is calculated as follows: number of injured skaters divided by the total number of skaters participating in the event, which means the risk of a sport injury per participating athlete. Then when we know the numbers of the participating skaters in each event, we assume we can estimate the relative risk of injury of FS Skaters. For the 2023/2024 season, the IP was 1.3% in FS.

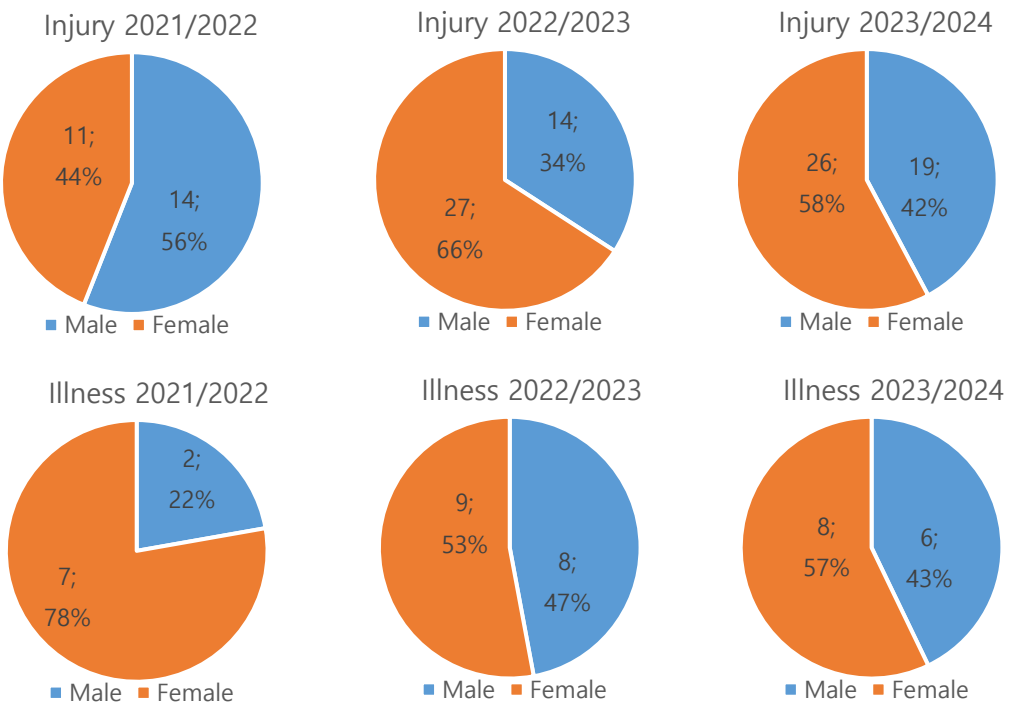


***Figure 2. Gender differences of reported injuries/illnesses***

Female Skaters have generally reported more injuries and illnesses in FS.

## Injury

***Table 2. Reported type of injuries***

| Diagnosis | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Concussion | 1(3.7) | 1(1.9) | 5(8.3) |
| Fracture | - | 1(1.9) | 7(11.7) |
| Stress fracture | 2(7.4) | 1(1.9) | 2(3.3) |
| Dislocation, subluxation | 1(3.7) | 2(3.8) | 4(6.7) |
| Lesion of meniscus or cartilage | - | 1(1.9) | 1(1.7) |
| tendon rupture | - | - | 2(3.3) |
| ligaments (sprain) | 6(22.2) | 5(9.6) | 16(26.7) |
| Muscle strain/tear | 4(14.8) | 13(25.0) | 5(8.3) |
| Contusion/bruise | 4(14.8) | 7(13.5) | 4(6.7) |
| Chronic tendinopathy | - | 2(3.8) | 2(3.3) |
| Arthritis/synovitis/bursitis | 1(3.7) | 1(1.9) | 3(5.0) |
| Laceration/abrasion | 2(7.4) | 6(11.5) | 3(5.0) |
| Nerve/Spinal chord | - | - | - |
| Muscle cramp/spasm | - | 4(7.7) | 1(1.7) |
| Other (specify) | 4(14.8) | 3(5.8) | 4(6.7) |
| Not Recorded | 2(7.4) | 5(9.6) | 1(1.7) |
| Total | 27(100) | 52(100) | 60(100) |

*Other 2021/2022: Cut, abscess, cellulitis
*Other 2022/2023: Radiating pain, numbness in feet, hip/groin pain, tight muscles, middle/lower back tension, nose hemorrhage
*Other 2023/2024: callus on foot, joint hypomobility, facial abscess

Several skaters reported multiple injuries at a time: two skaters in 2021/2022 season, seven skaters in 2022/2023 season, and 11 skaters in 2023/2024 season.

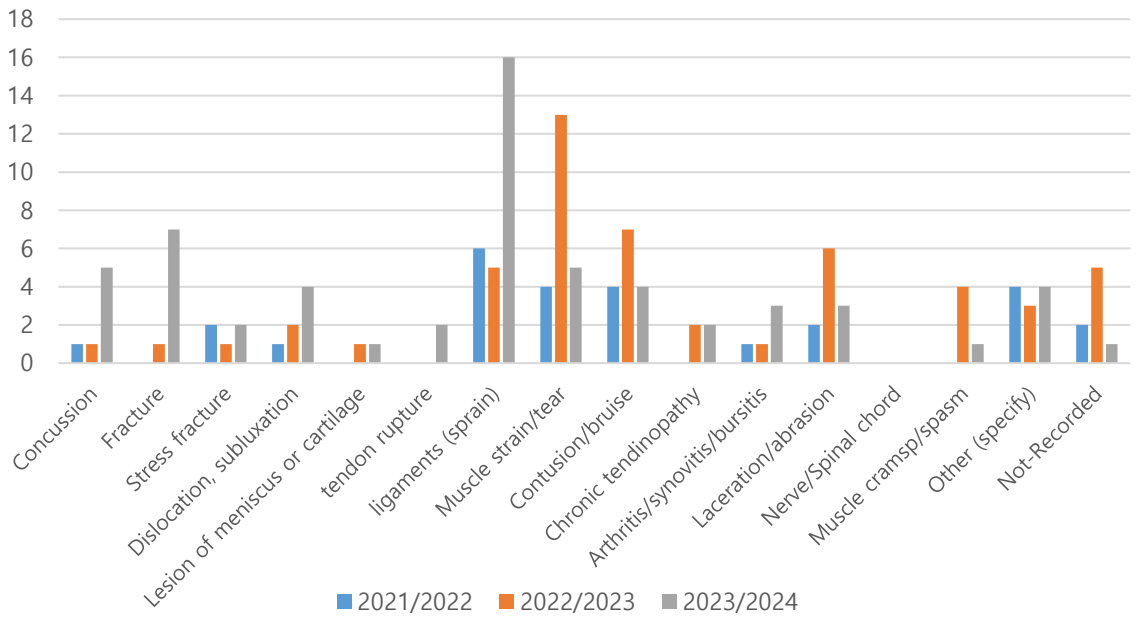


***Figure 3. Reported type of injuries***

Ligament sprain was reported predominantly the most in the 2023/2024 season, shifted from muscle strain/tear in the previous season. There has been significant increase in cases of concussion, fracture, dislocation/subluxation and ligament sprain for which we should be concerned.

***Table 3. Causes of injuries***

| Contact with | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Equipment | 5(19.2) | 5(10.4) | 5(10.2) |
| Ice | 10(38.5) | 18(37.5) | 16(32.7) |
| Boards/Pads | - | 1(2.1) | 1(2.0) |
| Person | 1(3.8) | 2(4.2) | 2(4.1) |
| Non-Contact | 8(30.8) | 16(33.3) | 23(46.9) |
| Not Recorded/ Other | 2(7.7) | 6(12.5) | 2(4.1) |
| Total | 26(100) | 48(100) | 49(100) |

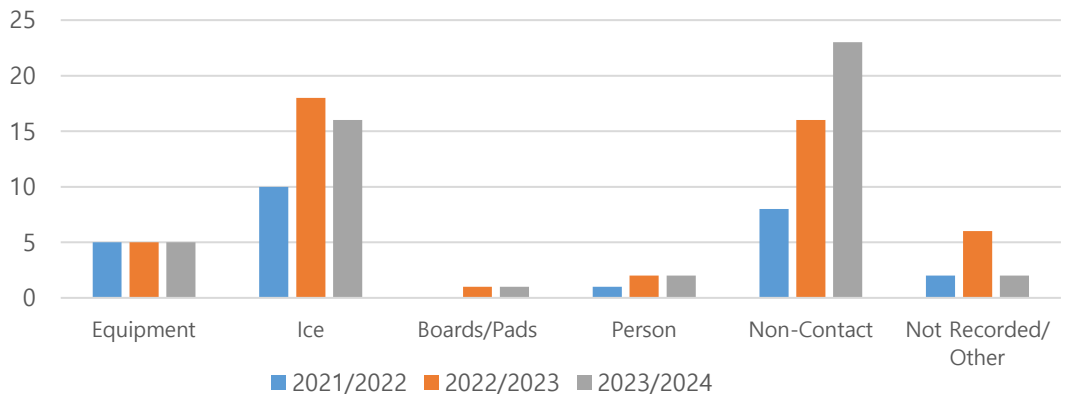


***Figure 4. Causes of injuries***

Non-contact injuries counted the most in the 2023/2024 season and have consistently increased in the past three seasons. Injuries caused by contacting with ice had the highest number in the 2022/2023 season and then have slightly decreased.

*Table 4. Region (body parts)*

| Region | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Abdomen/pelvis/buttock | 1(3.7) | 1(2.0) | 1(1.9) |
| Ankle/foot | 11(40.7) | 5(10.0) | 19(36.5) |
| Elbow/forearm | - | 2(4.0) | 1(1.9) |
| Face | - | 1(2.0) | 1(1.9) |
| Head | - | 1(2.0) | 2(3.8) |
| Neck | 1(3.7) | - | 3(5.8) |
| Hip/groin | 1(3.7) | 3(6.0) | 3(5.8) |
| Knee | 1(3.7) | 5(10.0) | 4(7.7) |
| Lower back | 3(11.1) | 9(18.0) | 3(5.8) |
| Lower leg/Achilles tendon | 3(11.1) | 1(2.0) | 8(15.4) |
| Shoulder/clavicle/upper arm | 1(3.7) | 6(12.0) | 2(3.8) |
| Sternum/ribs | 1(3.7) | - | - |
| Thigh | - | 4(8.0) | 2(3.8) |
| Wrist/hand/fingers | 2(7.4) | 3(6.0) | 1(1.9) |
| Not Recorded/Other | 2(7.4) | 3(6.0) | 2(3.8) |
| | 27(100) | 50(100) | 52(100) |

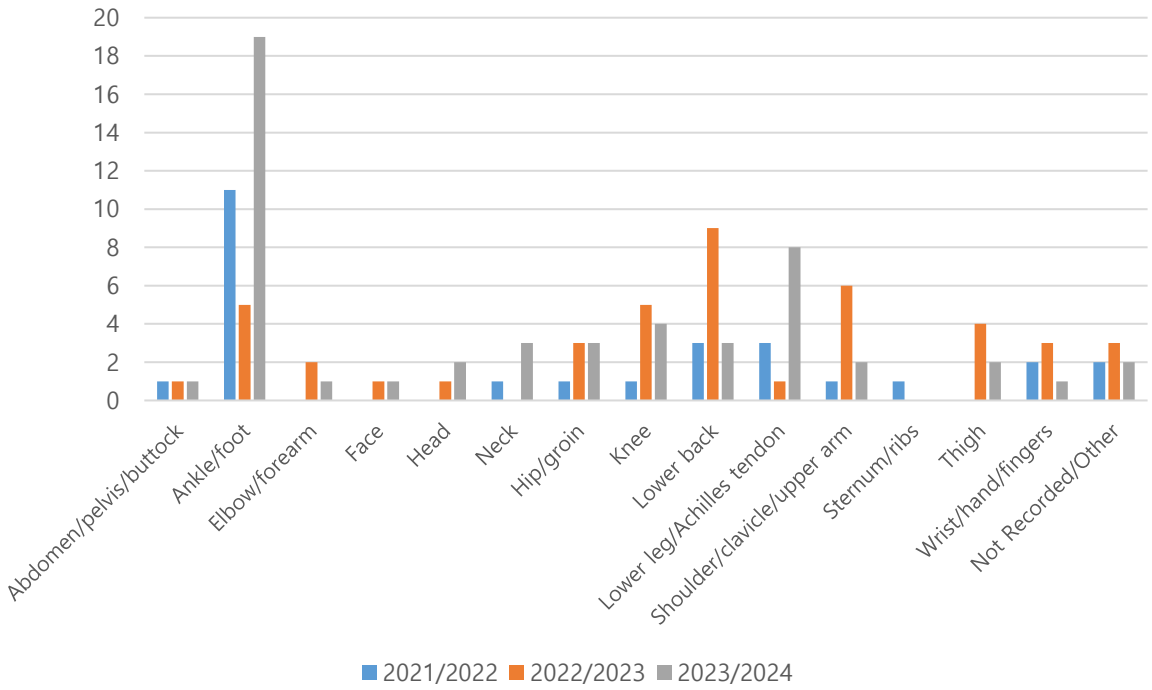


***Figure 5. Region (body parts)***

Ankle/Foot were predominantly the most commonly reported injured body parts in FS, followed by lower leg/achilleas tendon. The result shows that incidence of ankle strains and lower leg injuries were widely reported in the 2023/2024 season.

***Table 5. Characteristics of injuries***

| Status | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Acute (new onset) | 12(48.0) | 28(62.2) | 19(39.6) |
| Chronic | - | 1(2.2) | 4(8.3) |
| Recurrent (upon previous injury) | 11(44.0) | 14(31.1) | 16(33.3) |
| Not Recorded | 2(8.0) | 2(4.4) | 9(18.8) |
| Total | 25(100) | 45(100) | 48(100) |

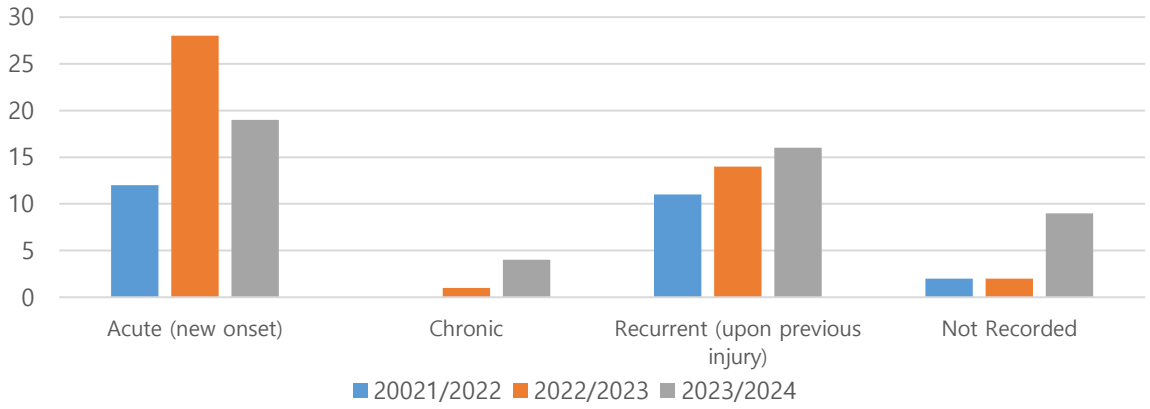


***Figure 6. Characteristics of injuries***

Although the most FS injuries were acute (new onset), their number was decreasing sharply from 2022/2023 to 2023/2024 season. Recurrent (upon previous injury) type of injuries has increased in the last three seasons.

***Table 6. Time of injury occurrence***

| Onset | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Competition | 6(24.0) | 8(17.8) | 11(23.4) |
| Practice/Training | 17(68.0) | 33(73.3) | 31(66.0) |
| Practice/Training (competition) | - | - | - |
| Other (specify) | - | 4(8.9) | 1(2.1) |
| Not Recorded | 2(8.0) | - | 4(8.5) |
| Total | 25(100) | 45(100) | 47(100) |

*Other 2022/2023: At the hotel, during the exhibition

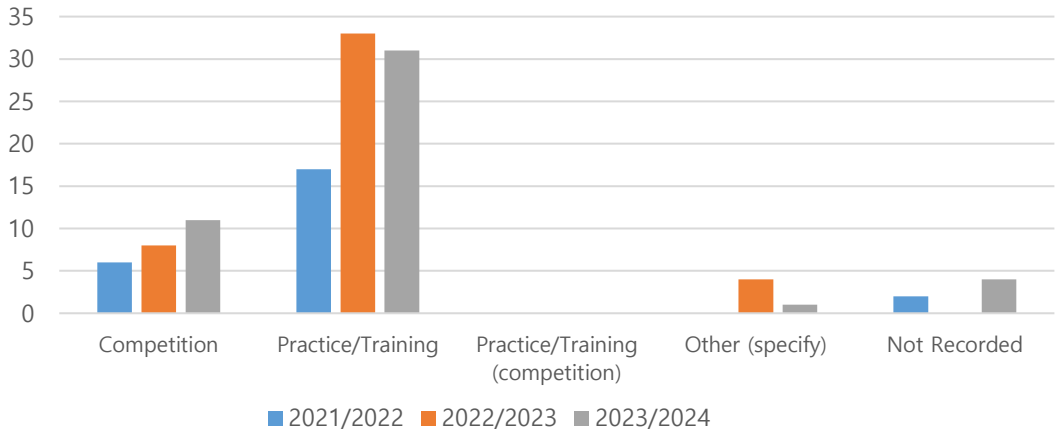


***Figure 7. Time of injury occurrence***

While most FS injuries occur during practice/training, injuries during the competition are increasing gradually.

***Table 7. Disposition after injury***

| Injury Severity | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Unable to train/compete | 16(64.0) | 14(31.8) | 26(57.8) |
| Resumed activity | 4(16.0) | 25(56.8) | 13(28.9) |
| Transport to hospital | 1(4.0) | 1(2.3) | 4(8.9) |
| Not Recorded | 4(16.0) | 4(9.1) | 2(4.4) |
| Total | 25(100) | 44(100) | 45(100) |

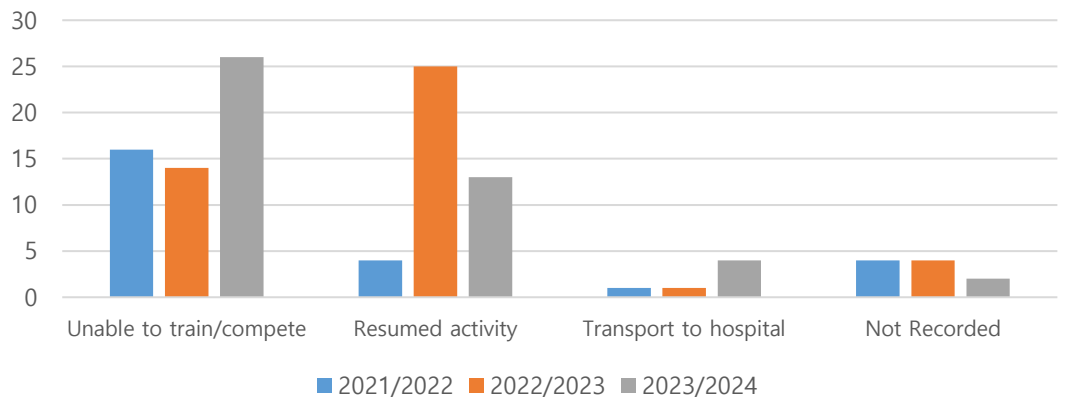


***Figure 8. Disposition after injury***

***Table 8. Lay-off time (severity) after injury***

| Expected absence | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Less than 1 day | 3(12.0) | 20(45.5) | 9(20.0) |
| 1 to 3 days | 2(8.0) | 2(4.5) | 1(2.2) |
| 4 to 7 days | 5(20.0) | 5(11.4) | 3(6.7) |
| Greater than 7 days | 12(48.0) | 10(22.7) | 29(64.4) |
| Not Recorded | 3(12.0) | 7(15.9) | 3(6.7) |
| Total | 25(100) | 44(100) | 45(100) |

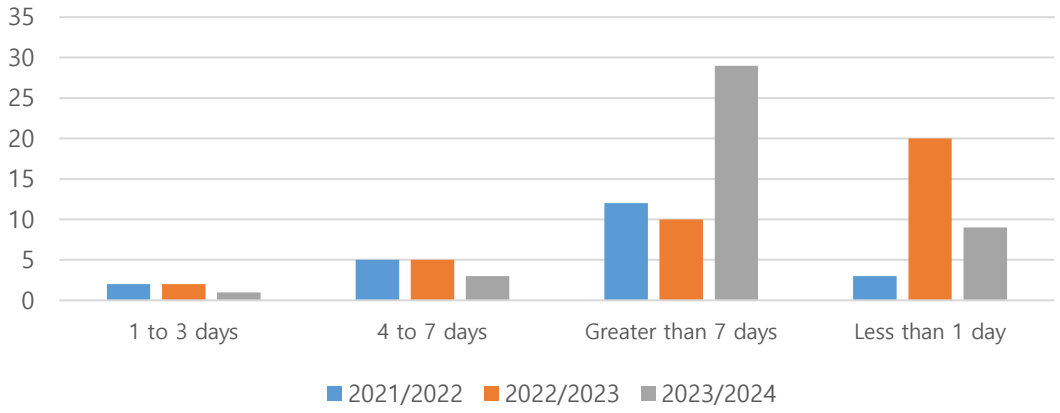


***Figure 9. Lay-off time (severity) after injury 2021/2022 – 2023/2024***

Injuries with 'unable to train/compete' and 'greater than 7 days' absence have increased sharply (57.8% and 64.4%, respectively), which generally means that the share of severe injuries has increased.

To wrap up, lately in FS, usually female skaters are suffering from non-contact ankle ligament injuries during training, which seems to be getting severe.

## Illness

***Table 9. Reported type of illnesses***

| Main Symptom(s) | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Fever | 2(10.5) | 7(20.0) | 4(16.7) |
| Pain | 3(15.8) | 4(11.4) | 5(20.8) |
| Diarrhea/vomiting | 2(10.5) | 5(14.3) | 1(4.2) |
| Dyspnea/cough | - | 5(14.3) | 4(16.7) |
| Palpitations | 3(15.8) | - | 1(4.2) |
| Dehydration | 1(5.3) | 2(5.7) | - |
| Itching/Skin rash | - | 3(8.6) | - |
| Syncope/collapse | - | - | 1(4.2) |
| Lethargy/dizziness | 2(10.5) | 5(14.3) | 4(16.7) |
| Other (Specify) | 6(31.6) | 4(11.4) | 4(16.7) |
| Total | 17(100) | 35(100) | 24(100) |

*Other 2021/2022: Near syncope, covid-19 positive, covid-19 close contact
*Other 2022/2023: Epistaxis, sore throat, rhinorrhea, fatigue,
*Other 2023/2024: Dizziness, painful urination(hematuria), ear pain and loss of hearing, circulatory dysregulation

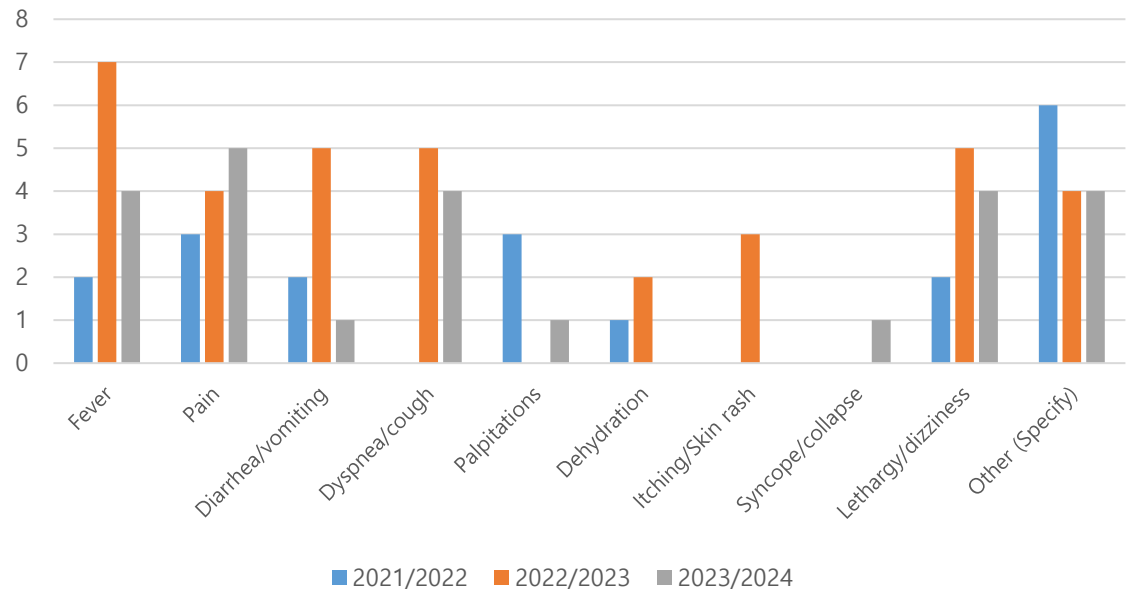


***Figure 10. Reported type of illnesses***

***Table 10. Affected Systems***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Respiratory (ear, nose, throat) | 1(12.5) | 10(45.5) | 7(38.9) |
| Gastro-intestinal | 2(25.0) | 7(31.8) | 3(16.7) |
| Cardio-vascular | 3(37.5) | - | 4(22.2) |
| Allergic/immunological | - | - | 0 |
| Neurologic/psychiatric | 1(12.5) | - | 1(5.6) |
| Dermatologic | - | 3(13.6) | 0 |
| Dental | - | 0 | 0 |
| Other (Specify) | 1(12.5) | 2(9.1) | 3(16.7) |
| Total | 8(100) | 22(100) | 18(100) |

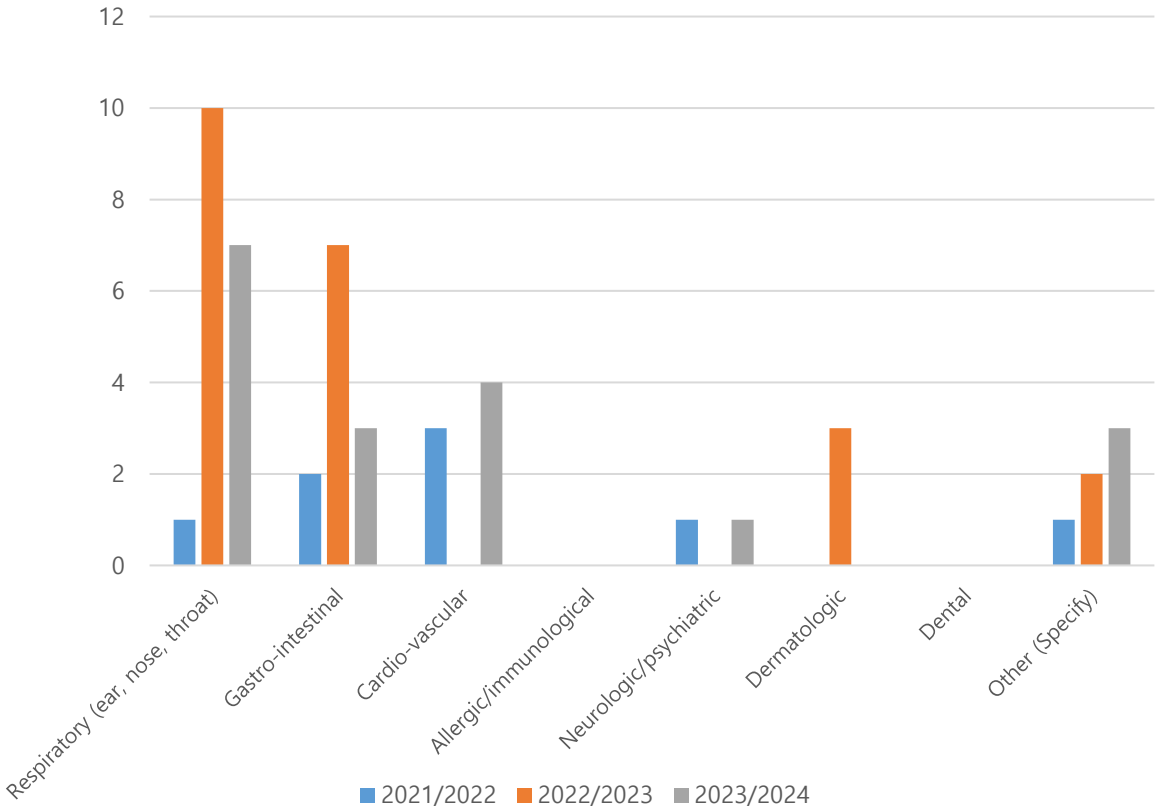


***Figure 11. Affected Systems***

***Table 11. Supposed cause of illness***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Pre-existing (e.g. asthma, allergy) | 2(25.0) | 1(5.6) | 2(10.5) |
| Infection | 1(12.5) | 12(66.7) | 7(36.8) |
| Exercise-induced | - | - | 2(10.5) |
| Environmental | 1(12.5) | 2(11.1) | 2(10.5) |
| Other | 4(50.0) | 3(16.7) | 6(31.6) |
| Total | 8(100) | 18(100) | 19(100) |

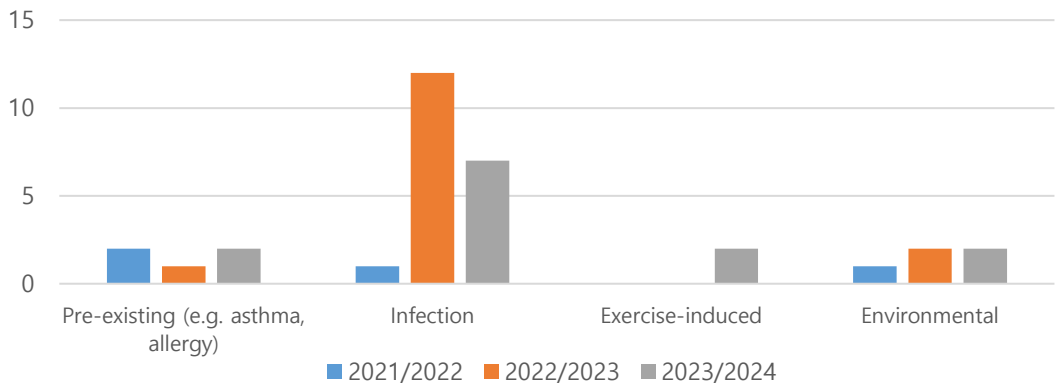


***Figure 12. Supposed cause of illness***

Notable illnesses or trends were not observed in FS skaters.

## Summary

The latest data shows that non-contact ankle ligament injuries during training have become the biggest trend in FS. They are more prevalent among female athletes and are increasing in severity. No notable illness trend was observed.

# Speed Skating (SS)

## Overview

***Table 12. Reported cases and frequencies***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Total cases | **24** | **16** | **24** |
| Injury | 11 | 4 | 12 |
| Illness | 13 | 12 | 12 |
| No. of events (ISU/International) | 14 | 13 | 14 |
| Injury/SS event | 0.79 | 0.31 | 0.86 |

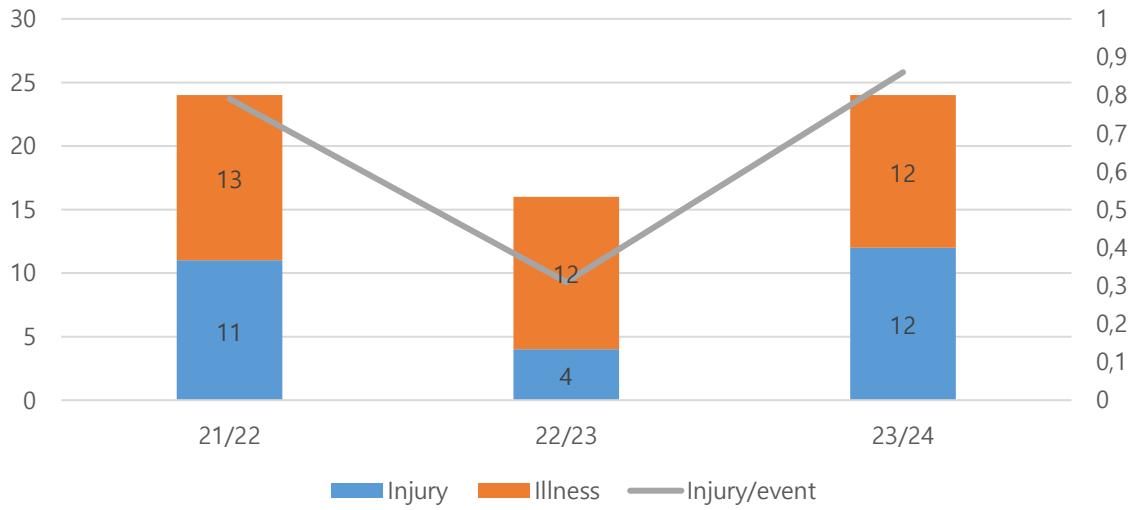


***Figure 13. Reported cases and frequencies***

The share of SS related injuries per each event has risen since the 2022/2023 season, and has also surpassed the value seen in 2021/2022 season.

For the 2023/2024 season, the Incident Rate (IR) was 1.49 - 2.07, and the Injury Proportion (IP) was 0.4% in SS.

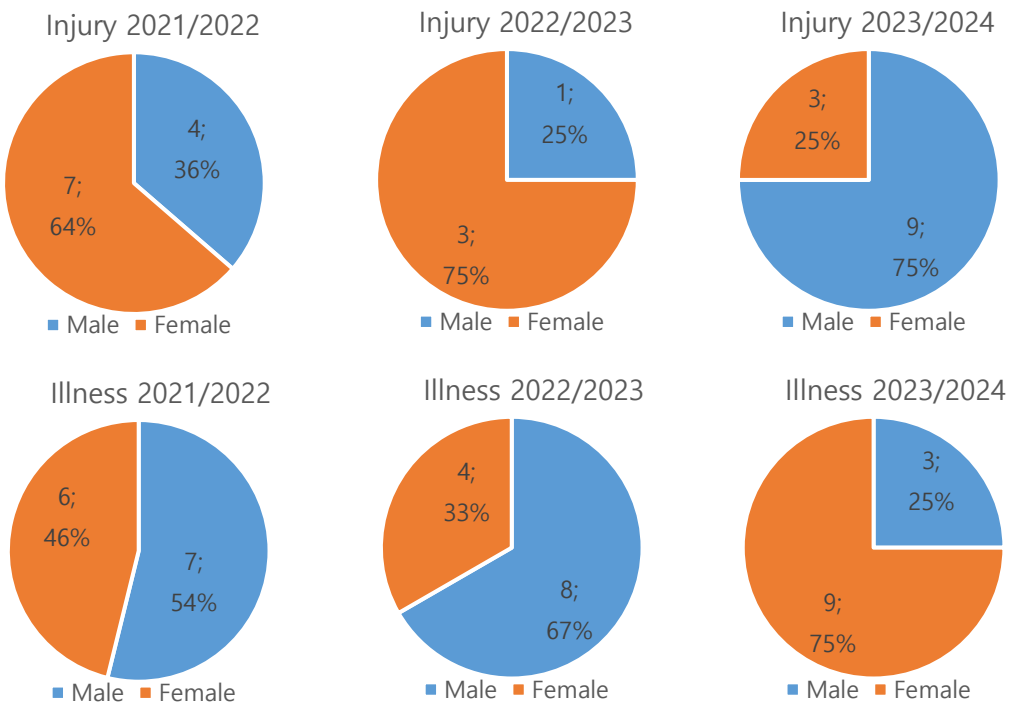


***Figure 14. Gender differences of reported injuries/illnesses***

No consistent trend in gender was observed in SS.

## Injury

***Table 13. Reported type of injuries***

| Diagnosis | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Concussion | 1(9.1) | 1(20.0) | 1(7.7) |
| Fracture | - | - | - |
| Stress fracture | - | - | - |
| Dislocation, subluxation | - | - | - |
| Lesion of meniscus or cartilage | 1(9.1) | - | - |
| Tendon rupture | - | - | - |
| ligaments (sprain) | 2(18.2) | 2(40.0) | - |
| Muscle strain/tear | 2(18.2) | - | 3(23.1) |
| Contusion/bruise | - | - | 1(7.7) |
| Chronic tendinopathy | - | - | - |
| Arthritis/synovitis/bursitis | - | 1(20.0) | - |
| Laceration/abrasion | - | - | 2(15.4) |
| Nerve/Spinal chord | 1(9.1) | - | 1(7.7) |
| Muscle cramp/spasm | 3(27.3) | - | 3(23.1) |
| Other (specify) | - | 1(20.0) | 2(15.4) |
| Not Recorded | 1(9.1) | - | - |
| Total | 11(100) | 5(100) | 13(100) |

*Other 2022/2023: Lingering issues from herniated disk
*Other 2023/2024: Cut, mild muscle strain

One skater reported multiple injuries at a time in each 2021/2022 and 2023/2024 seasons.

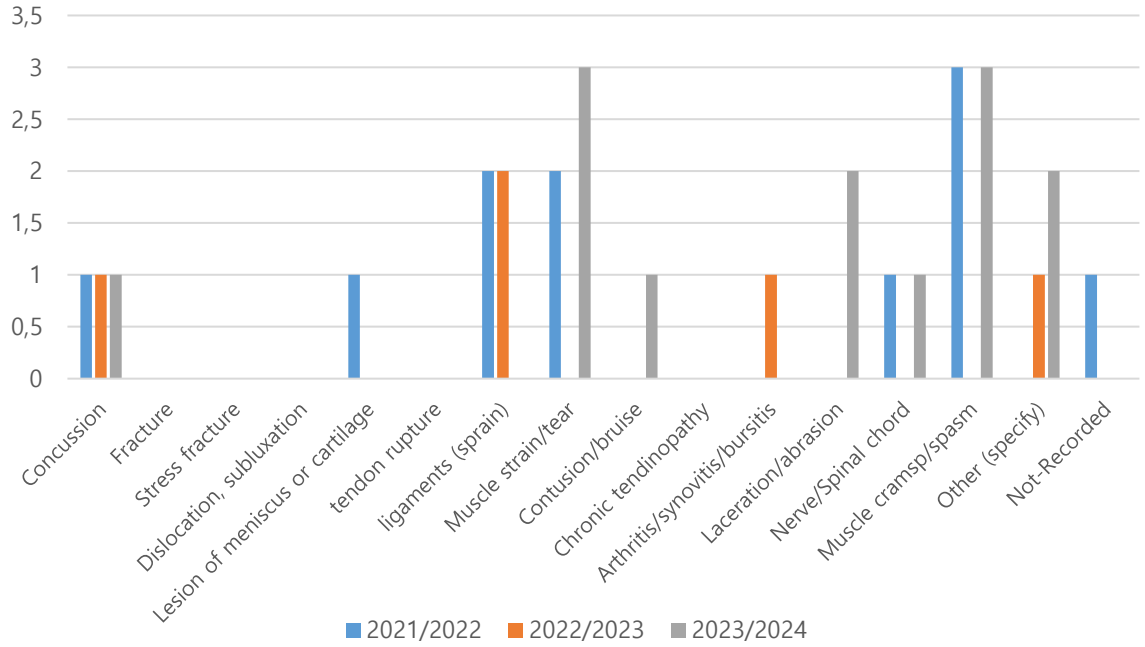


***Figure 15. Reported type of injuries***

SS skaters mainly were suffering from muscle spasm or strain while ligament sprain was the most common injury type in 2022/2023 season.

***Table 14. Causes of injuries***

| Contact with | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Equipment | - | - | - |
| Ice | - | - | 1(7.1) |
| Boards/Pads | 1(9.1) | 1(25.0) | 2(14.3) |
| Person | 1(9.1) | - | 5(35.7) |
| Non-Contact | 8(72.7) | 3(75.0) | 6(42.9) |
| Not Recorded/ Other | 1(9.1) | - | - |
| Total | 11(100) | 4(100) | 14(100) |

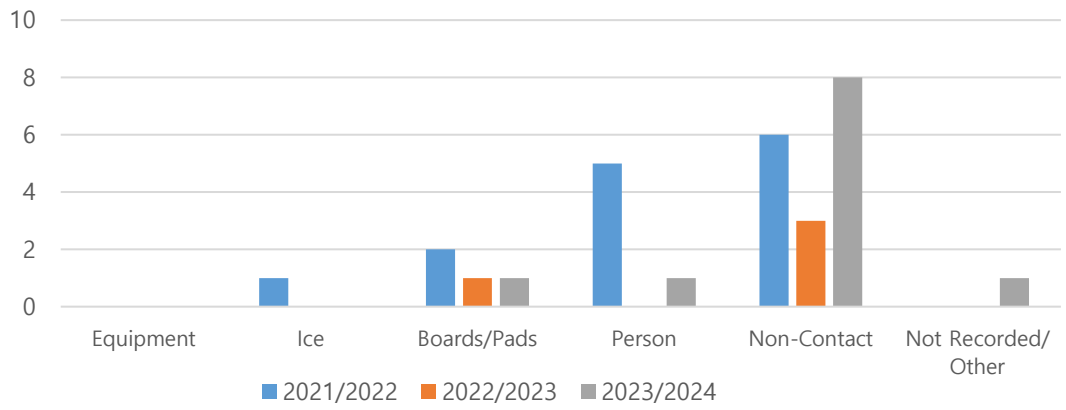


***Figure 16. Causes of injuries***

Non-contact injuries have been the most common over the last three seasons.

*Table 15. Region (body parts)*

| Region | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Abdomen/pelvis/buttock | - | - | - |
| Ankle/foot | 1(9.1) | - | 3(21.4) |
| Elbow/forearm | - | - | - |
| Face | - | - | 1(7.1) |
| Head | 1(9.1) | - | 1(7.1) |
| Neck | - | 1(25.0) | - |
| Hip/groin | 4(36.4) | 1(25.0) | 2(14.3) |
| Knee | 1(9.1) | 1(25.0) | 1(7.1) |
| Lower back | 3(27.3) | 1(25.0) | 3(21.4) |
| Lower leg/Achilles tendon | - | - | 3(21.4) |
| Shoulder/clavicle/upper arm | - | - | - |
| Sternum/ribs | - | - | - |
| Thigh | - | - | - |
| Wrist/hand/fingers | - | - | - |
| Not Recorded/Other | 1(9.1) | - | - |
| | 11(100) | 4(100) | 14(100) |

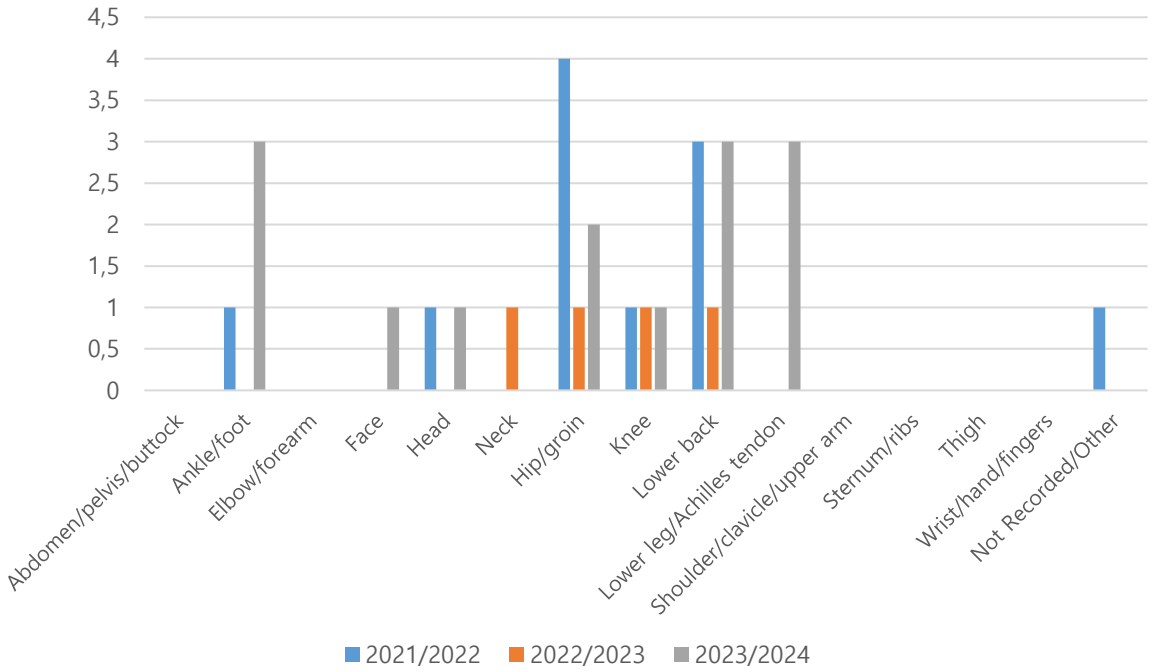


***Figure 17. Region (body parts)***

Although ankle/foot, lower back and lower leg/achilleas tendon injuries were commonly reported in the 2023/2024 season, the numbers were not substantial enough to identify the trends.

***Table 16. Characteristics of injuries***

| Status | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Acute (new onset) | 6(54.5) | 3(75.0) | 9(75.0) |
| Chronic | - | - | - |
| Recurrent (upon previous injury) | 5(45.5) | 1(25.0) | 3(25.0) |
| Not Recorded | - | - | - |
| Total | 11(100) | 4(100) | 12(100) |

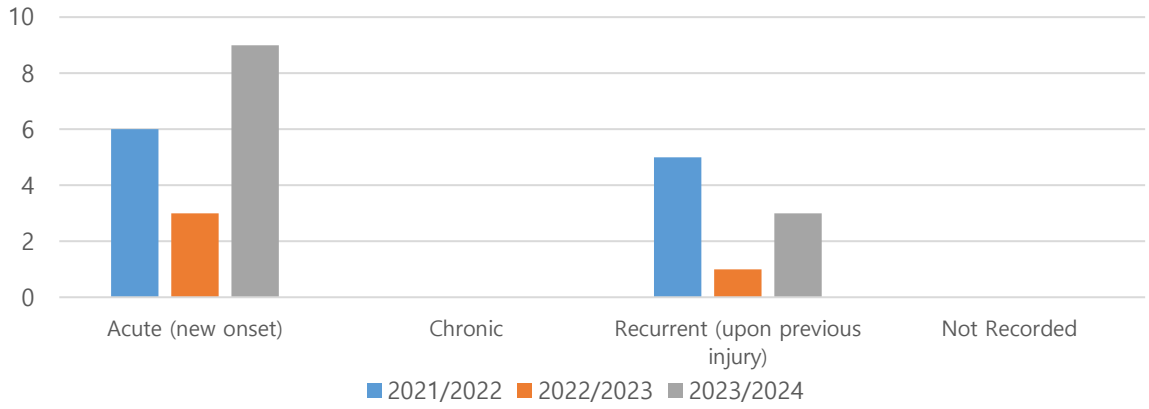


***Figure 18. Characteristics of injuries***

No chronic injuries were reported over the last three seasons.

***Table 17. Time of injury occurrence***

| Onset | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Competition | 6(50.0) | 2(40.0) | 7(53.8) |
| Practice/Training | 6(50.0) | 3(60.0) | 5(38.5) |
| Practice/Training (competition) | - | - | - |
| Other (specify) | - | - | 1(7.7) |
| Not Recorded | - | - | - |
| Total | 12(100) | 5(100) | 13(100) |

*Other 2023/2024: At the hotel

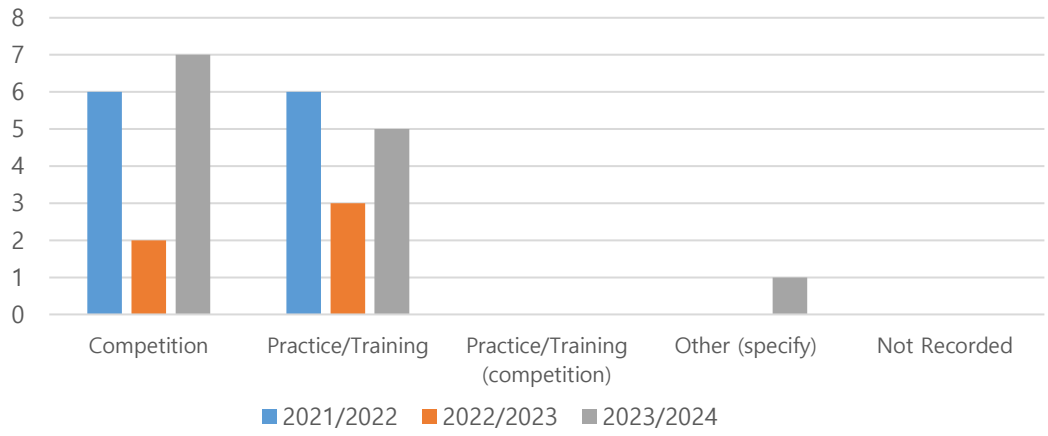


***Figure 19. Time of injury occurrence***

The similar number of injuries have occurred both during competitions and practice/training sessions over the last three seasons.

*Table 18. Disposition after injury*

| Injury Severity | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Unable to train/compete | 5(45.5) | 3(75.0) | 9(75.0) |
| Resumed activity | 5(45.5) | 1(25.0) | 2(16.7) |
| Transport to hospital | - | - | - |
| Not Recorded | 1(9.1) | - | 1(8.3) |
| Total | 11(100) | 4(100) | 12(100) |

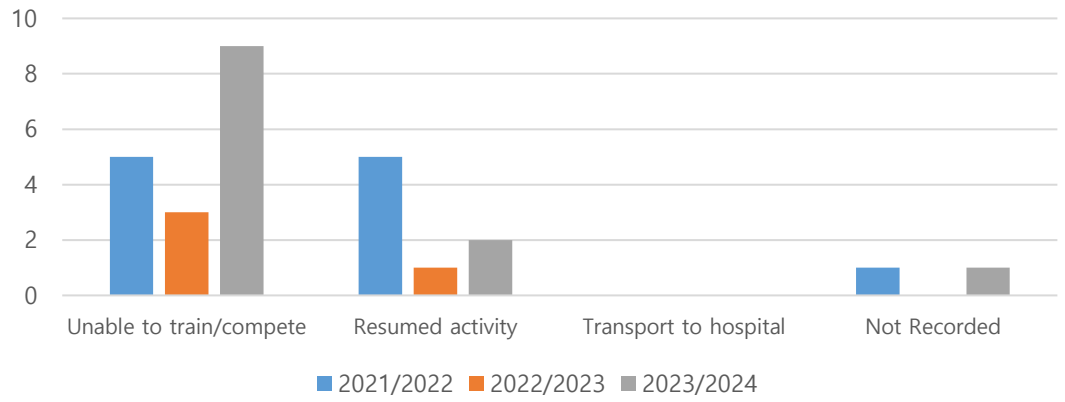


*Figure 20. Disposition after injury*

*Table 19. Lay-off time (severity) after injury*

| Expected absence | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Less than 1 day | 2(18.2) | - | 4(33.3) |
| 1 to 3 days | 2(18.2) | 2(50.0) | 4(33.3) |
| 4 to 7 days | 1(9.1) | 1(25.0) | 2(16.7) |
| Greater than 7 days | 4(36.4) | 1(25.0) | 2(16.7) |
| Not Recorded | 2(18.2) | - | - |
| Total | 11(100) | 4(100) | 12(100) |

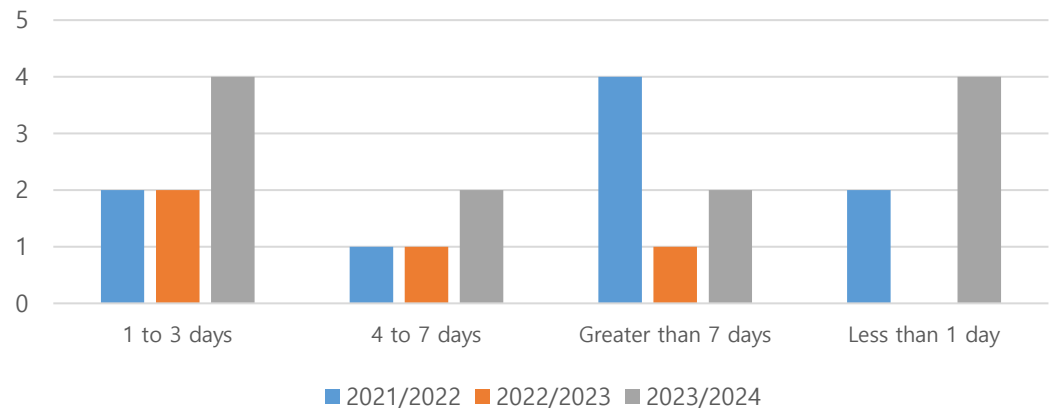


***Figure 21. Lay-off time (severity) after injury***

Two-thirds of the injured SS skaters have recovered in less than 1 day or 1 to 3 days, which shows the relative mildness of the injuries.

To wrap up, compared to the other disciplines, relatively fewer SS skaters are suffering from mild, non-contact injuries such as muscle or ligament sprain.

## Illness

***Table 20. Reported type of illnesses***

| Main Symptom(s) | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Fever | 2(15.4) | 6(37.5) | 3(17.6) |
| Pain | 1(7.7) | 3(18.8) | 2(11.8) |
| Diarrhea/vomiting | 2(15.4) | 1(6.3) | - |
| Dyspnea/cough | 2(15.4) | 4(25.0) | 6(35.3) |
| Palpitations | - | - | - |
| Dehydration | - | - | - |
| Itching/Skin rash | - | - | 1(5.9) |
| Syncope/collapse | - | - | - |
| Lethargy/dizziness | - | 1(6.3) | - |
| Other (Specify) | - | 1(6.3) | 5(29.4) |
| Total | 13(100) | 16(100) | 17(100) |

*Other 2022/2023: Malaise
*Other 2023/2024: Headache, sinus pain, feeling unwell

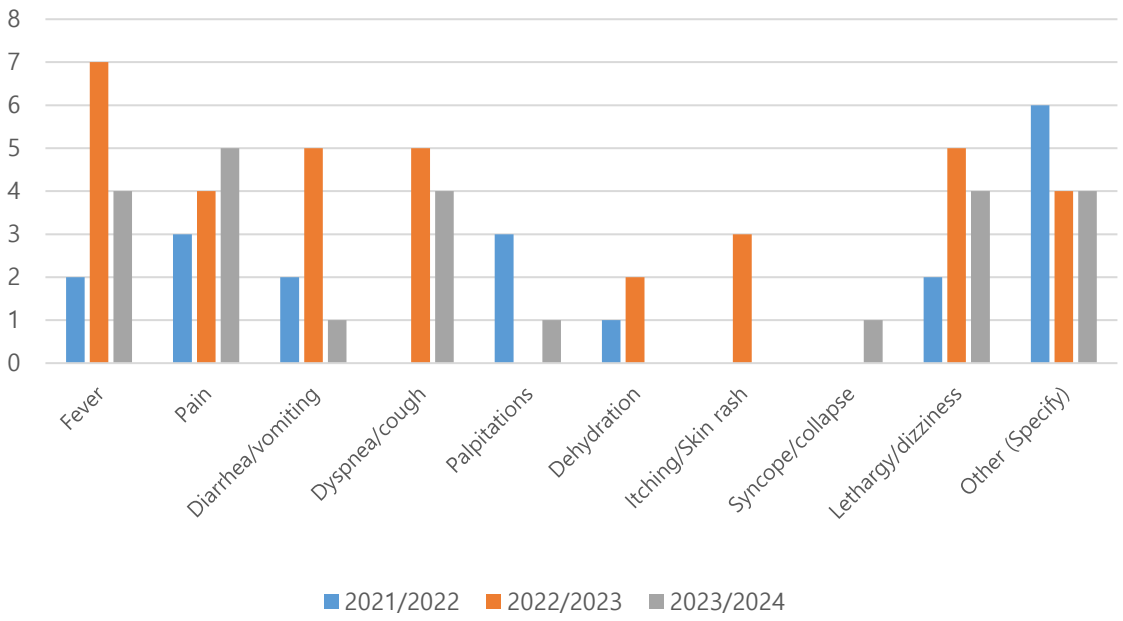


***Figure 22. Reported type of illnesses***

***Table 21. Affected Systems***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Respiratory (ear, nose, throat) | 7(70.0) | 9(81.8) | 8(61.5) |
| Gastro-intestinal | 1(10.0) | 1(9.1) | - |
| Cardio-vascular | 1(10.0) | - | - |
| Allergic/immunological | - | - | 1(7.7) |
| Neurologic/psychiatric | - | - | - |
| Dermatologic | - | - | - |
| Dental | - | - | - |
| Other (Specify) | 1(10.0) | 1(9.1) | 4(30.8) |
| Total | 10(100) | 11(100) | 13(100) |

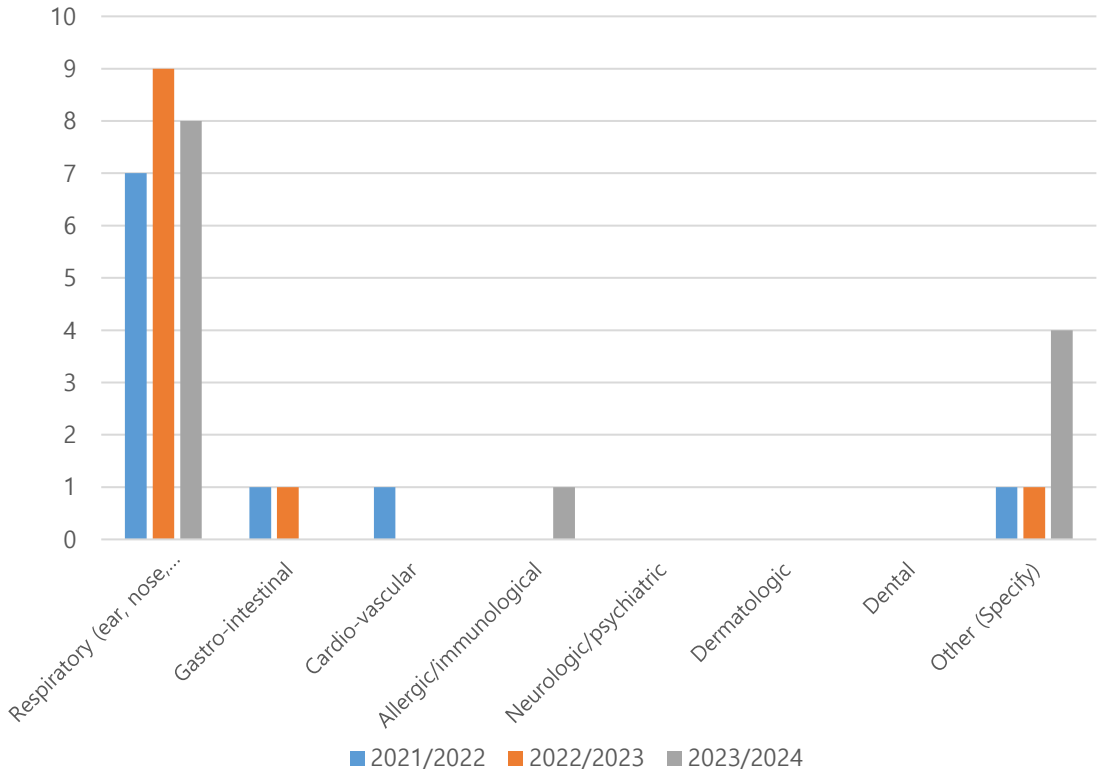


***Figure 23. Affected Systems***

***Table 22. Supposed cause of illness***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Pre-existing (e.g. asthma, allergy) | 2(18.2) | 2(15.4) | 4(28.6) |
| Infection | 6(54.5) | 8(61.5) | 6(42.9) |
| Exercise-induced | - | - | 1(7.1) |
| Environmental | - | - | 2(14.3) |
| Other | 3(27.3) | 3(23.1) | 1(7.1) |
| Total | 11(100) | 13(100) | 14(100) |

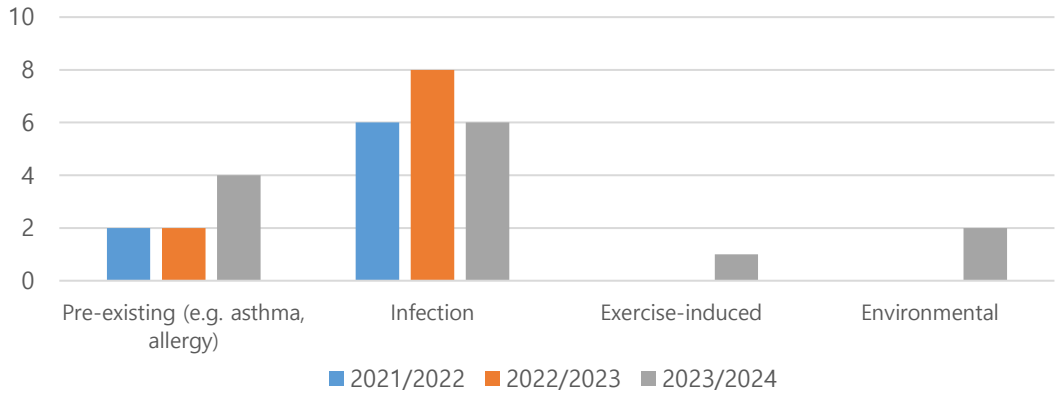


***Figure 24. Supposed cause of illness***

Respiratory related illnesses caused by infection are most commonly observed in SS skaters.

## Summary

The current SS skaters tend to sustain non-contact injuries, such as muscle or ligament sprain. However, the symptoms are relatively mild compared to the other disciplines. Meanwhile, respiratory-related illnesses caused by infection have been identified as the most prevalent illnesses over the last three seasons.

# Short Track (ST)

## Overview

***Table 23. Reported cases and frequencies***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Total cases | **18** | **36** | **28** |
| Injury | 10 | 26 | 25 |
| Illness | 8 | 10 | 3 |
| No. of events (ISU/International) | 8 | 9 | 10 |
| Injury/ST event | 1.25 | 2.89 | 2.50 |

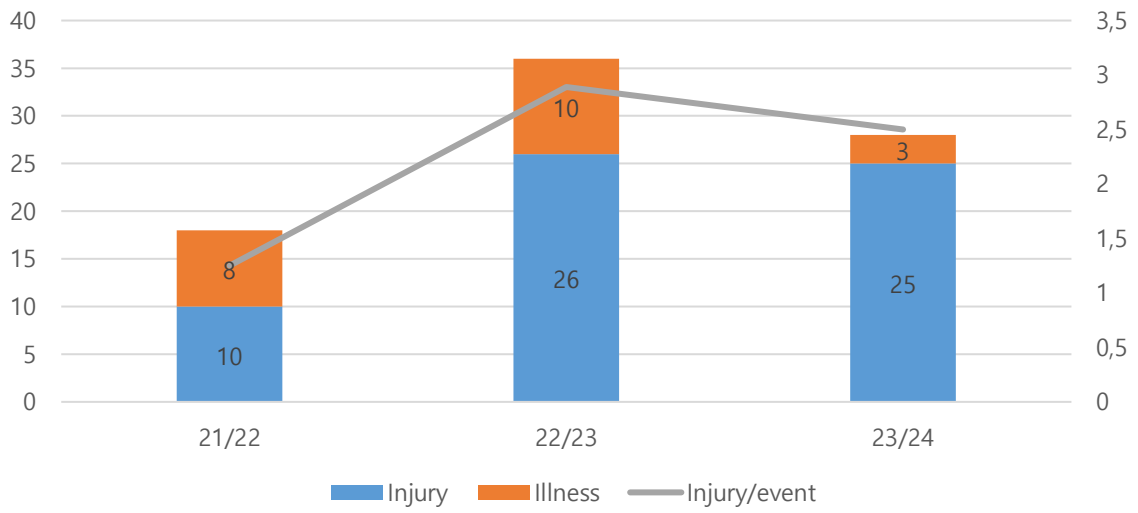


***Figure 25. Reported cases and frequencies***

The share of ST related injuries per each event has slightly decreased in the 2023/2024 season (2.50) compared to that seen in the previous season (2.89), which in its turn had a big increase since 2021/2022 season (1.25).

For the 2023/2024 season, the Incident Rate (IR) was 2.68 - 3.26, and the Injury Proportion (IP) was 1.5% in ST.

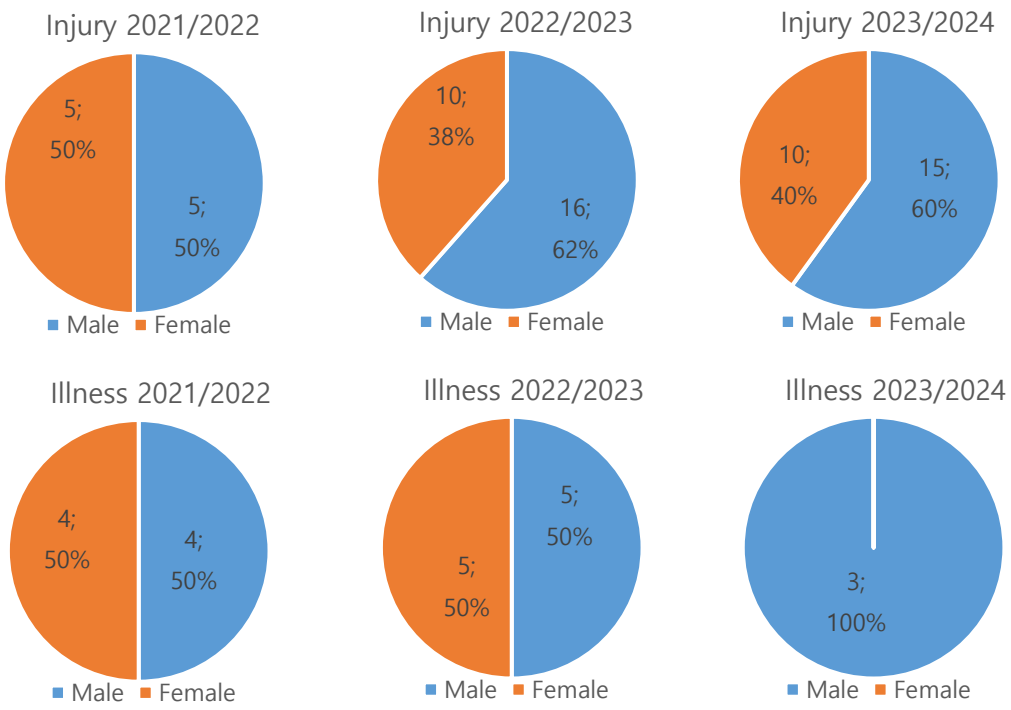


***Figure 26. Gender differences of reported injuries/illnesses***

Male Skaters have generally reported more injuries and illnesses in ST.

## Injury

***Table 24. Reported type of injuries***

| Diagnosis | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Concussion | - | 5(17.2) | 7(23.3) |
| Fracture | 2(15.4) | 2(6.9) | 3(10.0) |
| Stress fracture | - | - | - |
| Dislocation, subluxation | 1(7.7) | - | 2(6.7) |
| Lesion of meniscus or cartilage | - | - | - |
| Tendon rupture | - | - | - |
| ligaments (sprain) | 2(15.4) | 2(6.9) | 4(13.3) |
| Muscle strain/tear | 3(23.1) | 7(24.1) | 1(3.3) |
| Contusion/bruise | 3(23.1) | 4(13.8) | 8(26.7) |
| Chronic tendinopathy | - | - | - |
| Arthritis/synovitis/bursitis | - | 2(6.9) | - |
| Laceration/abrasion | 2(15.4) | - | 2(6.7) |
| Nerve/Spinal chord | - | - | - |
| Muscle cramp/spasm | - | 1(3.4) | 1(3.3) |
| Other (specify) | - | 4(13.8) | 2(6.7) |
| Not Recorded | - | 2(6.9) | - |
| Total | 13(100) | 29(100) | 30(100) |

*Other 2022/2023: Cut, pain on head
*Other 2023/2024: Skin wound

Several skaters reported multiple injuries at a time: three skaters in each 2021/2022 and 2022/2023 seasons, and four skaters in 2023/2024 season.

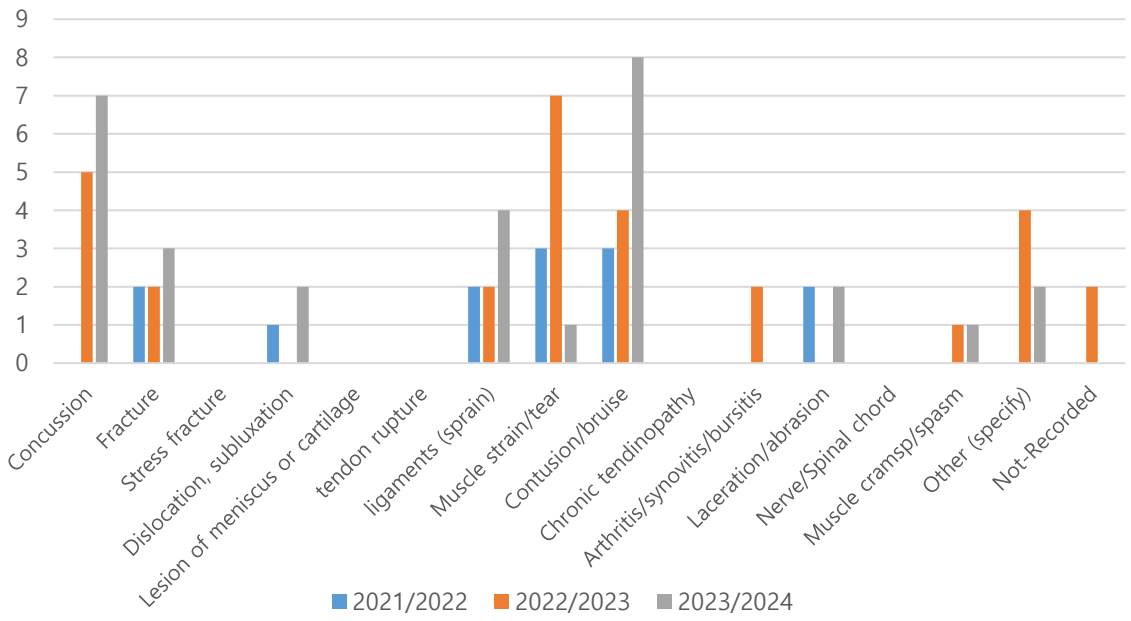


***Figure 27. Reported type of injuries***

Most frequent types of injuries were contusions/bruise in ST. There has been a notable increase in reported cases of concussion in the recent two seasons, for which we should be concerned.

***Table 25. Causes of injuries***

| Contact with | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Equipment | 2(14.3) | 1(3.0) | 4(14.3) |
| Ice | 3(21.4) | 7(21.2) | 6(21.4) |
| Boards/Pads | 2(14.3) | 8(24.2) | 7(25.0) |
| Person | 4(28.6) | 9(27.3) | 9(32.1) |
| Non-Contact | 3(21.4) | 8(24.2) | 2(7.1) |
| Not Recorded/ Other | - | - | - |
| Total | 14(100) | 33(100) | 28(100) |

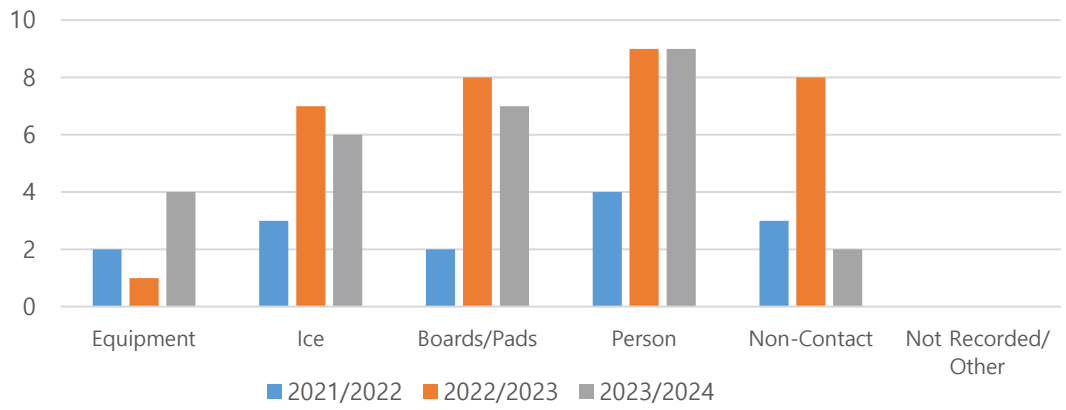


***Figure 28. Causes of injuries***

Most injuries were caused by contacts. Unfortunately, Table 4 and Figure 4 do not indicate the efficacy of the new padding system. We think that a movable or hybrid padding system appeared very effective in preventing or reducing severe injuries such as fractures, dislocations and so on associated with a collision with padding even though races have been getting even more competitive lately.

*Table 26. Region (body parts)*

| Region | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Abdomen/pelvis/buttock | 1(8.3) | - | - |
| Ankle/foot | 4(33.3) | 8(27.6) | 6(21.4) |
| Elbow/forearm | - | - | 1(3.6) |
| Face | - | 2(6.9) | 3(10.7) |
| Head | - | 8(27.6) | 3(10.7) |
| Neck | 1(8.3) | 3(10.3) | 2(7.1) |
| Hip/groin | 2(16.7) | 1(3.4) | 1(3.6) |
| Knee | 1(8.3) | 1(3.4) | 2(7.1) |
| Lower back | 1(8.3) | 4(13.8) | 3(10.7) |
| Lower leg/Achilles tendon | 1(8.3) | - | 4(14.3) |
| Shoulder/clavicle/upper arm | - | - | 2(7.1) |
| Sternum/ribs | 1(8.3) | 2(6.9) | - |
| Thigh | - | - | 1(3.6) |
| Wrist/hand/fingers | - | - | - |
| Not Recorded/Other | - | - | - |
| | 12(100) | 29(100) | 28(100) |

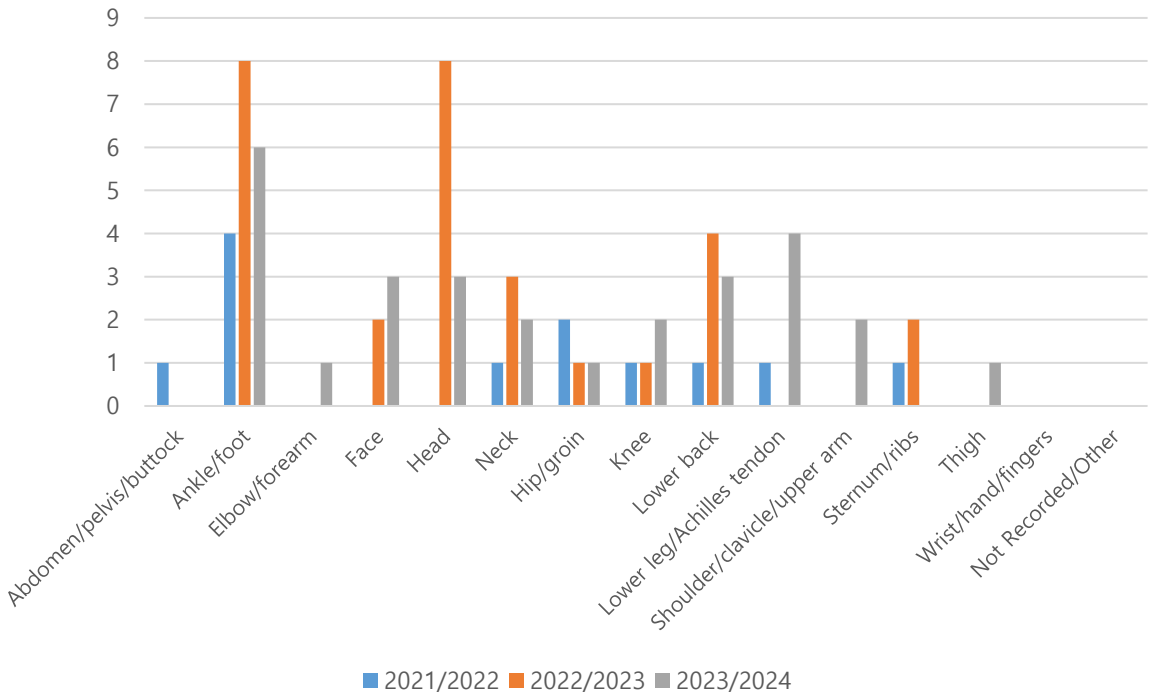


***Figure 29. Region (body parts)***

Ankle/Foot have been the most commonly reported injured body parts in ST over the last three seasons. Skaters with the symptoms of concussion reported they injured either Head, Face or Neck.

***Table 27. Characteristics of injuries***

| Status | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Acute (new onset) | 10(83.3) | 22(84.6) | 21(84.0) |
| Chronic | - | - | - |
| Recurrent (upon previous injury) | 2(16.7) | 4(15.4) | 4(16.0) |
| Not Recorded | - | - | - |
| Total | 12(100) | 26(100) | 25(100) |

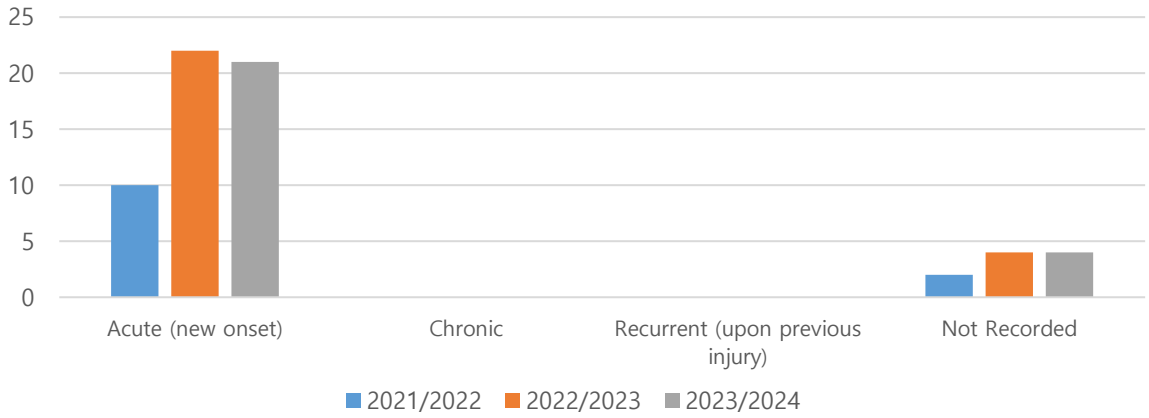


***Figure 30. Characteristics of injuries***

Nearly 85% of the injuries were Acute (new onset) in ST.

***Table 28. Time of injury occurrence***

| Onset | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Competition | 8(80.0) | 20(76.9) | 20(80.0) |
| Practice/Training | 2(20.0) | 6(23.1) | 4(16.0) |
| Practice/Training (competition) | - | - | - |
| Other (specify) | - | - | - |
| Not Recorded | - | - | 1(4.0) |
| Total | 10(100) | 26(100) | 25(100) |

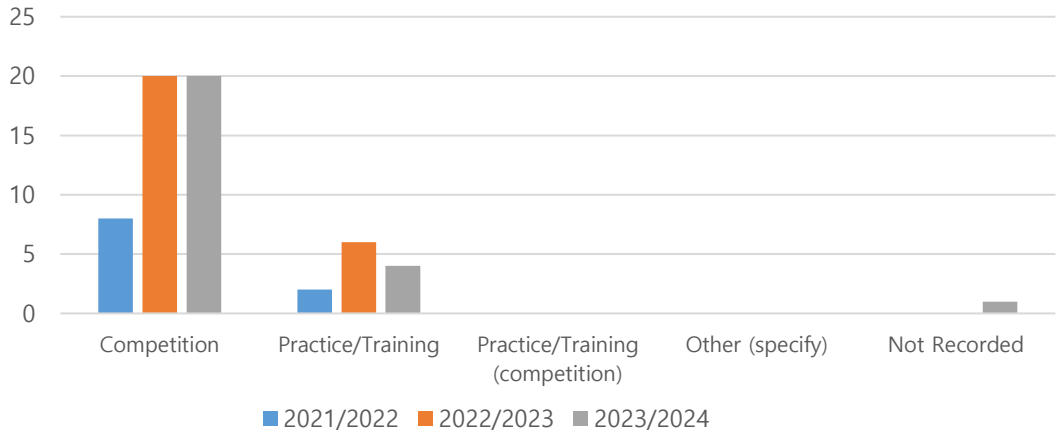


**Figure 31. Time of injury occurrence**

Around 80% of ST injuries occurred in-competition, which indicates that improving in-competition injury preventive measures would effectively decrease the cases.

*Table 29. Disposition after injury*

| Injury Severity | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Unable to train/compete | 4(40.0) | 14(53.8) | 14(56.0) |
| Resumed activity | 1(10.0) | 8(30.8) | 3(12.0) |
| Transport to hospital | 5(50.0) | 3(11.5) | 8(32.0) |
| Not Recorded | - | 1(3.8) | - |
| Total | 10(100) | 26(100) | 25(100) |

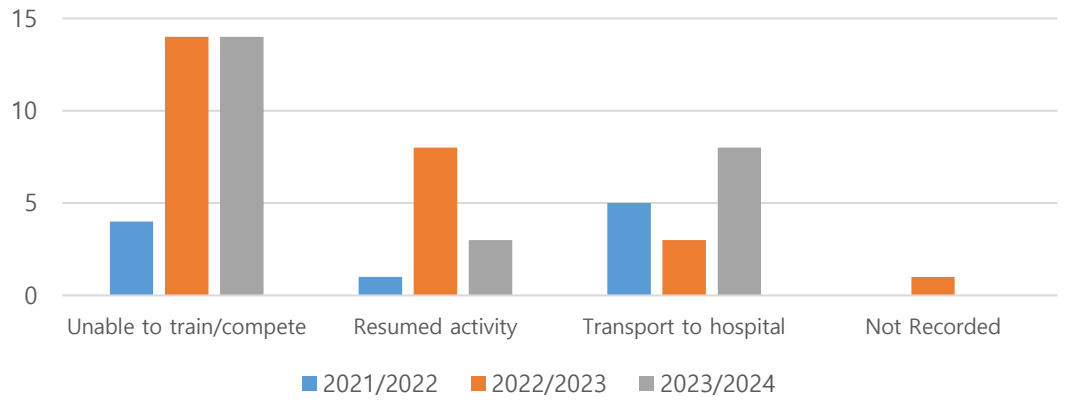


*Figure 32. Disposition after injury*

*Table 30. Lay-off time (severity) after injury*

| Expected absence | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Less than 1 day | 3(30.0) | 3(11.5) | 5(20.0) |
| 1 to 3 days | 1(10.0) | 6(23.1) | 3(12.0) |
| 4 to 7 days | 1(10.0) | 6(23.1) | 5(20.0) |
| Greater than 7 days | 5(50.0) | 7(26.9) | 12(48.0) |
| Not Recorded | - | 4(15.4) | - |
| Total | 10(100) | 26(100) | 25(100) |

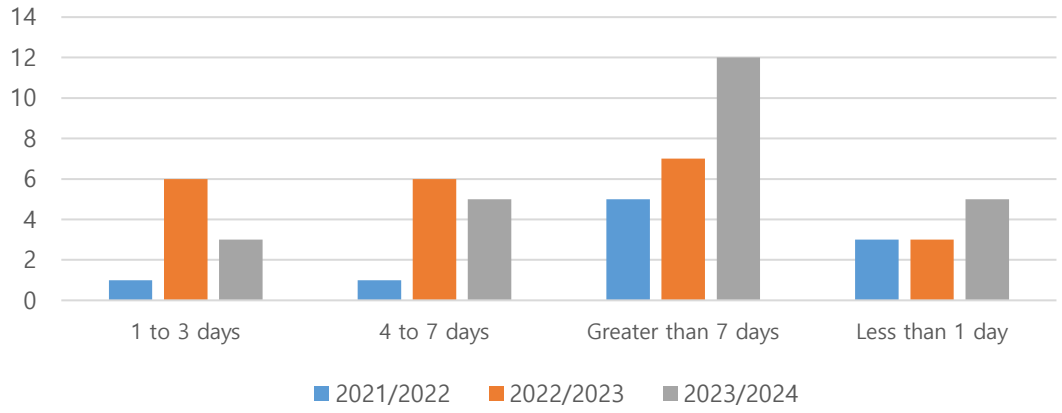


***Figure 33. Lay-off time (severity) after injury***

The number of the 'Unable to train/compete' athletes with injuries has stayed the same (14 cases, over 50%). Also considering the expected absence 'Greater than 7 days' as severe injury, the incidence of severe injuries has also been increasing.

To wrap up, it appears that ST skaters are sustaining significant injuries in spite of our effort to reduce the ST injuries by such measures as padding system and technical rule changes, since most ST injuries occur in-competition where the ST races are getting very competitive lately.

## Illness

***Table 31. Reported type of illnesses***

| Main Symptom(s) | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Fever | - | 7(28.0) | 1(20.0) |
| Pain | 2(18.2) | 1(4.0) | - |
| Diarrhea/vomiting | - | 3(12.0) | - |
| Dyspnea/cough | 2(18.2) | 7(28.0) | 2(40.0) |
| Palpitations | - | - | - |
| Dehydration | - | - | - |
| Itching/Skin rash | - | 1(4.0) | - |
| Syncope/collapse | 1(9.1) | - | - |
| Lethargy/dizziness | - | 3(12.0) | 1(20.0) |
| Other (Specify) | 6(54.5) | 3(12.0) | 1(20.0) |
| Total | 11(100) | 25(100) | 5(100) |

*Other 2021/2022: Covid-19 positive, Covid-19 closed contact, runny nose
*Other 2022/2023: Vertigo, sore throat
*Other 2023/2024: Chest pain

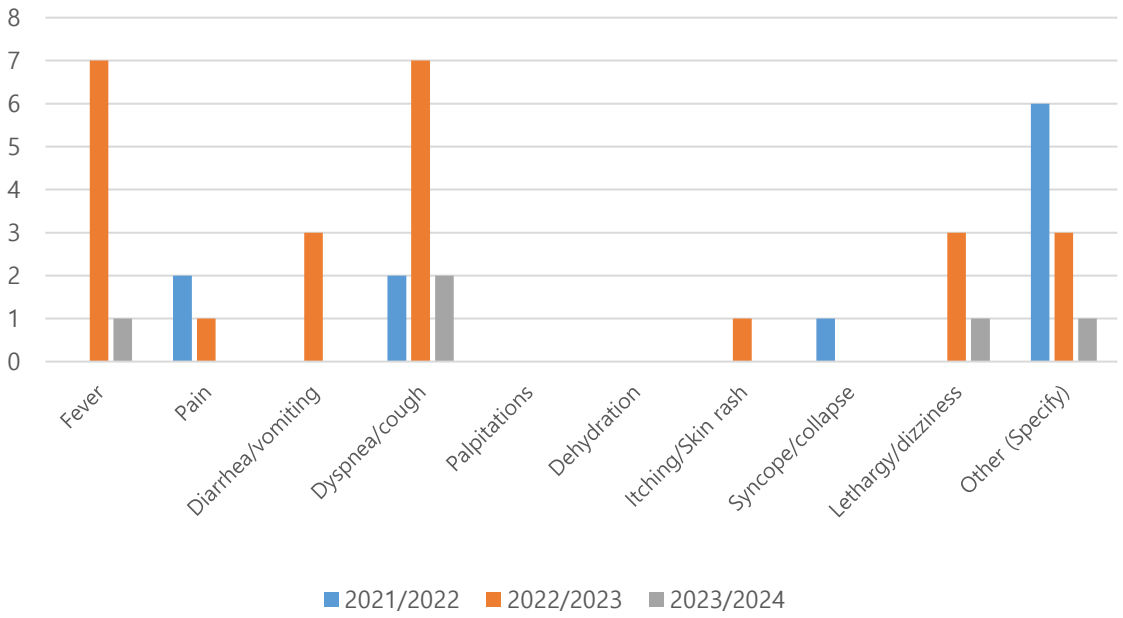


***Figure 34. Reported type of illnesses***

***Table 32. Affected Systems***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Respiratory (ear, nose, throat) | 2(25.0) | 9(75.0) | 3(100.0) |
| Gastro-intestinal | 1(12.5) | 3(25.0) | - |
| Cardio-vascular | - | - | - |
| Allergic/immunological | 1(12.5) | - | - |
| Neurologic/psychiatric | - | - | - |
| Dermatologic | - | - | - |
| Dental | - | - | - |
| Other (Specify) | 4(50.0) | - | - |
| Total | 8(100) | 12(100) | 3(100) |

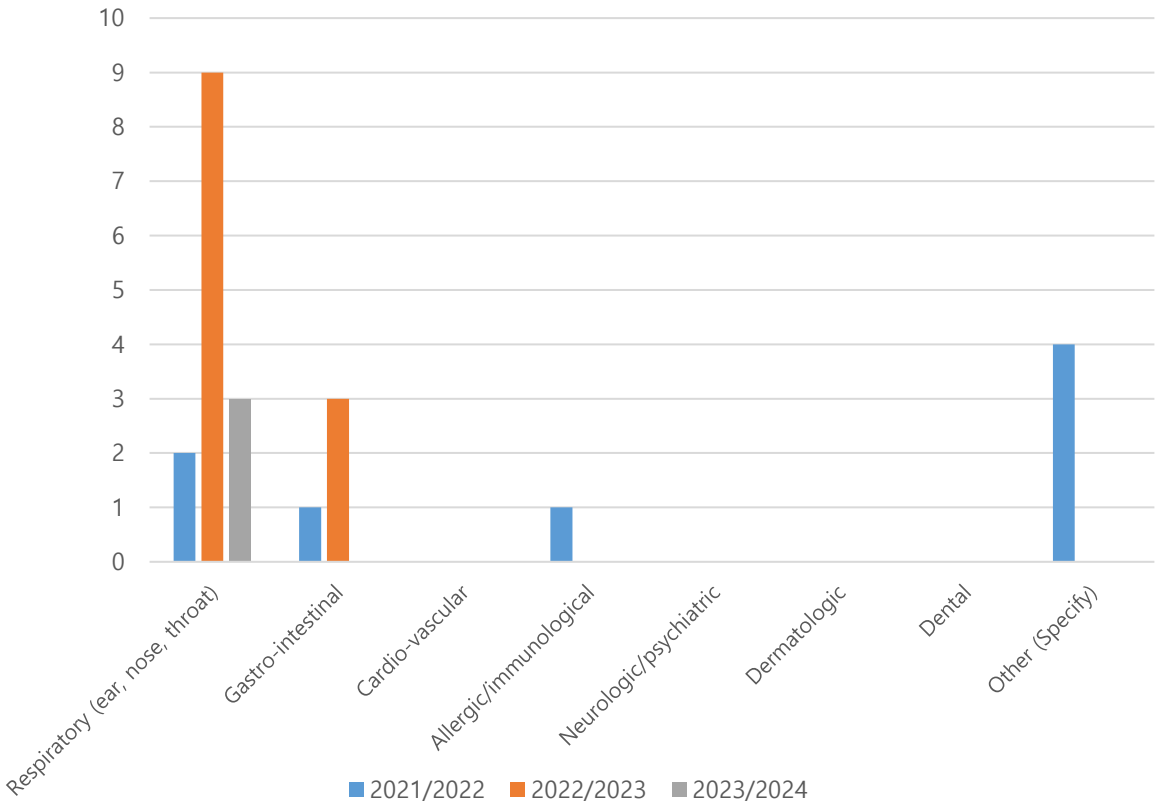


***Figure 35. Affected Systems***

***Table 33. Supposed cause of illness***

| | 2021/2022 | 2022/2023 | 2023/2024 |
|---|---|---|---|
| Pre-existing (e.g. asthma, allergy) | 1(16.7) | 1(9.1) | - |
| Infection | 4(66.7) | 8(72.7) | 3(100.0) |
| Exercise-induced | 1(16.7) | - | - |
| Environmental | - | 2(18.2) | - |
| Other | - | - | - |
| Total | 6(100) | 11(100) | (100) |

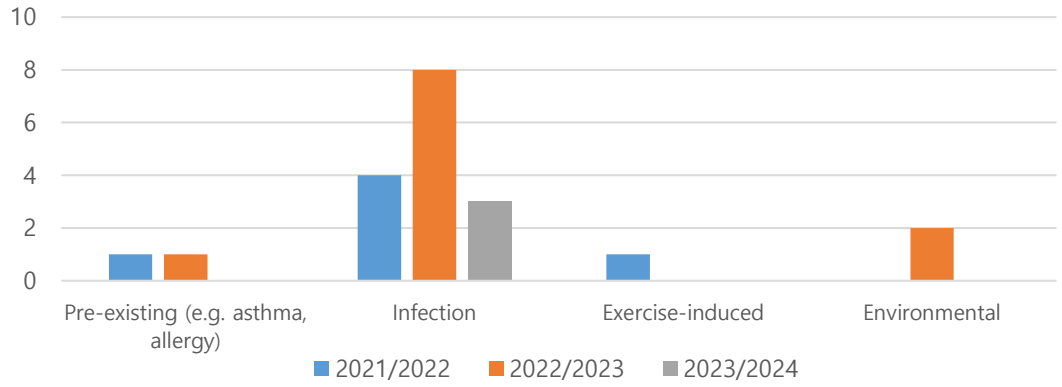


***Figure 36. Supposed cause of illness***

Notable illnesses or trends were not observed in ST skaters.

## Summary

The current ST skaters tend to sustain contact injuries during the competition, such as contusions/bruise. They are more prevalent among male athletes and are increasing in severity. Moreover, there has been an increase in concussion cases over the past two seasons, which requires continuous attention. No notable illness trend was observed.

## Overall Summary

Across the three disciplines, non-contact injuries in FS and contact injuries in ST are the two notable trends identified through the survey. These trends could suggest a rise in the competition level and an increase in the physical load on skaters during both competition and training. Therefore, close observation of those trends in conjunction with sport regulation reviews are recommended. Additionally, the increase in concussion in both disciplines requires continued attention and further research.