

## Injury pattern and factors affecting the performance in Oxfam Trailwalker 2006

### 影響 2006 樂施毅行者表現的受傷模式及因素

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A total of 3844 walkers took part in Oxfam Trailwalker 2006 and 3257 (84.7%) walkers finished the 100 km trail. There were 239 nurses plus other healthcare providers providing medical support for the event; 1639 walkers had medical contact with the nurses and 699 (42.6%) visited the medical tents more than once. Most walkers attended for minor complaints with muscle cramp (60.8%), blisters (25.8%) and wounds (5.6%). Seventeen cases were sent to hospitals and only 4 were admitted. In general, successful walkers had more medical complaints: 25.5% of the successful walkers complained of muscle cramp while 19.5% of the dropouts complained of muscle cramp ( $p=0.0020$ ); 13.6% of the successful walkers complained of blisters while 10.6% of the dropouts complained of blisters ( $p=0.0515$ ); 4.5% of the successful walkers complained of wound as compared to 2.6% of the dropouts ( $p=0.0292$ ) and 4.7% of the successful walkers had other complaints while 2.2% of the dropouts had other complaints ( $p=0.0074$ ). Other complaints included a variety of conditions like vomiting, diarrhoea, fever, and tiredness. Ankle sprain was the only exception: 3.4% of the dropouts complained of ankle sprain while 3.3% of the successful walkers had ankle sprain. Nevertheless, the finding was not statistically significant ( $p=0.8317$ ). It seems that higher proportions of muscle cramp, blister, wound and other complaints were found among successful walkers. The odds ratios of muscle cramp (1.15) and other complaints (1.69) were statistically significant. Among the successful walkers muscle cramp ( $p=0.0008$ ), blisters ( $p=0.0039$ ) and ankle sprain ( $p=0.0298$ ) slowed the finishing time. Linear regression analysis showed that only blister mattered ( $p=0.0372$ ). (*Hong Kong j.emerg.med.* 2008;15:96-105)

共有 3844 名步行者參與 2006 樂施毅行者活動，而 3257 名 (84.7%) 步行者完成 100 公里的路徑。239 名護士聯同其他醫療人員提供活動的醫療支援。1639 名步行者曾與護士有醫療接觸，及 699 名 (42.6%) 多於一次到醫療帳篷求診。大多數步行者因輕微不適而求診：肌肉抽筋 (60.8%)，水泡 (25.8%) 及傷口 (5.6%)。17 個案被送往醫院，只有 4 名要住院。大體上，成功完成的步行者有較多的身體不適，25.5% 成功的步行者申訴肌肉抽筋，而只有 19.5% 退出的步行者申訴肌肉抽筋 ( $p=0.0020$ )。13.6% 成功的步行者申訴起水泡，而只有 10.6% 退出的步行者申訴起水泡 ( $p=0.0515$ )。4.5% 成功的步行者申訴有傷口而比較 2.6% 退出的步行者 ( $p=0.0292$ )。4.7% 成功的步行者有其他申訴而只有 2.2% 退出的步行者有其他申訴 ( $p=0.0074$ )。其他申訴包括各種各樣的狀況如嘔吐、腹瀉、發燒及疲倦。足踝扭傷為唯一的例外。3.4% 退出的步行者及 3.3% 成功的步行者申訴足踝扭傷。然而，這調查結果沒有統計顯著性 ( $p=0.8317$ )。似乎更高比例的成功步行者有肌肉抽筋、水泡、傷口及其他申訴。肌肉抽筋 (1.15) 及其他申訴 (1.69) 的機會比率有統計顯著性。在成功步行者中，肌肉抽筋 ( $p=0.0008$ )、起水泡 ( $p=0.0039$ ) 及足踝扭傷 ( $p=0.0298$ ) 減慢完成時間。直線性回歸分析顯示只有起水泡有重要性 ( $p=0.0372$ )。

**Keywords:** Athletic injuries, exercise, hiking, physical endurance, sports

**關鍵詞:** 運動受傷、運動、遠足、身體耐力、體育

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## Introduction

Trailwalker used to be an endurance training of the Gurkhas in Hong Kong. Walkers form a team of four to complete the 100 km MacLehose Trail (Figure 1) within a 48-hour time limit. In 1985, the Gurkhas



Figure 1. The MacLehose Trail of Hong Kong (reprinted from Oxfam Hong Kong with permission).

invited five non-military teams to join the event. In 1986, Trailwalker was opened to the public. As Hong Kong faced the handover of sovereignty in 1997, Oxfam Hong Kong was invited to co-organise the event with the Gurkhas in 1996. Oxfam Hong Kong requested the support of many other community organisations to organise the event. Nurses and doctors from Queen Elizabeth Hospital started to provide medical support since 1996. Nurses and doctors from other hospitals of the Kowloon Central Cluster (KCC) of the Hospital Authority joined the team later. The event was renamed as Oxfam Trailwalker (OTW) in 2002 and is usually held in early November each year. OTW is currently the most popular hiking competition in Hong Kong.

Oxfam Trailwalker is now held in Australia, Belgium, Japan, New Zealand and UK. The Hong Kong Oxfam Trailwalker is the mother of all these events. The Hong Kong route remains the most difficult one (Figure 2).

**Medical support 1996 to 2005**

OTW used to be a military drill. Hence, the chain of command is well established. Nurses and doctors of the KCC formed the core medical team. Hundreds of first-aiders from the Auxiliary Medical Service (AMS) worked with the nurses at some checkpoints.

Preparation is the key to success in medical coverage of mass events.<sup>1</sup> Oxfam organised logistic meetings with all the participating organisations. The first meeting was usually held in May or June. After the first logistic meeting, each organisation holds its own

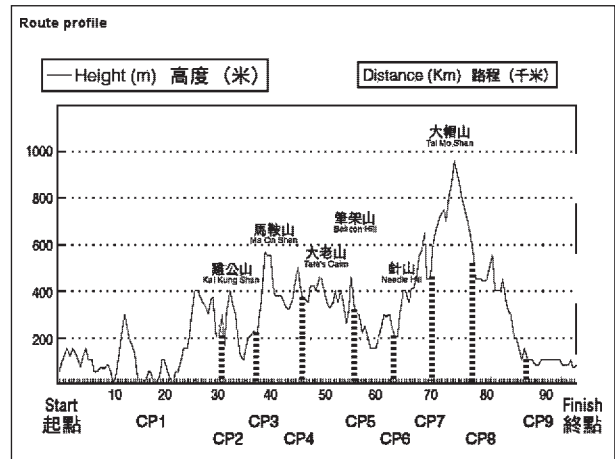


Figure 2. The route profile of Oxfam Trailwalker Hong Kong (reprinted from Oxfam Hong Kong with permission).

meetings and training. Volunteers from KCC were responsible for: (1) purchase and preparation of medical supplies, (2) recruitment of nurses and doctors, and (3) overall command of the medical services of the event.

**Nurses**

A total of 239 nurses from KCC volunteered to help the event in OTW 2006. They served the walkers day and night throughout the event (Figures 3 and 4). As a matter of fact, nurse's availability was essential for insurance purpose. A checkpoint had to be shut down in case the nurse was absent from it. A nurse coordinator was appointed at each checkpoint since 2003. A few Mobile Nursing Commands drove along the trail. They helped setting up the medical tents and replenished medical supplies. They offered advice on management via mobile phones.

**Doctors**

Mobile doctor

Two mobile doctors drove along the trail and supervised the medical coverage throughout the event. Communication was maintained via mobile phones.

Check point doctor

Since 2004, a Medical Command stationed at the Finishing Point as the chief co-ordinator of all the medical services of the event. He or she could discuss with Commands of other organisations on issues



**Figure 3.** Nurses at the medical tent of Checkpoint 5 (Beacon Hill).

related to evacuation, suspension of event, etc. In addition, many medical incidents like hypotension and hypoglycaemia occurred at the Finishing Point and required a doctor's input. Similarly, a doctor was posted at Checkpoint 7 from 19:00 on Day 1 to 08:00 on Day 2. A few trailwalkers, who intended to finish the 100 km within 18 hours, collapsed at this checkpoint during this period because of over-exertion. The "18 hours" is a magic figure among walkers. Any walker who can complete the 100 km within 18 hours will be named as Super Trailwalker, an honour which many walkers dream of.

### ***Other healthcare providers***

First-aiders of the Auxiliary Medical Service (AMS) stationed at almost all checkpoints except the Start Point, Checkpoint 1 and Checkpoint 9. AMS also provided five ambulances equipped with defibrillators. These ambulances stationed at different checkpoints along the trail. This service was most valuable as the event was held in a rural area. Physiotherapists provided physiotherapy at Checkpoint 4 and Checkpoint 8 during peak hours. They organised two pre-event briefings to walkers on injury prevention. Podiatrists stationed at Checkpoint 4 during peak hours and provided specialised care to the feet of the walkers.

### ***Other volunteers***

The Government Flying Service (GFS) provided helicopter for transportation of personnel and resources to Checkpoint 1 and casualty evacuation along the



**Figure 4.** Nurses at Checkpoint 6 (Smugglers Ridge) attending walkers.

trail. In 2005, a young walker suffered from acute myocardial infarction. He was transferred to hospital by helicopter. Members of the Adventure Corps and Civil Aid Service formed the mountain rescue teams. They provided first aid treatment to walkers in need. If required, they would carry walkers to nearby checkpoints for further treatment.

### ***Communication***

PCCW, the telephone company, installed fixed phone lines to all checkpoints. Hong Kong Amateur Radio Transmitting Society (HARTS) provided radio transmission along the trail. Mountain rescue teams maintained close communication with checkpoint coordinators via these radios. All Commands like Medical Command, Rescue Command, Oxfam Command, Ambulance Command etc. stationed at the Finishing Point. Instant updates and discussion among all community organisations and Oxfam could be maintained.

### ***OTW 2006***

OTW 2006 took place from 10th to 12th November 2006 with a total of 3844 walkers. Table 1 shows the age group of these walkers. Experience is one of the keys to success in the event.<sup>2,3</sup> Table 2 shows the experience of these walkers. About half of the walkers were new to the event. Male usually dominates the event.<sup>3</sup> Table 3 shows the make-up of the walkers according to gender. About 85% were males. There were 535 male-only teams while there were only 24 female-only teams.

Out of the 3884 walkers, 3257 finished the event. Walkers dropped out at different checkpoints and Table 4 shows the breakdown. It must be noted that some walkers dropped out in between checkpoints. The organisers would record them as dropouts at the next checkpoint. Table 4 shows that the highest dropout rate was at Checkpoint 3 and Checkpoint 4. It is understandable as the routes between these two checkpoints were considered the most difficult along the trail. Checkpoint 4 was put up at Gilwel Scout Campsite. It was relatively spacious and well facilitated. Many walkers rested at Checkpoint 4. Quite a number of them lost their perseverance once they took a long rest!

**Objective**

This study aimed to study the characteristics of medical contacts in OTW 2006 and the relationship between injuries and performance.

**Method**

**Study design**

Checkpoint nurses recorded all medical contacts at checkpoints. The team number, chief complaint and treatment provided were recorded. Most of the injuries were minor and walkers were discharged on spot. The outcome of those who were sent to hospitals by ambulance was followed by the investigators. The demographic data and finishing time of all 3844 walkers were obtained from Oxfam Hong Kong.

**Inclusion and exclusion criteria**

All 3844 walkers were included and divided into successful walkers and dropouts according to the database of Oxfam Hong Kong. The 3881 walkers were then divided into successful walkers without any medical contacts, successful walkers with medical contacts, dropouts with medical contacts and dropouts without medical contacts. Data of members of the support teams, volunteers and Oxfam staff were excluded from analysis.

**Ethical consideration**

This study was an internal audit of the nature of the medical contacts and medical service provided to the

**Table 1.** Age distribution of walkers in OTW 2006

| Age          | No. of walkers | %            |
|--------------|----------------|--------------|
| 18-25        | 536            | 13.9         |
| 26-35        | 1577           | 41.0         |
| 36-49        | 1415           | 36.8         |
| 50-59        | 236            | 6.1          |
| 60+          | 11             | 0.3          |
| Unknown      | 69             | 1.8          |
| <b>Total</b> | <b>3844</b>    | <b>100.0</b> |

**Table 2.** Experience among walkers in OTW 2006

| Previous participation in Oxfam Trailwalker | No. of walkers | %            |
|---|----------------|--------------|
| 0   | 2140           | 55.7         |
| 1   | 737            | 19.2         |
| 2-5   | 830            | 21.6         |
| 6-10  | 115            | 3.0          |
| 11-15                                       | 19             | 0.5          |
| 16+   | 3              | 0.1          |
| <b>Total</b>                                | <b>3844</b>    | <b>100.0</b> |

**Table 3.** Gender and finishing rate

|                  | Starting point | Finishing point | %    |
|------------------|----------------|-----------------|------|
|                  | No.            | No.             |      |
| Individual       | 3844           | 3257            | 84.7 |
| Male             | 3159           | 2675            | 84.7 |
| Female           | 685            | 582             | 85.0 |
| Full team        | 961            | 644             | 67.0 |
| Male only team   | 535            | NA              | NA   |
| Female only team | 24             | NA              | NA   |
| Mixed team       | 402            | NA              | NA   |

**Table 4.** Dropouts at different checkpoints

| Dropout                                  | N           | %              |
|--|-------------|----------------|
| Walkers who dropped out at CP1           | 36          | 0.94           |
| Walkers who dropped out at CP2           | 29          | 0.75           |
| Walkers who dropped out at CP3           | 134         | 3.49           |
| Walkers who dropped out at CP4           | 124         | 3.22           |
| Walkers who dropped out at CP5           | 92          | 2.40           |
| Walkers who dropped out at CP6           | 88          | 2.29           |
| Walkers who dropped out at CP7           | 43          | 1.12           |
| Walkers who dropped out at CP8           | 22          | 0.57           |
| Walkers who dropped out at CP9           | 16          | 0.42           |
| <b>Total number of dropout</b>           | <b>584</b>  |                |
| Walkers who finished all the checkpoints | 3257        | 84.73          |
| Missing data                             | 3           | 0.08           |
| <b>Total</b>                             | <b>3844</b> | <b>100.00%</b> |

CP=checkpoint

walkers. Oxfam Hong Kong approved the audit provided that no personal data of the walkers would be revealed.

### ***Personnel***

Checkpoint nurses recorded the information on treatment records. The Checkpoint Nurse Co-ordinators collected all treatment records from all checkpoints.

### ***Equipment and materials***

The treatment record included the walker team number, chief complaint and treatment provided.

## **Results**

The data of three walkers were found missing from the Oxfam database. A medical contact was defined as a visit by a walker to the medical tent where our nurses provided treatment to the walker. Some walkers were evacuated to hospitals on spot by rescue teams. Before evacuation, nurses at the nearby checkpoints were contacted. The walker might come for one complaint or multiple complaints. Treatment could be single or multiple. The walkers might visit all eleven medical tents. Some might visit the same medical tent twice (at different times). A total of 1639 walkers had medical contacts, with 940 walkers (57.4%) visited the medical tent only once in the event, 415 (25.3%) visited the

medical tents twice. The rest are shown in Table 5. Medical contacts with physiotherapist or podiatrists only were not included as our nurses did not attend these walkers.

Most walkers had only one medical contact with our nurses. Table 6 shows the breakdown of minor complaints and treatment provided at checkpoints. It must be noted that only walkers with injuries were included. The nurses treated quite a number of support team members and volunteers of the event. These records were excluded. More than 60% of the complaints were muscle cramp. Treatment included self-stretching plus bandaging and analgesic balm. Massage was only provided by physiotherapists. A total of 290 prescriptions were made to 232 walkers. All the drugs prescribed were in fact over-the-counter drugs. They were acceptable in sports events according to the Prohibited List by the World Anti-Doping Agency.<sup>4</sup> Details are shown in Table 7. Panadol was the most popular drug, followed by Triact and Dologesic. Overdose could be a possible problem. Table 8 shows the frequency of prescription. Most walkers received only one prescription. Table 8 also shows the breakdown of those walkers who received multiple prescriptions.

CASEVAC (casualty-evacuation) of cases was defined as patients who were directly transferred to hospital. There were 17 cases and they were listed in Table 9. As illustrated, most cases were discharged after

**Table 5.** Frequency of medical contact

|           | Number of visit to the medical tent |       |        |      | Total |
|-----------|-------------------------------------|-------|--------|------|-------|
|           | Once                                | Twice | Thrice | ≥4   |       |
| Total No. | 940                                 | 415   | 171    | 113  | 1639  |
| %         | 57.35                               | 25.32 | 10.43  | 6.89 | 100   |

**Table 6.** Medical contacts (minor) and treatment given at different checkpoints

| Complaint | Muscle cramp            | Blister    | Ankle sprain | Wound    | Total        |       |
|-----------|-------------------------|------------|--------------|----------|--------------|-------|
|           | 1532                    | 650        | 142          | 196      |              |       |
|           | 60.8%                   | 25.8%      | 5.6%         | 7.8%     |              |       |
| Treatment | Muscle cramp management | Aspiration | Bandaging    | Dressing | Prescription | Total |
|           | 827                     | 195        | 684          | 421      | 290          | 2417  |
|           | 34.2%                   | 8.1%       | 28.3%        | 17.4%    | 12.0%        | 100   |

treatment at the accident and emergency department (AED). Please note that 3 support team members (i.e. non-walkers) were included in Table 9 for the sake of completeness. They were all excluded in the following statistical analysis. Three patients with heat exhaustion or heat cramp received treatment at the observation (emergency) ward of the AED. Two patients were

admitted to the orthopaedics ward due to fracture or dislocation. One walker was admitted to the medical ward due to rhabdomyolysis. One walker was admitted to the surgical ward due to coffee ground vomiting. It was interesting to note that 9 out of 17 major cases came from Checkpoint 7. They all occurred after the doctor of Checkpoint 7 left i.e. after 08:00 on Day 2. Two patients were evacuated by helicopter (GFS) simply because of the difficulty in evacuation in mountain areas. On the other hand, two patients did not seek medical treatment once they arrived at the AED. It was suspected that these patients utilised the ambulance service to go to the urban area. The findings suggested that it might be cost-effective to extend the covering time by a doctor at Checkpoint 7.

**Table 7.** Prescription (analgesic balm was not included)

| Medication                                   | No. of prescription |
|--|---------------------|
| Aspirin (acetylsalicylic acid)               | 1                   |
| Clarityne (loratadine)                       | 2                   |
| Stemetil (prochlorperazine)                  | 3                   |
| Holopon (hyoscine methobromide)              | 9                   |
| Naprosyn (naproxen)                          | 9                   |
| Glucose powder                               | 10                  |
| Imodium (loperamide)                         | 12                  |
| Maxolon (metoclopramide hydrochloride)       | 23                  |
| GES (glucose electrolyte solution)           | 34                  |
| Dologesic (paracetamol + dextropropoxyphene) | 39                  |
| Triact (aluminium/magnesium hydroxide)       | 54                  |
| Panadol (paracetamol)                        | 94                  |
| <b>Total</b>                                 | <b>290</b>          |

***Dropouts vs. successful walkers***

The investigators, the organisers and the walkers themselves want to answer the following questions: "What are the factors governing successful completion of the event? Is there a difference in the injury pattern between successful walkers and dropouts?"

The relationship between successful walkers, dropouts and their medical complaints are shown in Table 10.

**Table 8.** Details of prescription in walkers

| No. of prescription                    | No. of person |
|--|---------------|
| One prescription in the same person    | 197           |
| Two prescriptions in the same person   | 24            |
| Three prescriptions in the same person | 6             |
| Four prescriptions in the same person  | 3             |
| Six prescriptions in the same person   | 1             |
| Nine prescriptions in the same person  | 1             |
| <b>Total</b>                           | <b>232</b>    |

| Walker   | Walkers with multiple prescriptions |         |           |        |          |         | Total |
|----------|-------------------------------------|---------|-----------|--------|----------|---------|-------|
|          | GES                                 | Panadol | Dologesic | Triact | Immodium | Holopon |       |
| Walker 1 | 2                                   | 0       | 0         | 0      | 1        | 1       | 4     |
| Walker 2 | 1                                   | 0       | 2         | 1      | 0        | 0       | 4     |
| Walker 3 | 0                                   | 4       | 0         | 0      | 0        | 0       | 4     |
| Walker 4 | 1                                   | 0       | 3         | 2      | 0        | 0       | 6     |
| Walker 5 | 0                                   | 1       | 4         | 4      | 0        | 0       | 9     |

GES=glucose electrolyte solution

**Table 9.** All major cases in Oxfam Trailwalker 2006

| Date  | Time in  | CP   | Sex | Age | Diagnosis  | Transport | Hospital | CK     | Ur/Cr     | Destination   |
|-------|----------|------|-----|-----|--|-----------|----------|--------|-----------|---|
| 10/11 | 17:17    | 3    | M   | 41  | Heat cramp   | Ambulance | PWH      | Normal | Increased | Observation ward  |
| 10/11 | 18:04    | 2    | F   | 41  | Dehydration;<br>Urine<br>ketone +++                            | Ambulance | TKOH     | -      | -         | Home  |
| 10/11 | 21:13    | 4    | M   | 36  | Heat cramp   | Ambulance | UCH      | 761    | Increased | Observation ward  |
| 11/11 | 10:32    | 7    | M   | 28  | Coffee<br>ground<br>vomitus                                    | Ambulance | YCH      | -      | Increased | Admitted but then<br>discharged against<br>medical advice |
| 11/11 | 12:56    | 6-7  | M   | 29  | Sprained<br>ankle  | GFS       | PYNEH    | -      | -         | Home  |
| 11/11 | 15:23    | 7    | M   | 33  | Heat<br>exhaustion   | GFS       | PYNEH    | 596    | Increased | Observation ward  |
| 11/11 | 20:30    | 9-FP | M*  | 19  | Olecranon<br>fracture, lip<br>laceration; fell<br>into a ditch | Ambulance | TMH      | -      | -         | Admitted  |
| 11/11 | 20:49    | 8    | M   | 37  | Rhabdomyolysis   | Ambulance | YCH      | 1028   | Increased | Admitted  |
| 11/11 | 21:45    | 8    | M*  | 42  | Fracture of left<br>7th rib; fell<br>from 5 feet               | Ambulance | PMH      | -      | -         | Home  |
| 11/11 | 22:33    | 7    | M*  | 47  | Gastroenteritis  | Ambulance | YCH      | -      | -         | Home  |
| 11/11 | 22:34    | 7    | M   | 33  | Heat exhaustion  | Ambulance | YCH      | 1147   | Normal    | Home  |
| 11/11 | 23:42    | 7    | F   | 33  | Severe left knee<br>pain                                       | Ambulance | YCH      | 715    | Normal    | Home  |
| 11/11 | 22:57    | 7    | F   | 29  | Heat exhaustion  | Ambulance | YCH      | 1239   | Normal    | Home  |
| 12/11 | Midnight | 7    | M   |     | Leg pain   | Ambulance | YCH      | -      | -         | Not registered at<br>AED                                  |
| 12/11 | Midnight | 7    | F   | 28  | Leg pain   | Ambulance | YCH      | -      | -         | Not registered at<br>AED                                  |
| 12/11 | 01:00    | 9-FP | M   | 29  | Patellar<br>dislocation  | Ambulance | TMH      | -      | -         | Admitted after<br>close reduction at<br>AED               |
| 12/11 | 01:45    | 7    | M   | 23  | Left heel &<br>right knee pain                                 | Ambulance | YCH      | 1632   | Normal    | Discharged against<br>medical advice                      |

AED=accident & emergency department, CK=creatinine, CP=checkpoint, FP=finishing point, GFS=Government Flying Service, PWH=Prince of Wales Hospital, PYNEH= Pamela Youde Nethersole Eastern Hospital, TKOH=Tseung Kwan O Hospital, TMH=Tuen Mun Hospital, YCH=Yan Chai Hospital, UCH=United Christian Hospital, Ur/Cr=urea/creatinine

\*members of the support teams

**Table 10.** Comparison between dropouts and successful walkers in terms of medical complaints

| Complaint        |       | Dropout (%)  | Successful walker (%) | Total (%)     | Pearson Chi-Square | df | p-value |
|------------------|-------|--------------|-----------------------|---------------|--------------------|----|---------|
| Muscle cramp     | No    | 470 (80.5%)  | 2426 (74.5%)          | 2896 (75.4%)  | 9.59               | 1  | 0.0020  |
|                  | Yes   | 114 (19.5%)  | 831 (25.5%)           | 945 (24.6%)   |                    |    |         |
|                  | Total | 584 (100.0%) | 3257 (100.0%)         | 3841 (100.0%) |                    |    |         |
| Blister          | No    | 522 (89.4%)  | 2815 (86.4%)          | 3337 (86.9%)  | 3.791              | 1  | 0.0515  |
|                  | Yes   | 62 (10.6%)   | 442 (13.6%)           | 504 (13.1%)   |                    |    |         |
|                  | Total | 584 (100.0%) | 3257 (100.0%)         | 3841 (100.0%) |                    |    |         |
| Ankle sprain     | No    | 564 (96.6%)  | 3151 (96.7%)          | 3715 (96.7%)  | 0.045              | 1  | 0.8317  |
|                  | Yes   | 20 (3.4%)    | 106 (3.3%)            | 126 (3.3%)    |                    |    |         |
|                  | Total | 584 (100.0%) | 3257 (100.0%)         | 3841 (100.0%) |                    |    |         |
| Wound            | No    | 569 (97.4%)  | 3109 (95.5%)          | 3678 (95.8%)  | 4.756              | 1  | 0.0292  |
|                  | Yes   | 15 (2.6%)    | 148 (4.5%)            | 163 (4.2%)    |                    |    |         |
|                  | Total | 584 (100.0%) | 3257 (100.0%)         | 3841 (100.0%) |                    |    |         |
| Other complaints | No    | 571 (97.8%)  | 3105 (95.3%)          | 3676 (95.7%)  | 7.176              | 1  | 0.0074  |
|                  | Yes   | 13 (2.2%)    | 152 (4.7%)            | 165 (4.3%)    |                    |    |         |
|                  | Total | 584 (100.0%) | 3257 (100.0%)         | 3841 (100.0%) |                    |    |         |

In general, successful walkers had more medical complaints: 25.5% of the successful walkers complained of muscle cramp while 19.5% of the dropouts complained of muscle cramp ( $p=0.0020$ ); 13.6% of the successful walkers complained of blisters while 10.6% of the dropouts complained of blisters ( $p=0.0515$ ); 4.5% of the successful walkers complained of wound as compared to 2.6% of the dropouts ( $p=0.0292$ ) and 4.7% of the successful walkers had other complaints while 2.2% of the dropouts had other complaints ( $p=0.0074$ ). Other complaints included a variety of conditions like vomiting, diarrhoea, fever, tiredness etc. Ankle sprain was the only exception: 3.4% of the dropouts complained of ankle sprain while 3.3% of the successful walkers had ankle sprain. Nevertheless, the finding was not statistically significant ( $p=0.8317$ ). It seems that higher proportions of muscle cramp, blister, wound and other complaints were found among successful walkers. A binary logistic regression (backward stepwise: Wald) was performed and is shown in Table 11. In step 1, all variables were included. In step 2, ankle sprain was eliminated. Only the odds ratio of muscle cramp (1.15) and other complaints (1.69) were statistically significant.

### *Among successful walkers*

Table 12 shows the t-tests and linear regression analysis

performed among successful walkers only. Successful walkers all shared a common denominator – they all had finished the 100 km. The dependent variable was the mean finishing time. Successful walkers without muscle cramp were 61 minutes faster than those with muscle cramp ( $p=0.0008$ ). Successful walkers without blisters were 62 minutes faster than those with blisters ( $p=0.0039$ ). Successful walkers without ankle sprain were 84 minutes faster than those with ankle sprain ( $p=0.0298$ ). Successful walkers without wound were 27 minutes slower than those with wound ( $p=0.4759$ ). Successful walkers without other complaint were 17 minutes slower than those with other complaints ( $p=0.6513$ ). In other words, muscle cramp, blister and ankle sprain showed statistically significant results. In the linear regression analysis, only blister showed a statistically significant result ( $p=0.0372$ ).

## Discussion

Although all the medical records prepared by all the nurses were included, the injury record was incomplete. Many walkers with medical background (nurses, doctors, paramedics) treated themselves. Some walkers with muscle cramp and blisters were managed by physiotherapists and podiatrists at Checkpoint 4 and

**Table 11.** A binary logistic regression (backward stepwise: Wald)

| Variables in the Equation |              | 95.0% CI   |        |        |               |
|---------------------------|--------------|------------|--------|--------|---------------|
|                           |              | Odds ratio | Lower  | Upper  | p-value       |
| Step 1(a)                 | Muscle cramp | 1.16       | 1.0057 | 1.3282 | <b>0.0414</b> |
|                           | Blister      | 1.23       | 0.9705 | 1.5568 | 0.0869        |
|                           | Ankle sprain | 0.92       | 0.5874 | 1.4430 | 0.7184        |
|                           | Wound        | 1.55       | 0.9430 | 2.5533 | 0.0838        |
|                           | Others       | 1.69       | 1.0094 | 2.8427 | <b>0.0460</b> |
|                           | Constant     | 5.01       | -      | -      | <0.001        |
| Step 2(a)                 | Muscle cramp | 1.15       | 1.0040 | 1.3237 | <b>0.0437</b> |
|                           | Blister      | 1.23       | 0.9683 | 1.5513 | 0.0906        |
|                           | Wound        | 1.55       | 0.9402 | 2.5430 | 0.0859        |
|                           | Others       | 1.69       | 1.0086 | 2.8401 | <b>0.0463</b> |
|                           | Constant     | 5.00       | -      | -      | <0.001        |

Variable(s) entered on step 1: muscle cramp, blister, ankle sprain wound and others.

Ankle sprain is removed from the model in step 2.

**Table 12.** Comparison of finishing time of successful walkers with and without medical complaints

| Medical complaints |     | No. of successful walkers (%) | Mean finishing time (SD) | t     | df   | p-value       |
|--------------------|-----|-------------------------------|--------------------------|-------|------|---------------|
| Muscle cramp       | No  | 2426                          | 1932.49 (451.06)         | -3.36 | 3255 | <b>0.0008</b> |
|                    | Yes | 831                           | 1993.58 (455.77)         |       |      |               |
| Blister            | No  | 2815                          | 1939.73 (459.27)         | 2.9*  | 631  | <b>0.0039</b> |
|                    | Yes | 442                           | 2001.25 (407.13)         |       |      |               |
| Ankle sprain       | No  | 3151                          | 1945.34 (454.90)         | 2.2*  | 115  | <b>0.0298</b> |
|                    | Yes | 106                           | 2029.46 (384.68)         |       |      |               |
| Wound              | No  | 3109                          | 1949.31 (454.49)         | 0.713 | 3255 | 0.4759        |
|                    | Yes | 148                           | 1922.14 (420.58)         |       |      |               |
| Other complaints   | No  | 3105                          | 1948.87 (455.40)         | 0.452 | 3255 | 0.6513        |
|                    | Yes | 152                           | 1931.86 (401.39)         |       |      |               |

\*Equal variance is not assumed

Linear regression of finishing time by complaints among successful walkers

|              | Standardised coefficients |               |       |             | df | R square |
|--------------|---------------------------|---------------|-------|-------------|----|----------|
|              | Beta                      | Significant   | F     | Significant |    |          |
| Muscle cramp | 0.022                     | 0.2173        | 2.557 | 0.026       | 5  | 0.004    |
| Blister      | 0.037                     | <b>0.0372</b> |       |             |    |          |
| Ankle sprain | 0.034                     | 0.0532        |       |             |    |          |
| Wound        | -0.024                    | 0.1761        |       |             |    |          |
| Others       | -0.01                     | 0.5725        |       |             |    |          |

Checkpoint 8 during peak hours. These records were not included. Some walkers who were managed by the AMS first-aiders did not register with our nurses. Their records were not counted.

Our analyses were based on the number and frequency of medical complaints at medical tents. The severity of the conditions was not taken into account. A walker could have attended the medical tent with a small blister only or a large number of blisters.

As OTW is a team event, the finishing time recorded was the team finishing time. Uninjured or fast walkers must wait for the injured or slow walkers. The linear regression analysis in Table 12 might not reflect the true effect on finishing time. Psychological factors and team spirit were not studied.

A previous study did not find any specific trait among successful walkers except for age, male sex and experience.<sup>3</sup> This study showed that successful walkers, in general, suffered more injuries than dropouts. The findings were understandable as successful walkers covered more mileage than the dropouts. The longer the mileage the higher the chance of getting injured!

## Conclusion

In general, there were more injuries in successful

walkers than in dropouts. Blister is the injury that affects the performance among successful walkers. Prevention and treatment of blister may lead to better finishing time.

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