

From Navigation to Major Incident: A Pilot Wilderness Simulation for Medical Students

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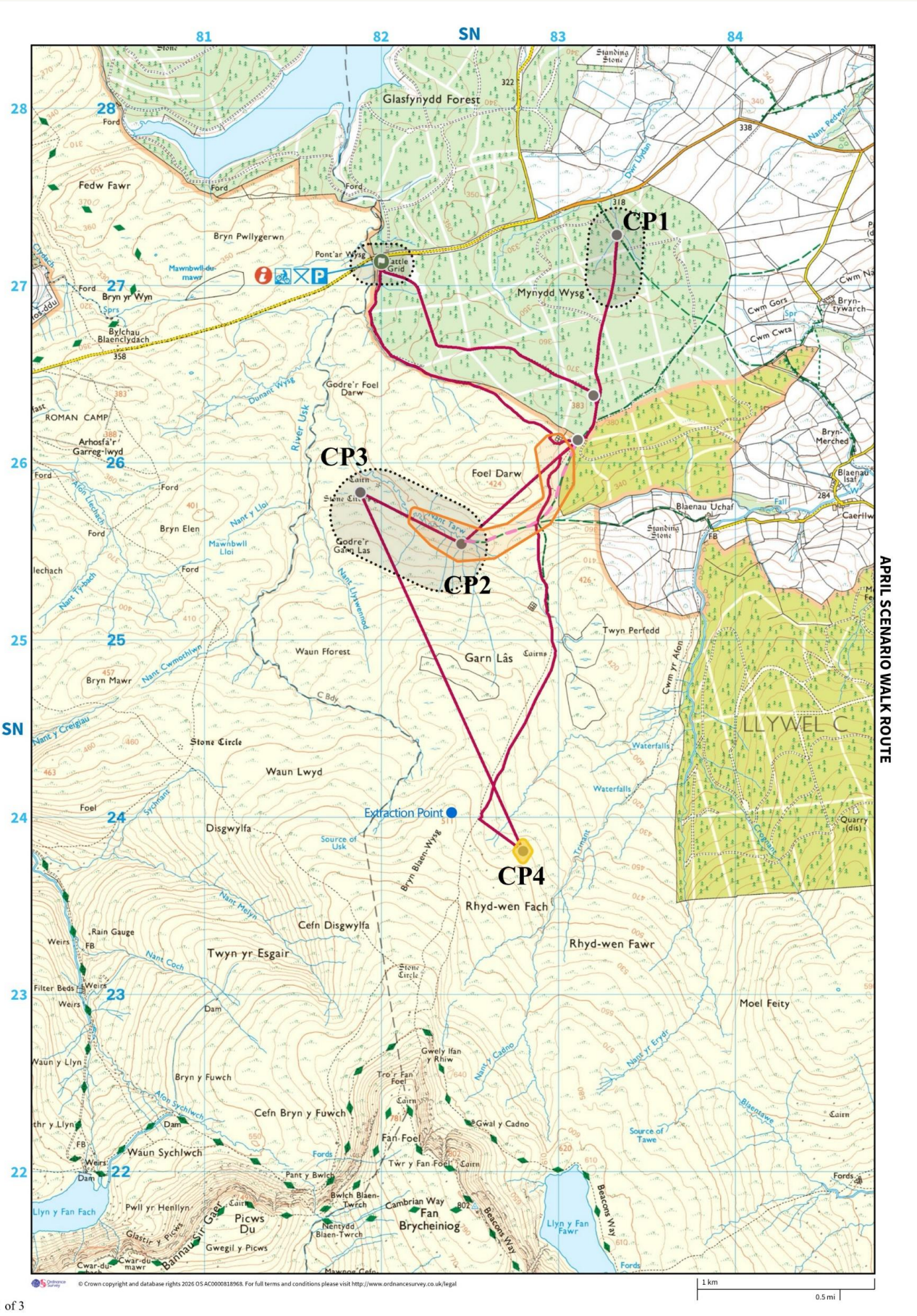
This pilot demonstrated how a wilderness navigation exercise can provide a framework for an unanticipated major-incident simulation, while highlighting the influence of communication, environmental conditions and adaptive planning

Background

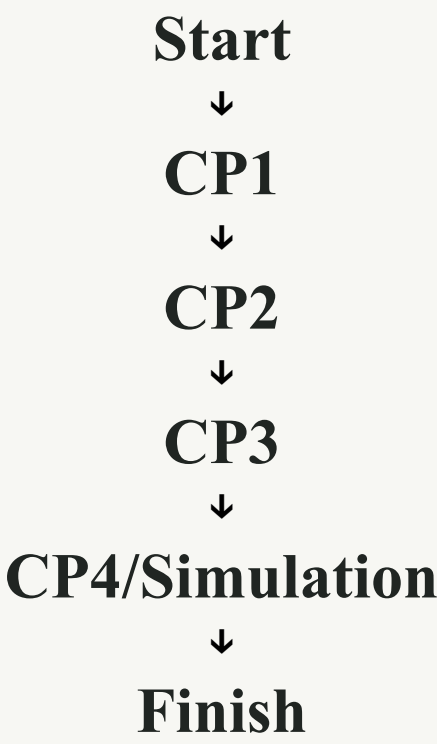
- Wilderness major incidents require integration of clinical, navigational, communication and teamwork skills.
- Medical students may have limited opportunities to practice these skills in a realistic outdoor environment.
- We developed a navigational exercise incorporating an unanticipated simulated aircraft crash to explore how students responded before formal major-incident teaching later in the year.

Aims

- Develop and deliver an immersive wilderness-based major-incident simulation using navigation as the framework
- Explore participant decision-making, teamwork, communication and casualty management in an unfamiliar environment.
- Identify operational and environmental lessons to inform the planned Spring 2027 repeat



Route requirements
12.1km planned route
336m ascent
4 checkpoints (CP)



Map Key:

- Planned route
- Group 1 alternative route
- CP1-CP4
- Simulation site
- Communication outage
- Environmental challenges

Scenario design

The exercise was designed as a wilderness navigation and orienteering task that would unexpectedly transition into a simulated major incident. Participants were not informed of the aircraft-crash scenario in advance, allowing the simulation to assess how they adapted to an unfamiliar and evolving situation.

Navigate	Discover	Manage
- Map and compass - Radio - Checkpoints	- Mayday call - Aircraft down 5 casualties	5 casualties - Limited kit - Evacuation planning

Casualty design

Five volunteer actors with individual histories and findings. Information was elicited through participant history taking and examination.

Casualty	Key feature
1	Unresponsive, no obvious injuries, no signs of life
2	Catastrophic haemorrhage
3	Neurovascularly compromised upper limb fracture, distracting
4	Hypoglycaemic episode, combative
5	Head injury initially lucid, rapid deterioration to collapse

Design principles

Unanticipated	Environmental	Resource-limited	Participant-led
Participants unaware of the incident in advance	Natural terrain, weather and navigation were integral to the scenario	Equipment restricted to what groups carried or available at the scene	No predefined major-incident framework; teams developed their approach

Simulation delivery and Environment

Navigation: Groups progressed through the planned navigation exercise with intermittent communication with Control.

Incident: At the final checkpoint, a simulated Mayday introduced the aircraft-crash scenario and five casualties.

Adaptation: Weather, communications and group convergence required real-time adaptation. Exercise terminated early on safety grounds.

Key findings

COMMUNICATIONS	ENVIRONMENT
Terrain affected radio coverage - Communication with Control was intermittent - Groups could hear one another when Control could not reliably communicate, affecting progression through the exercise	Conditions changed rapidly - Heavy rainfall resulted in substantially waterlogged ground - Hail and wind became limiting factors, impacting actor welfare and simulation logistics
DECISION-MAKING	OPERATIONS
Participants adapted to uncertainty - Groups selected different routes according to perceived terrain risk - No prescribed route or major incident framework was provided. Groups approached the event with prior medical and navigational experience	Real-world constraints altered delivery - Group convergence affected simulation flow - Only one group completed the full exercise and simulation, impairing comparison between groups

Limitations

- Communication:** Unreliable radio coverage affected coordination and checkpoint progression
- Weather:** Deteriorating conditions required adaptation and early termination¹
- Incomplete delivery:** only one of three groups completed the simulation
- Scenario fidelity:** Actor familiarity with some participants could not be completely excluded^{2,3}

Changes for Spring 2027

Equipment & Communications: Strengthen communication and equipment provision^{2,3}
New radios | Emergency CP grid references | Comms contingency | Sim kit list
Environment & Simulation Logistics: Improve environmental resilience
New location | Additional survival kit for actors^{1,3} | Strengthen weather provisions
Participant Experience & Scenario Development: Expand participation and adapt the scenario^{4,5,6}
Smaller groups to improve navigation and triage^{4,6} | Building on TST teaching^{4,5}

References: 1. Fudge JR, et al. *Clin J Sport Med*. 2015;25:432–436. 2. Spano SJ, et al. *Wilderness Environ Med*. 2015;26:43–53. 3. Donelan S. *Wilderness Environ Med*. 2000;11:52–55. 4. To B, et al. *Wilderness Environ Med*. 2020;31:247–254. 5. Babamiri G, Karimianakolaki Z. *BMC Med Educ*. 2025;25:1180. 6. Levett-Jones T, Lapkin S. *Nurse Educ Today*. 2014;34:e58–e63.