Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons (SACMILL)

Statement on the Medical Implications of Use of the Ziegler Wasserwerfer 9000 Vehicle-Mounted Water Cannon System

The Role of SACMILL

1. The Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons (SACMILL) is an advisory Non-Departmental Public Body that provides independent advice to Ministers of Her Majesty's Government on the medical aspects surrounding the use of less-lethal weapons (LLWs) on members of the public.[1]

2. SACMILL took over this role in March 2012 when it assumed the responsibilities of its predecessor committee, DOMILL.[2]

3. SACMILL is sponsored by the Surgeon General in the Ministry of Defence (MOD) but operates independently at arm's length from government.

4. SACMILL is concerned with the safety of members of the public subjected to LLWs. In addressing this remit, SACMILL will consider aspects of a LLW system that have a bearing on the equipment's safe operational use. These aspects include: developing an understanding of the effects on the person of the weapon's output; the quality of the user guidance and training; how the equipment will be stored and maintained; the manner in which the system will be deployed and used; monitoring and learning from adverse outcomes arising from operational use of LLWs in the UK and elsewhere; and assessing the implications of basic research into the medical effects of LLWs.

5. While recognising that the use of LLWs is unlikely to be free of medical risk, SACMILL will seek to minimise residual risk by systematically evaluating all elements of a less-lethal system and advising Ministers and other stakeholders accordingly.

Background to the Present Medical Statement

6. The UK currently possesses a vehicle-mounted water cannon capability comprising six Somati RCV 9000 vehicles (numbers 001-006).[3] These vehicles, which have been deployed and used in serious public disorder in Northern Ireland over the past 10 years, are owned, maintained and operated by the Police Service of Northern Ireland (PSNI) under PSNI guidance and training.

[1] The health and safety implications for users of less-lethal systems are routinely assessed by others as part of the employment of these systems by law enforcement agencies. However, SACMILL will take these user-related aspects into account when forming a view on medical implications for the public.
[2] Defence Scientific Advisory Council Sub-Committee on the Medical Implications of Less-Lethal Weapons (DOMILL).
[3] The medical implications of use of the Somati RCV 9000 vehicle-mounted water cannon were considered by DOMILL in 2004 (see: www.publications.parliament.uk/pa/ld200304/ldlwa/40316wa1.pdf; accessed 5th February 2015).

7. To increase the range of policing options available for the management of serious public disorder incidents on the UK mainland, the Metropolitan Police Service (MPS) has purchased three Ziegler Wasserwerfer 9000 (WaWe 9) water cannon vehicles from the German police authorities. These vehicles, which are more than 20-years-old, arrived in the UK in June 2014 where they then underwent modifications to bring them into line with UK technical and operational requirements.

8. Following modification, the three WaWe 9 vehicles underwent technical testing by the Home Office Centre for Applied Science and Technology (CAST). In parallel, the MPS and College of Policing (CoP) developed training curricula, user guidance and other material around the WaWe 9 system.

9. In 2013, SACMILL were tasked by the UK Less-Lethal Technologies and Systems Strategic Board (LLTSSB) to provide an initial opinion on the medical implications of the WaWe 9 system to help inform the procurement process. This opinion, which was published in the form of an interim medical statement[4], was necessarily based on the limited information available at the time.

10. The present medical statement constitutes SACMILL's opinion on the medical implications of the WaWe 9 system now that vehicle modifications and technical testing have concluded and the supporting documentation is at a high level of maturity. This statement will form part of the information used by the Home Secretary to inform a decision on whether to authorise use of the system in England and Wales.

Technical Approach

11. In forming an opinion on the WaWe 9 water cannon system, SACMILL considered the following:

    a) A review of the medical implications of use of water cannon prepared by the Defence Science and Technology Laboratory (Dstl). (Dstl/TR74621 version 1.0, dated 19th July 2013.)
    b) A review of MPS and CAST responses to recommendations made by SACMILL in the committee's interim medical statement.
    c) CAST 'WaWe9 Trials - Summary Report' (version 1.0, dated 22nd January 2015);
    d) The latest guidance, training and maintenance documents relating to UK operational use of water cannon:
        i. MPS 'Water Cannon - Operational Use and Training' Standard Operating Procedure (version 7.5, dated 22nd April 2014);
        ii. CoP 'National Police Public Order Training Curriculum Module E4 - Water Cannon in Public Order' (version 2.2, dated 2nd January 2015);
        iii. MPS Specialist Training Centre: Training Packages for Water Cannon Commanders, Crew Commanders and Cannoneers (undated, no version control);
        iv. MPS WaWe 9 'Pre-Drive Checks', 'Weekly/Pre-Deployment Checks' and maintenance schedule (undated, no version control).
    e) A review by Dstl, prepared at the request of SACMILL, of the above documentation (Dstl/CR86514 version 1.0, dated 30th January 2015 and version 2.0, dated 18th February 2015).

[4] SACMILL *Interim Statement on the Medical Implications of Use of Vehicle-Mounted Water Cannon, with Special Reference to the Ziegler Wasserwerfer 9000.* (HQSG/SACMILL/STATEMENTS/001/WATERCANNON, dated 18th November 2013.)

f) In addition to the above, three members of SACMILL attended the Metropolitan Police Specialist Training Centre on 11th September 2014 to observe testing of one of the modified WaWe 9 vehicles. These members also took the opportunity to experience the crew cabin environment, manipulate the water cannon monitors and activate the water jets against various targets.

On the basis of the above information, SACMILL offers the following opinion on the medical implications of the WaWe 9 vehicle-mounted water cannon system.

Conclusions

12. The review did not identify any novel mechanisms through which high pressure water jets can induce injury over and above those previously articulated in the 2004 DOMILL statement on the Somati RCV 9000 water cannon or the 2013 SACMILL interim statement on the WaWe 9 water cannon. These injuries included a wide range of musculoskeletal injuries (such as sprains, dislocations or fractures – including spinal fracture) as well as other serious injuries, such as concussion, eye injury and blunt trauma (including spinal cord injury). These injury mechanisms are repeated here for completeness:

    a) A predictable risk of primary injuries from a direct interaction of the water jet with the body. Anatomical ports of entry, such as the nostrils, ears and mouth place body tissues in these areas at greater risk of injury from the ingress of high pressure water jets. The risk of serious injury to the eye from a water jet is also of concern, and the risk may be increased by the impact of glass, plastic or other material from broken spectacles.

    b) A predictable risk of secondary injuries resulting from tissue damage produced by the impact of street furniture and debris energised by the water cannon jet. This could comprise penetrating or blunt trauma depending on the physical nature (mass, volume and geometry) of the energised object and may include the projection of protesters' weapons into the crowd after being energised by the water jets.

    c) A predictable risk of tertiary injuries (especially to the head and neck) sustained as a result of the body being propelled by the water cannon jets onto the ground or into rigid objects. This is especially a risk for personnel who may be located on an elevated surface, such as a wall or vehicle roof, where the use of a water cannon jet may result in a fall from height.

    d) In certain vulnerable groups, such as children, those with physical or mental vulnerabilities, pregnant, disabled or elderly people, or those under the influence of alcohol or drugs, the risk of injury may be higher.

    e) The risks will be higher if an individual is struck, even glancingly, by two water jets either simultaneously or in rapid succession.

    f) There is a small risk of hypothermia when wet. Additional factors that may increase this risk include low ambient temperature, wind chill, low body mass index, alcohol intoxication and

restricted movement (e.g. due to restraint or confinement of movement).

g) There is a risk of inducing immediate or delayed psychological or mental health sequelae (for example acute panic reaction, disorientation or post-event distress). This risk includes the reactivation of an otherwise clinically silent pre-existing mental health condition.

h) There is a risk to the public from the vehicle itself. This may arise while the vehicle is manoeuvring and may be exacerbated by an inability to brake efficiently in wet conditions and by limited visibility from the cab. Toxic exhaust emissions may present an exposure hazard.

i) There may be a risk of slips, trips and falls during and after the use of water cannon. This risk will be exacerbated in freezing conditions.

13. Officers deployed with water cannon should be aware of circumstances in which injuries or environmental damage may be more likely:

a) In environments where there is loose debris (e.g. gravel, stones, broken masonry) which could be energised by the water cannon jets;

b) Where jets strike the head, even glancingly;

c) Where jets strike, even peripherally, people using handheld equipment (e.g. mobile phones, cameras, binoculars) which may be energetically displaced by the jets and present an impact hazard;

d) Where persons carry bulky items (such as placards, boards, etc.) that may take the full force of the jet;

e) Where jets impact on weak or flimsy structures;

f) Where persons may be toppled into another hazard (such as into the path of a moving vehicle or into a water hazard such as a lake, pond or river);

g) Where persons trying to evade the water cannon jet run or trip;

h) Where environmental damage may be caused by the washing of contaminants into ground or water courses.

14. An example of serious ocular trauma sustained during civil protests in Stuttgart in 2010 underlines the ability of water cannon jets to produce serious primary injury to the eyes. Eardrum perforation and concussion from police water cannon jets in South Korea have also been reported and graphic images of civil unrest in Turkey in 2013 further illustrate the potential of water cannon jets to cause primary and tertiary injuries. These examples highlight the need for fully developed guidance and training to control the operational use of water cannon, to ensure that this use is proportional and

to make sure that, wherever possible, medical assessment is undertaken or offered in order to document the nature of any injuries.

15. A review of the latest available PSNI water cannon use statistics indicated that the Somati RCV 9000 water cannon were used – that is, water jets activated – in civil disturbances 71 times between April 2008 and September 2014.[5] Set against this level of use, SACMILL has not become aware of any verified injuries resulting from use of water cannon either during this period or since the Somati RCV 9000 was introduced into service in Northern Ireland. The PSNI identified an incident in July 2013 in which a man was toppled from the roof of a police Land Rover by the force from a water cannon jet. Although the PSNI recorded no reported injuries resulting from the man's fall, the incident underlines one of the risks associated with water cannon use. The PSNI has also advised SACMILL of a recent complaint which is currently under investigation. If this complaint is substantiated, SACMILL understands that it is likely to be related to an injury mechanism already identified in this medical statement.

Technical Data on the WaWe 9 Water Cannon Vehicles

16. SACMILL has reviewed the report emanating from the technical assessment by CAST of three modified WaWe 9 vehicles and has identified a number of issues that await resolution. CAST has been made aware of these issues.

Review of the Guidance and Training Documentation

17. The training and guidance documentation seen by SACMILL has now been updated to reflect the specific attributes and functionality of the WaWe 9 water cannon system. SACMILL has identified several aspects requiring clarification and possible revision. These aspects have been made known to the MPS and CoP.

Recommendations

The following recommendations are made as a result of the present review.

The DOMILL Statements on the Use of the Water Cannon in Northern Ireland

18. SACMILL notes that the earlier DOMILL statements (issued in 2002 and 2004) covering the use of the Somati water cannon in Northern Ireland relate to the use of a different vehicle type and in a different operational theatre. SACMILL reaffirms the validity of these earlier statements as they relate to use by the PSNI of the Somati RCV 9000 water cannon system.

The Ziegler WaWe 9 Water Cannon System

19. **Recommendation 1:** A condition of the present statement is that SACMILL receives an assurance from CAST that the outstanding issues (itemised in a separate memorandum) have been addressed.

[5] PSNI Statistics on Police Use of Force: www.psni.police.uk/use_of_force_1_april_2014_-_30_september_2014_web.pdf (accessed 3rd February 2015)

20. **Recommendation 2**: A condition of this statement is that SACMILL receives assurance from the MPS that the outstanding issues (itemised in a separate memorandum) have been addressed.

21. **Recommendation 3:** This medical statement is applicable only to the use of the three WaWe 9 vehicles of the build standard considered in the review, when used in conjunction with the deployment, use and training protocols employed by the MPS. This statement is not necessarily applicable to other Police Forces within the United Kingdom.

22. **Recommendation 4:** Personnel operating the WaWe 9 water cannon need to ensure that they are trained under realistic simulated operational conditions, especially with respect to operating in low-light/night-time conditions in realistic public order scenarios.

23. **Recommendation 5:** The MPS must ensure that any injuries sustained through the use of water cannon are reported to SACMILL and that a formal process for reporting such injuries is implemented as a condition for the continued applicability of this medical statement. Similarly, any changes to the water cannon system (vehicles, command and control or controlling paperwork or training) are to be reported to SACMILL for review.

The WaWe 9 System Overall

24. The hazards identified in SACMILL's Interim Medical Statement have been reviewed in the context of the latest available guidance and training documents submitted by the CoP and the MPS, the final report by CAST on the modification and testing of the device, and taking into consideration of the information acquired by Dstl in a literature survey of injuries sustained from the use of water cannon around the world.

25. SACMILL have made a number of recommendations as a result of this latest review of the system. These address various aspects of the user documentation and training as well as the vehicles themselves. Since some recommendations, such as those relating to deployment and use of the system at night or use under different command structures, concern elements of the system that may influence its safety, SACMILL is of the opinion that it is important for these to be addressed before the WaWe 9 system is employed operationally.

26. SACMILL broadly consider that the three Wasserwerfer 9000 (WaWe 9) water cannon vehicles in their current build standard for use by the MPS, when deployed and used by trained personnel in accordance with the training and guidance documents identified in this statement and after mitigation of the issues identified in our review, are unlikely to result in serious or life-threatening injuries.

[signed on original]

SACMILL Chairman