

# THE 'DOWNRANGE ACOUSTIC TOOLBOX': AN ACTIVE SOLUTION FOR ACUTE ACOUSTIC TRAUMA.

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## THE DAT

The downrange acoustic toolbox (DAT) has been developed by the UK Defence's HearWELL collaboration to mitigate AAT. It is an immediate management guideline with a small, portable, ruggedised case containing equipment that allows rapid diagnostic hearing and otological assessment. In addition, it facilitates secondary care opinion and invasive hearing rescue treatments outside of hospital settings.

The DAT (now renamed the Acute Acoustic Trauma Toolkit) comprises of:

### 1) Wireless Automated Hearing Test System (WAHTS)



This boothless headset conducts automated diagnostic hearing tests in any location to the same accuracy as a traditional booth test (+/- 5dB). It does not require an audiologist to use it, and can be controlled remotely.

### 2) Mobile endoscopic otoscopy (endoscope-i)



This device is compatible with smartphones, allowing for high-quality, wide-angled still and video images of the EAC and TM.

Used live, this allows for immediate surgical intervention such as intratympanic steroid injections, or even myringoplasty under LA.

### 3) Tympanometer

### 4) Steroids (oral, drops) and ppi



Endoscopic images + audiological data can be shown to the patient, or sent to an off-site ENT surgeon for review. This will streamline referrals and surgical planning.

## ACUTE ACOUSTIC TRAUMA (AAT)

Acute Acoustic Trauma (AAT) is caused by a loud impulse noise e.g. weapon firing or explosion. This can result in anatomical disruption to the tympanic membrane (TM), middle ear and/or inner ear. This leads to conductive, sensorineural or mixed hearing loss which may be temporary or permanent.

The additional personal implications of untreated AAT are:

- negative changes to the patient's relationships
- social isolation
- sleep loss,
- and feelings of despair.



The Boothless Audiometer (WAHTS) and Endoscope-i

Protocol available at NHS England Emergency, Preparedness, Resilience and Response p66-67:



AAT may affect patients' job retention or impair career progression. Over \$1bn was paid by the USA to military personnel for complications of AAT from 2001 - 2006. (corresponding to the Afghan war)



The DAT has been used both within the UK and abroad in austere environments to conduct over 500 assessments and enabling delivery of hearing rescue treatment including invasive procedures where required .



Events such as the Vienna shootings and the Beirut explosion highlight the importance of the toolkit in the public arena, where both the assessment and surgical treatment of catastrophic hearing injuries, in a mass casualty scenario, can now be removed from secondary care settings, freeing up valuable hospital resource at a critical time.

## WIDER IMPACT

Outside of AAT, the toolkit can translate directly to support a new NHS hearing health care pathway. Globally, this has the potential to reduce disparity in access to hearing healthcare between urban and rural communities, by facilitating earlier diagnosis and allowing timely interventions outside of secondary care - preserving hearing critical to maintaining the ability to work and maintain a healthy personal and family life.