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NATO LETTER OF PROMULGATION

23 April 2025

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TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION 1-1
1.1. AIM 1-1
1.2. STAKEHOLDERS 1-1
1.3. DEFINITIONS 1-1
CHAPTER 2 SCOPE AND BACKGROUND 2-1
2.1. GENERAL STATEMENTS 2-1
2.2. MILITARY CONTEXT 2-1
CHAPTER 3 BENEFITS OF TELEMEDICINE 3-1
3.1. GENERAL BENEFITS 3-1
3.2. OPERATIONAL BENEFITS 3-2
CHAPTER 4 INTEROPERABILITY 4-1
CHAPTER 5 REQUIREMENTS 5-1
5.1. PLANNING AND ORGANIZATIONAL REQUIREMENTS 5-1
5.2. FUNCTIONAL REQUIREMENTS 5-2
5.3. INFORMATION REQUIREMENTS 5-3
5.4. COMMUNICATION REQUIREMENTS 5-3
5.5. TRAINING AND PERSONNEL REQUIREMENTS 5-4
5.6. EVALUATION, RE-EVALUATION AND RISK ASSESSMENT REQUIREMENTS 5-4
CHAPTER 6 CONCLUSION AND PERSPECTIVE 6-1

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CHAPTER 1 INTRODUCTION

1.1. AIM

1. The aim of the NATO COMEDS Tele-Health Panel in providing this document is:

a. to describe telemedicine - scope, benefits and challenges;

b. to set out guidance as well as standards (minimum requirements and processes) for nations developing national Telemedicine capabilities;

c. to support the development of telemedicine capabilities which enable interoperability between NATO forces or affiliates in multinational missions.

2. The aim of the NATO COMEDS Tele-Health Panel in providing this document is: The vision of healthcare interoperability within NATO (or other multi-national missions) will only be achieved if nations can connect their systems using information and communication technologies. This STANAG serves as a guiding document to support this aim. Within this STANAG, the Tele-Health Panel members provide recommendations for the development of procedures, policies and capabilities which will support the development and fielding of telemedicine, as a major medical support tool for NATO operations (in Article 5 operations and in non-Article 5 Crisis response operations), as envisioned by the COMEDS vision and objectives.

1.2. STAKEHOLDERS

For interoperability purposes key stakeholders are the Nations, ACT, ACO, NCIA, NATO COMEDS Health Information and Technologies Working Group (HIST WG) and Federated Mission Networking Inter-FMN Working Group (IWG) Medical Syndicate. The NATO COMEDS Tele-Health Panel can provide an up-to-date stakeholder list.

1.3. DEFINITIONS

While there are multiple definitions of telemedicine and telehealth, the following terms and definitions have been agreed within the NATO Tele-Health Panel, are available on the NSO website and are used in this STANAG:

(1) **Telemedicine** is the delivery and support of healthcare over a distance using information and communication technologies.

The term “Telemedicine” has a broad scope encompassing capabilities from a simple telephone conversation to remote robotic surgery and is supporting an

ever-increasing spectrum of clinical practice. Telemedicine (including medical Video Teleconference (VTC)) is a capability that uses advanced medical and communications technologies to enable patients and healthcare professionals to obtain advice (opinion, recommendation etc.) from a provider, usually an expert (e.g. dermatologist, radiologist, infectious disease specialist etc.) or for a provider to perform a medical procedure (e.g. robotic surgery). Telemedicine is a supporting capability for the delivery of clinical care and is not an end in and of itself. Telemedicine is increasingly being used by NATO allies and nations in the Partnership for Peace (PfP) program for the support of their forces. Telemedicine is a subdiscipline of telehealth.

(2) **Telehealth** is the provision of all remote health services, including telemedicine, health education and preventive care, using information and communication technology (ICT).

The term Telehealth encompasses the whole spectrum of use cases in this field, where Telemedicine is a subdiscipline. It includes also provider education to ensure a uniform standard of care (e.g. e-learning, teleteaching) and health interventions that fall short of healthcare. Many areas of innovation exist: for example, wearable/body sensors, medical devices, mobile applications and physiological monitors which can be exploited to inform command decision making and facilitate clinical decision making.

CHAPTER 2 SCOPE AND BACKGROUND

2.1. GENERAL STATEMENTS

1. The importance of telemedicine within the medical community in NATO is widely accepted as it is one of the ways to mitigate scarce medical specialist resources. Availability of sufficient medical personnel is a well-known and pervasive issue and it is acknowledged that this will not be solved soon. *Where capacity cannot be increased with numbers of personnel, we have to do it smart.* Telemedicine solutions provide the opportunity to optimize the deployment of scarce medical specialists forward. NATO and affiliates use telemedicine to strengthen and sustain their resilience at an enhanced level.

2. A fundamental aim of telemedicine, in the context of pre-hospital and hospital care, is to expand the delivery of safe and efficient healthcare, while eliminating or reducing resource limitations (e.g. costs) and overcoming geographical barriers.

3. Telemedicine helps to provide clinical support, including supervision, in a timely manner while using a variety of ICT.

4. Telemedicine is a supporting capability and is not an end in and of itself, but is an enabling tool for the delivery of clinical care and allows the building of a network of experts to optimize response times and resources.

5. Telemedicine provides options to allow for both synchronous (e.g. VTC) and asynchronous usage (store and forward, e.g. medical images or information), using any combination of voice, data, still or video images. Telemedicine can involve a variety of technologies that enable the connection of patients or healthcare providers at the ‘originating site’, and medical experts at the ‘distant site’. While using telemedicine it is possible to attach images, audio or video clips, waveforms and other types of media to improve the remote experts’ understanding of the problem and improve outcomes.

6. Leveraging global communication, computing power and miniaturization will extend the reach, utility and economy of medical services, improving service delivery and patient outcomes.

2.2. MILITARY CONTEXT

1. In the international context of military medicine, telemedicine has already been utilized by NATO nations for many years, often on a daily basis, with proven health and financial benefits, following the motto: “Exportation of the expertise instead of exportation of the experts“.

2. Whilst telemedicine is not a new technology, a plethora of use cases and applications have been created in recent years to provide or support healthcare (detailed information on each nation's capabilities is available in the HIST WG "Capability and Innovation Matrix"). The depth and breadth of development has been one of the major drivers in the expansion of the more narrowly focused telemedicine to the broader spectrum of telehealth.

3. Numerous applications of telemedicine are in use as process-supporting operational tools for healthcare.

4. At NATO level, a multinational telemedical communication network in the context of natural disasters has been evaluated. The aim within this project was to create a multinational ability to reduce the impact of disasters on the health of the affected population and to bring adequate help to the people in the affected regions.

5. The capabilities delivered by telemedicine provide an enabling function for military health care both in the home country and in the deployed environment, on national and NATO operations throughout the length of the patient care pathway. The FMN IWG Medical Syndicate will provide the procedural instructions and technical requirements for telemedicine to support multinational medical operations ("to provide virtual medical support using telehealth throughout the entire medical chain").

6. Within the NATO context, telemedicine facilitates the remote sharing of medical information that includes but is not limited to medical images, data from medical devices, written and verbal exchange of information and the ability to perform clinical evaluations remotely.

CHAPTER 3 BENEFITS OF TELEMEDICINE

1. There is a significant and growing body of literature establishing the evidence of benefits derived from the use of telemedicine applications.

2. It is recommended to monitor and evaluate benefits arising from the use of telemedicine by continuously collecting and evaluating data, which can be used to further improve the capability and demonstrate the value of the investment.

3. Experiences regarding benefits of the use of telemedicine are readily available, particularly after the COVID-19 pandemic. The SARS-CoV-2 pandemic has emphasized the importance of telemedicine as a capability for nations to maintain a healthy, operationally ready force (telemedicine as a “game changer”).

4. One of the most attractive and consistently cited benefits of using telemedicine is cost savings. Potential savings can be difficult to quantify, so cost-benefit analysis tailored to the respective application (cost-benefit; cost-effectiveness; cost-minimizing; cost-utility analysis) should be undertaken. Hard benefit factors and soft benefit factors should be considered and clearly quantified so that the benefits will be obvious and verifiable.

5. Telemedicine enables safe, timely and effective provision of the required medical services in potentially critical areas of deployed health care. However, it is critical that operational benefits to combat forces are also demonstrated so that the resource commitments are justified, fully understood, and agreed by the chain of command.

3.1. GENERAL BENEFITS

1. To list just a selection of “general benefits” frequently deriving from telemedicine use cases:

   a. Avoidance of medical transport, travel costs (at least less travel time) and costs for evacuation.

   b. Reduction of hospital admissions, hospital stays and length of stay.

   c. Time savings for medical personnel (consults of larger patient numbers possible).

   d. Remote advice can prevent the overwhelming of a Medical Treatment Facility (MTF) in the event of an outbreak (or can at least reduce attendance).

   e. Time savings for the patients (avoiding waiting times).

f. Triage of patients without having to compromise on health or quality of treatment (Tele-Triage).

g. Optimized and smart treatment when using medical Videoconferences (med. VTC) combining different experts from various disciplines.

h. Protection of healthcare staff from exposure to infectious threats (especially in times of epidemics and pandemics).

i. Availability of expertise where otherwise it would not be available.

g. Expert care available immediately (speed of specialist care).

k. Telemedicine expert networks can contribute to the exchange of information and to the containment of epidemics (especially if they were already established before the outbreak).

3.2. OPERATIONAL BENEFITS

1. To list just a selection of additional “operational benefits”, adding to the general benefits, mentioned above, deriving from military telemedicine use cases:

a. Improved health outcomes.

Telemedicine contributes to the health of service members and other entitled personnel by improving the accessibility, timeliness, and/or comprehensiveness of healthcare delivery, which in turn improves health outcomes. The level and standard of medical expertise within the deployed operations space can be increased, leading to more timely or more appropriate diagnosis and treatment. Telemedicine capabilities may contribute to the generation of new knowledge via research practices (e.g. trauma registries and disease surveillance). Health outcomes can be further optimized to support pre-hospital care, when data are accessible at the first contact of medical personnel with a wounded person (this can, but does not have to be the point of injury, POI) and forwarded or monitored; improved evacuation and medical regulating allocations also contribute to better outcomes for patients/casualties.

b. Improved military readiness.

Use of telemedicine helps service members to return to duty more quickly. This applies both within the operational theatre and when used to reach out to service members in their bases or homes.

c. Improved use of resources.

Telemedicine can create efficiencies in missions: the need for patient evacuation may be mitigated or avoided; scarce, high-value, difficult to recruit healthcare providers can utilize their expertise in previously inaccessible areas; lost productivity of both healthcare providers and service members may be avoided or reduced; the logistical and personnel footprint in the operational theatre may be reduced; and, costs may be reduced or avoided.

d. Improved experience of care.

Telemedicine provides care experiences which can be more culturally/socially effective, timely, convenient, and comprehensive.

e. Improved Disease Surveillance (Force Health Protection).

Telemedicine can contribute to near real time surveillance, e.g. Telemicrobiology. An outbreak can potentially be recognized faster, particularly when data is made accessible to a suitable group of experts such as a Rapid Deployable Outbreak Investigation Team (RDOIT) or Medical Deployable Outbreak Investigation Team (MedDOIT). Telemedicine systems help in the gathering of epidemiological data and distribution of medical information and intelligence.

f. Improved Situational Awareness.

Telemedicine is extremely helpful in emergency medicine, especially in the area of situational awareness within and outside of MTFs, both for objective information and additional context which can greatly enhance preparation and responsiveness.

2. In addition to the benefits observed in various use cases, the Medical Standardization Working Group of the NATO Standardization Agency also identified the need for, and the benefits of, interoperable telemedicine support, both within and across national force lines (see: AJP 4.10).

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CHAPTER 4 INTEROPERABILITY

1. NATO operational doctrine is founded on the principal of interoperability. The key is compatibility and compliance with equipment and software standards. Generally, a medical communication and information system (MedCIS) enables interoperability by providing an agreed mechanism for the exchange of health information in electronic format between nations in order to support multinational, combined and joint operations (see: FMN, Federated Mission Networking, work of the IWG Medical Syndicate).

2. FMN specifications exist for generic communications activity. In the future, telemedicine systems will be delivered and integrated in accordance with FMN and Enablement Support Services Medical Suite Software (ESS MED SUITE) standards. Until then, telemedicine services will need to be developed by individual nations or within multinational systems. Compatibility and interoperability with other NATO telemedicine systems should be the target, wherever possible and practical.

3. This applies in particular when using these systems in a multinational environment, e.g. NATO missions or multinational missions.

4. Healthcare providers throughout the deployed NATO Medical Force structure should have access to a telemedicine capability which provides expert advice in all needed specialty areas.

5. The interoperability of telemedicine is necessary and critical to ensure quality and continuity of care for a patient moving through a multi-national care pathway with communications from the first point of care (“pre-hospital care” with the use of Bodysensors at the first contact of medical personnel with a wounded person) to the gaining medical facility.

6. In addition, interoperability with local and/or host nation civilian medical services is expedient and might provide additional expertise and capacity.

7. Standard data and information exchange protocols are vital to the implementation of telemedicine services. STANAG 2543 “Standards for data interchange between Health information systems” provides relevant standards and nomenclatures for medical data systems. National systems must conform to this data interchange standard wherever possible and practical in order to facilitate interoperability with NATO systems such as the medical Information system (MIMS) and be interoperable with ESS MED SUITE, and at all points along the patient care pathway.

8. Standardization of implementation, training and installation is necessary when implementing telemedicine applications, whether nationally or for multinational purposes (together with “affiliates“, recognized by the FMN framework). Rigorous

evaluation, re-evaluation and review of ‘lessons learned’ are also of key importance in the implementation of effective telemedicine applications. While developing national telemedicine systems, there is a requirement for all nations to employ internationally recognized and standardized protocols, such as industry network standards (e.g. IP/TCP/UDP Data and Application Standards like WebRTC, DICOM etc.).

9. In recent years, the rapid development of new web application technologies and the extensive capacities of web browsers makes it feasible to develop national applications (mostly web-based), that during a multinational mission, could be used by other nations. As an example, a physician uses his own nation’s telemedicine application to request a medical consultation. A medical expert of another nation receives a notification to connect and, as the application is web-based, they can connect using just a web browser from their own device. Web-based applications can also be easily internationalized, so each healthcare provider sees the User Interface (UI) in their own language.

10. Telemedical procedures within multinational alliances require technical interoperability, i.e. the ability to exchange data with each other. A distinction is to be made between syntactic and semantic interoperability: syntactic interoperability generally describes the communication path and requires compatible communication protocols and data formats. It is the basis for semantic interoperability, in which the content level is also considered and has to be standardized.

11. Medical equipment with video capabilities should have a standardized Video-Output-Interface (e.g. DVI/HDMI/SDI) that allows the capture of the video feed (Video-capture).

12. Interoperability of encryption and security measures for personal medical data will be a fundamental prerequisite and must be considered in the development of any such system (see: Requirements).

13. Multinational telemedicine systems have already been developed in the past; the processes are described and the systems developed for specific issues or applications (e.g. NATO project “Telemedicine in natural disasters”). Telemedicine can contribute to medical services being better prepared for such scenarios in the event of natural disasters, crises situations, epidemic or pandemic infections, etc. ("preparedness"). These transnational disaster management applications require a partnership strategy that is based on the needs of the actors that have been worked out in detail, in accordance with the requirement analysis.

14. Many military medical services use Commercial Off-The-Shelf (COTS) products when introducing or using telemedicine. Capabilities should be procured which have an open technical architecture, so as to promote interoperability. When purchasing COTS products, focus on solutions designed for civilian telemedicine which have the potential of adaptation to military needs.

15. Using commercial videoconferencing solutions developed for non-medical use, should be carefully analyzed, as they may not provide the level of quality and tools needed for telemedicine purposes. As they are designed for mass use, there is little possibility of influencing the vendors to provide modifications useful in the medical context. The configuration ability of the COTS products should be explored during the validation and procurement process (and during exercises) to confirm suitability for military use, including interoperability together with a patient/clinical safety policy to ensure governance and compliance with national legislation.

16. Enabling telemedicine interoperability will provide challenges in terms of communication systems (both trans-national and across strategic, operational and tactical boundaries), time, culture and co-ordination. The ability to communicate across national operational boundaries will be key.

17. Collaboration across borders has political, legal, organizational, semantic (related to the application) and technical (as well as architectural) areas to consider.

18. Problems naturally may arise due to language barriers and the different health systems of the nations involved. These types of differences have to be taken into account while developing a telemedicine solution. Providing their own user interface with multi-language support or data exchange to compatible national systems, can often resolve these issues.

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CHAPTER 5 REQUIREMENTS

1. The first action for a procurement is normally having a conceptual ‘course of action’ (COA) endorsed from which the requirements will develop. It is not our aim to set out detailed technical specifications, but to identify general requirements.

2. The identification of minimum recommendations for telemedicine systems and technology at each stage of the patient evacuation chain is elaborated within Federated Mission Networking (FMN; see: work of the IWG Medical Syndicate). Each nation should analyze these requirements (particularly the procedural instructions and technical requirements) as a guide to developing its own desired deployable telemedicine capabilities, to enable interoperability.

3. NATO members should invest in and maintain robust systems for remote consultation, as this proved to be essential for force generation in pandemics (lessons identified). Telemedicine must be adopted early as a proactive strategy and designed so that it can be scaled-up beyond emergency use in order to exploit its immense potential.

4. Within the scope of telemedicine, the (minimum) requirements may be divided into several areas to ensure the delivery of a coherent capability. Listed below is a selection of the requirements for the successful development and implementation of a telemedicine application which facilitates interoperability and aligns to the current best practice within NATO nations.

5.1. PLANNING AND ORGANIZATIONAL REQUIREMENTS

a. Recruitment of the suitable experts (medical, technical and administrative), and selection of the equipment (User Access Devices (UAD) and Medical Data Capture Devices) and applications (software to support and enhance medical outcomes) are critical.

b. For the successful implementation of a telemedicine system, user “buy-in” and support is essential, for both deployed personnel and experts. Guidance and partnership with Telemedicine experts is also required.

c. The planning components include medical, legal, economical, technical, data protection and quality management aspects (see also functional requirements).

d. The Telemedicine equipment shall be easy to use and simple to maintain by the end user.

e. The use of the same or similar (standardized) software/User Interface (UI) for different Telemedicine applications/disciplines is expedient to reduce training requirements and increase user competence.

f. Planning should take into account that the use of Telemedicine systems will be governed and may be restricted by operational electromagnetic security measures (delayed transmission or alternative options for data transfer would be needed).

g. The data shall be consequently incorporated into the national Healthcare system (e.g. Electronic Health Record (EHR) if such a system is already in function and also interoperable.

h. The Inclusion of the NATO recommendations for standardization of data, transfer modalities, including minimum data sets and information coding (e.g. STANAG 2543, 2231, 2348, 7149; AMedP-8.2 BASIC MILITARY MEDICAL REPORT; APP-11 NATO MESSAGE CATALOGUE).

5.2. FUNCTIONAL REQUIREMENTS

a. The first principle for telemedicine (whether synchronous or asynchronous) is the organization of the medical expertise on call/on request.

b. A wide range of technologies from text-based messaging, simple voice communication to real time media conferencing facilities (from telephone to med. VTC) are used in telemedicine/telehealth along with the ability to handle medical specialty-specific data streams captured with the use of specialized equipment (e.g. Bodysensors, video from endoscopes, microscopes, medical cameras, ECG, X-Ray, Ultrasound, other medical devices).

c. The Automated data recording (no action required by users) is required to provide acceptable speed and accuracy while using medical devices (e.g. Bodysensors).

d. The Bandwidth requirements are critical to understand. Telemedicine should provide a scalable capability able to function successfully in a low bandwidth environment.

e. Training cannot be guaranteed so applications must be standardized and should have a simple, intuitive, user-friendly Graphical User Interface (GUI) to ensure the applications implementation is successful and the correct work processes can be followed.

f. The (structured and standardized, defined and coded) healthcare data captured and transferred by telemedicine systems should be available for

secondary use from individual patient/clinician to NATO HQ level for disease (health) surveillance, epidemiological and public health purposes.

5.3. INFORMATION REQUIREMENTS

a. Language and cultural differences must be considered in information exchanges.

b. A structured system for the storage of information generated during telemedicine activities is required along with a mechanism for archiving a summary in the patient record.

c. Encryption and security measures for personal medical data are a fundamental prerequisite to any telemedicine system and should meet the standard required by each participating nation's health records law. It is key that encryption and security measures do not prevent interoperability (see Interoperability chapter).

d. Essential prerequisites for the successful and accepted use of information technology in communication between those involved in healthcare are confidentiality, data integrity and availability of patient information.

e. Systems should include measures to protect the privacy and confidentially of medical data in the multinational environment.

f. A secure legal framework is an important prerequisite for IT systems in the healthcare sector (see also: information security standards, e.g. ISO/IEC 27000-series, ISO/IEC 27001-privacy specific, NIST special publications 800-series).

g. All services, systems and products must meet the requirements of national legislation, national and international procurement regulations (including legal responsibility). Where agreements between nations include measures on the provision of health care, a section on the provision of health care by telemedicine should be included.

5.4. COMMUNICATION REQUIREMENTS

a. Telemedicine capabilities shall be interoperable and shall utilize standardized communication protocols, a standardized medical vocabulary (and classification) and data sets within the common reference architecture (medical data standards).

b. Available bandwidth will vary, depending on operational environment. Telemedicine capabilities need to be flexible enough organizationally and technically to adjust to upcoming and future challenges, including the ability to deliver capabilities in a low bandwidth environment. As combat intensity increases connection reliability becomes a greater constraint either because the priority for bandwidth is switched to combat activity or the available bandwidth is reduced (to mitigate electronic warfare activity).

c. Assessment of the infrastructure required for each location and to enable the transfer of data (synchronous vs. asynchronous; bandwidth availability, connection; availability of med. VTC, telephone facilities and the connections to transmit images, data, etc.) is needed.

5.5. TRAINING AND PERSONNEL REQUIREMENTS

a. Education, Training, Exercising and Evaluation (ETEE) must be carried out to ensure correct use of the system and that expected benefits are realized.

b. Existing workflows should not be disrupted by the introduction of a telemedicine service. The telemedicine processes must be implemented into "daily work". Consideration should be given to the best distribution of telemedicine systems in the workplace to optimize response times and user acceptance.

c. There is a need to create Standard Operating Procedures for users and experts (including standard minimum data sets; roles and responsibilities) for telemedicine in support of medical operations (see: Federated Mission Networking, work of the IWG Medical Syndicate; FMN).

5.6. EVALUATION, RE-EVALUATION AND RISK ASSESSMENT REQUIREMENTS

a. When introducing new systems, there should always be a pilot or concept phase that includes clinical validation. This study is to prove (proof of concept) whether the system in question can be used as described in the Standard Operating Procedure (SOP).

b. The (scientific) evaluation and re-evaluation of telemedicine applications is essential for the creation of an evidence base allowing translation of a capability into routine use. Health economic assessment into the feasibility, acceptance and efficiency of any system area is also necessary.

c. Proof of the efficiency and effectiveness of a telemedical service increases acceptance.

d. Known telemedicine risks, such as treatment delay, patient confidentiality, language friction, poor connectivity, image degradation, and service interruption, loss of visual, auditory and other cues, can be mitigated through the formulation of policy, robust organization as well as Education, Training, Exercising and Evaluation (ETEE).

e. System owners should ensure clinical risk assessments have been conducted to elaborate the worst case scenarios and these should be mitigated appropriately.

1. A telemedicine capability requires solutions in all of the above areas to ensure the delivery of a coherent capability across the spectrum of healthcare within military medical contexts.

2. The national representatives (national Subject Matter Experts (SME)) within the NATO COMEDS Telehealth Panel can provide the latest information and signposting to further sources and best practice (see also: Capability and Innovation matrix; by the HIST WG; part: Telemedicine). Please refer to your HIST WG representative for the latest factor analysis.

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CHAPTER 6 CONCLUSION AND PERSPECTIVE

1. Within a telemedicine network of NATO (or in multinational missions) it is the functional, organizational and, in particular, the personal dimensions of this network, that are considered success factors for a stable and resilient use of telemedicine.

2. The wider accessibility of communications technology is offering opportunities for medical communications innovation. National and NATO communication and medical initiatives need to consider medical capability requirements and multi-national interoperability when developing communications equipment and procuring services.

3. Whilst Telemedicine has its place in the medical-military tool-kit, it is a supporting capability for the delivery of clinical care and is not an end in and of itself.

4. In the future, the use of telemedicine/telehealth will be even more common and better available. Online collaborative platforms for patients, clinicians and staff may be available via online medical centres.

5. In the fields of robotics (e.g. remote robotic surgery) or sensors, artificial intelligence (AI), genome analysis, data analysis, big data, nanotechnology or virtual reality, there are rapid developments that go hand in hand with telemedicine/telehealth and contribute to bring the needed medical care to the patient without delay, anywhere in the world.

6. Military human-computer models may support telemedicine and autonomous care in austere environments. Computer Decision Support Systems leverage existing data sets to provide users with enhanced capability tailored to the needs to the patient and providers through the use of enhanced displays and data analysis/modelling. Telemedicine provides opportunities to record data (together with other systems) that could help to teach computers about human expert decisions. The data that remote human experts require to make informed decisions during telemedical encounters is the same data that autonomous or semi-autonomous systems will need to make similar “decisions” (proposals) in the future. The aim is and will be in future to optimize local decision support.

7. Where agreements between nations include measures on the provision of health care, consideration should be given to including a section on the provision of healthcare by telemedicine.

8. The aim of the NATO COMEDS Telehealth Panel is to provide a preliminary conceptual and practical framework to support the understanding and implementation of telemedicine capabilities (in nations and multinational).

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