

Army Regulation 40–21

Medical Services

**Medical
Aspects of
Army
Aircraft
Accident
Investigation**

**Headquarters
Department of the Army
Washington, DC
7 June 2019**

UNCLASSIFIED

SUMMARY of CHANGE

AR 40-21
Medical Aspects of Army Aircraft Accident Investigation

This major revision, dated 7 June 2019—

- o Updates responsibilities and policy (throughout).

Medical Services

Medical Aspects of Army Aircraft Accident Investigation

By Order of the Secretary of the Army:

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Army Civilian or contractor personnel, unless otherwise stated. This regulation applies during mobilization.

Proponent and exception authority.

The proponent of this regulation is The Surgeon General. The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this regulation by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal advisor. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific guidance.

Army internal control process. This regulation contains internal control provisions in accordance with AR 11–2 and identifies key internal controls that must be evaluated (see appendix C).

Supplementation. Supplementation of this regulation and establishment of command and local forms are prohibited without prior approval from The Surgeon General (DASG–HCZ) Washington, DC 20310–0101.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Headquarters, Department of the Army (DASG–HCZ) Washington, DC 20310–0101.

Distribution. This regulation is available in electronic media only and is intended for the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

History. This is a major revision.

Summary. This publication provides a mechanism for additional air medical support from the Armed Forces Medical Examiner System.

Applicability. This regulation applies to the Regular Army, members of the Reserve Components, and to all Department of the

Contents (Listed by paragraph and page number)

Purpose • 1, *page 1*
References • 2, *page 1*
Explanation of abbreviations and terms • 3, *page 1*
Responsibilities • 4, *page 1*
Checklist for medical information on aircraft accidents • 5, *page 2*
Preparation of reports • 6, *page 2*

Appendixes

- A. References, *page 3*
- B. Guide To Minimum Aeromedical Information To Be Recorded In Case Of An Aircraft Accident, *page 5*
- C. Internal Control Evaluation, *page 8*

Glossary

*This revision supersedes AR 40-21, dated 23 November 1976.

1. Purpose

This regulation prescribes policies and general administrative responsibilities for conducting medical investigations of Army aircraft accidents. These provisions are an integral part of the Army safety accident investigations convened under provisions of AR 385–10 and also implement North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) 3318.

2. References

See appendix A.

3. Explanation of abbreviations and terms

See the glossary.

4. Responsibilities

Commanders of Army commands, Army service component commands, and direct report units will ensure compliance with the provisions of this regulation.

a. Military treatment facility commanders. The military treatment facility commander on the Army installation located nearest the scene of an Army aircraft accident will—

(1) Arrange for pathologic support of medical aspects as expeditiously as possible through the Armed Forces Medical Examiner System (AFMES), if fatalities are involved. The military treatment facility commander of the Army installation located nearest the scene of an Army aircraft accident that has an operational autopsy suite will interact with the AFMES to ensure appropriate autopsy facilities are available if the decision is made to perform the autopsy at their location.

(2) Provide the ability to perform biochemical testing of personnel involved in or contributing to all Class A, Class B, or Class C aviation accidents, or when deemed appropriate by the commander or physician (consult with the AFMES, commercial: (302) 346–8648; DSN 366–8648; website: <https://www.health.mil/afmes>). Biochemical testing is required for all crewmembers and any other personnel who may have contributed to a Class A, Class B, or Class C aviation accident or on-duty ground Class A or Class B accidents in accordance with AR 385–10.

b. Flight surgeon. The flight surgeon appointed to an Aircraft Accident Investigation Board in accordance with AR 385–10 will, in coordination with the Command Surgeon, U.S. Army Combat Readiness Center/Safety Center—

(1) Make a thorough investigation of the accident, including the medical, psychological, social, economic, and training history of the individuals involved, to discover which human factors may have contributed to the accident.

(2) Make a thorough investigation of the fatal and nonfatal injuries sustained to determine their causes and to recommend ways of preventing or minimizing recurrence.

(3) Correlate the factors causing accident and injury with safety aspect of aircraft design, restraint system design, personal equipment, and existing operational and safety regulation practices. Provide results of this analysis in coordination with members of the Aircraft Accident Investigation Board.

(4) Perform physical examinations of surviving accident victims (per AR 40–501). When a flight surgeon is unavailable, a non-flight surgeon physician conducts the required examination(s) for review by the board-assigned flight surgeon.

(5) Evaluate any life support and personal protective equipment which is implicated in the cause or prevention of the injury and ensure that such equipment is forwarded with all components through the accident investigation board president by the responsible unit to—

Commander, U.S. Army Aeromedical Research Laboratory (ALSERP)
Building 6901 Farrel Road
Fort Rucker, AL 36362–5363

Note: Upon receipt, the Commander, U.S. Army Aeromedical Research Laboratory will furnish the unit with a memorandum detailing inventory of items to be inspected for property accountability.

(6) Notify the AFMES as soon as a fatality has been confirmed. A forensic pathologist from the AFMES will assist the flight surgeon in determining the medicolegal jurisdiction and provide expert consultation to the flight surgeon regarding forensic pathology investigations. The AFMES point of contact information is—

Armed Forces Medical Examiner System
115 Purple Heart Drive
Dover Air Force Base, DE 19902-5051
DSN: 366-8648 Phone: (302) 346-8648

c. Aeromedical physician assistant. The aeromedical physician assistant will neither substitute for the flight surgeon in aircraft accident investigations or flight evaluation boards nor will the aeromedical physician assistant sign reports for these investigations or boards. The aeromedical physician assistant may be involved in the initial accident site assessment, evaluation, treatment, data, and specimen collection from surviving crewmembers.

d. Armed Forces medical examiners. The Armed Forces medical examiner will—

(1) Assist the flight surgeon in determining the medicolegal jurisdiction of the incident.

(2) Conduct a forensic pathology investigation in accordance with Section 1471, Title 10, United States Code (10 USC 1471), if the Armed Forces medical examiner has medicolegal jurisdiction. The results of the investigation will be provided to the Aircraft Accident Investigation Board through the appointed flight surgeon. These results include an autopsy report which documents the identification of the individual, cause of death, manner of death, injuries sustained, toxicology results, and photographs taken during the investigation.

(3) Assist the accident investigation in the interpretation of the findings of a forensic pathology investigation that is conducted by civilian medical examiners/coroners who have medicolegal jurisdiction over the incident. Also, the medical examiner will assist the flight surgeon in determining—

(a) Human factors associated with the cause of the accident, including pre-existing disease conditions which may have contributed to the cause of the accident.

(b) Analysis of the injuries sustained by the pilot, crewmembers, and passengers which could have been prevented by proper crash safety design and components.

(c) Recommendations to the Aircraft Accident Investigation Board for the prevention of similar accidents and injuries.

5. Checklist for medical information on aircraft accidents

The checklist in appendix B implements NATO STANAG 3318 and lists minimum information required for a satisfactory medical investigation of Army aircraft accidents. The checklist will be used as a guide in conjunction with The Flight Surgeons Guide to Accident Investigation available at <https://safety.army.mil>.

6. Preparation of reports

The information contained in the reports required by this regulation will be utilized by the flight surgeon as a member of the Army Aircraft Accident Investigation Board in the preparation of DA Form 2397-9 (Technical Report of U.S. Army Aircraft Accident Part X - Injury/Occupational Illness Data), human factors summary. (See DA Pam 385-40 for information on human factors.) The autopsy report and toxicology reports in conjunction with the rest of the accident report will be forwarded in accordance with AR 385-10 to—

Commander, U.S. Army Combat Readiness Center (CSSC)
4905 Ruf Avenue
Fort Rucker, AL 36362-5363

Note. Photographs will be reviewed with the board flight surgeon upon request and will not be forwarded with the report.

Appendix A

References

Section I

Required Publications

This section contains no entries.

Section II

Related Publications

AFI 91–206(I)/AR 95–30/OPNAVIST 3750.16C/COMDTINST 5100.28

Participation in a Military or Civil Aircraft Accident Safety Investigation

AR 11–2

Managers' Internal Control Program

AR 25–30

Army Publishing Program

AR 40–501

Standards of Medical Fitness

AR 385–10

The Army Safety Program

DA Pam 385–40

Army Accident Investigations and Reporting

DODI 5154.30

Armed Forces Medical Examiner System (AFMES) Operations

DODI 6055.07

Mishap Notification, Investigation, Reporting and Record Keeping

NATO AAMedP–1.7

Aeromedical Aspects of Aircraft Accident and Incident Investigation (Available at <https://nso.nato.int/nso/>. Account required for access.)

NATO STANAG 3318

(Available at <https://nso.nato.int/nso/>. Account required for access.)

The Flight Surgeons Guide to Accident Investigation

(Available at <https://safety.army.mil/>.)

10 USC 1471

Forensic pathology investigations

Section III

Prescribed Forms

This section contains no entries.

Section IV

Referenced Forms

DA forms are available at the Army Publishing Directorate website (<https://armypubs.army.mil/>.)

DA Form 11–2

Internal Control Evaluation Certification

DA Form 2028

Recommended Changes to Publications and Blank Forms

DA Form 2397-9

Technical Report of U.S. Army Aircraft Accident Part X - Injury/Occupational Illness Data

Appendix B

Guide To Minimum Aeromedical Information To Be Recorded In Case Of An Aircraft Accident

The following information is referencing NATO STANAG 3318 and applies to Army aircraft accident investigation.

B-1. Part I – General information

Note. To be completed for each accident as applicable.

- a. Summary of information concerning occupants of aircraft (record for each individual occupant in the aircraft).
 - (1) Name.
 - (2) Rank and Department of Defense identification number.
 - (3) Age and gender.
 - (4) Crew duty.
 - (5) Position in aircraft.
 - (6) Medical condition as a result of the accident—
 - (a) Uninjured.
 - (b) Injured (slight/moderate, severe).
 - (c) Killed during accident (incinerated/not incinerated).
 - (d) Survived accident but died subsequently (seen/not seen before death).
 - (e) Missing.
- b. Information relating to the in-flight phase of the emergency (to be completed for all accidents except those, which occur prior to the beginning of takeoff).
 - (1) Nature of the emergency—
 - (a) Collision with ground/sea/obstacle.
 - (b) Emergency in flight.
 - (c) Mid-air collision.
 - (d) Other or unknown.
 - (2) Operating conditions at time of the emergency—
 - (a) Aircraft control (solo/dual/auto pilot).
 - (b) Single/formation (leader/number) flight.
 - (c) Form of ground control.
 - (3) Cause of the emergency (structural failure/collision/fire/lack of fuel/loss of control/failure of power/loss of auxiliary systems/other).
 - (4) Flight path (altitude, speed, and attitude) immediately before and during the emergency.
 - (5) Abandonment in flight. The manner of the abandonment (assisted/unassisted) and its success are to be recorded in summary form for each individual in the aircraft.
- c. Information relating to crash or emergency landing (to be completed only if aircraft was occupied at the moment of impact with the ground).
 - (1) Seating (record for each individual airman and passenger in the aircraft prior to the accident)—
 - (a) Type (manufacturer and mark) and orientation (to line of flight) of seat.
 - (b) Position of seat pan and seat back.
 - (c) Type of restraint harness.
 - (d) Type of quick release fitting.
 - (e) Type of personal survival pack.
 - (f) Weight setting of the seat (appropriate for occupant).
 - (g) Survival/personal equipment (for example, helmet, nomex, and so forth).
 - (2) Actions prior to ground impact—
 - (a) Time between onset of emergency and realization that crash was inevitable.
 - (b) Nature and time of warning to aircraft occupants that impact would occur.
 - (c) Stowing and securing of loose items.
 - (d) Seat harness (fastened or unfastened/degree of adjustment).
 - (e) Go forward lever (locked/unlocked) = seat belt lever.
 - (3) The impact—
 - (a) Obstructions on approach.
 - (b) Surface onto which impact occurred (type, contour, obstruction).

- (c) Details of impact (attitude, forward, and vertical speed and angle at impact, estimated deceleration, secondary impact, damage to aircraft).
- (d) Details of crash site.
- (4) The effect of impact (record for each individual occupant of the aircraft at impact)—
 - (a) Damage to seat.
 - (b) Restraint harness (adjustment, damage).
 - (c) Operation of quick release fitting (ease of opening by normal means, inadvertent operation).
 - (d) Escape from aircraft (escape route, ease of escape, cause of difficulties).
 - (e) Operation of the seat (effectiveness at absorbing energy).

B-2. Part II – Information relative to unassisted escape

- a. Escape system—
 - (1) Escape path clearance (door, hatch/manual, automatic).
 - (2) Static seat (position and type, harness system).
 - (3) Personal survival pack.
- b. Action before initiation—
 - (1) State of personal equipment (oxygen mask and supply, radio transmission devices).
 - (2) Position in aircraft when emergency declared.
 - (3) Order to abandon (ordered/own initiative).
- c. Aircraft state during abandonment—
 - (1) Control (under control or not).
 - (2) Speed, attitude, altitude, acceleration forces.
- d. Abandonment—
 - (1) Clearance of escape path (self/other).
 - (2) Movement to seat and to escape hatch (ease of movement, obstructions).
 - (3) Emergence from aircraft (difficulty in leaving).
 - (4) Injury attributable to abandonment (on moving to seat, to escape hatch, on emergence into airstream).

B-3. Part III Survival – Rescue and recovery

- a. Land Survival—
 - (1) Surface (type of terrain, surface wind, temperature, and precipitation).
 - (2) Previous experience of survival (practice/real).
 - (3) Mobility of airman.
 - (4) Location aids (list each available, those used and effectiveness of each).
 - (5) Shelter and protection (nature and effectiveness).
 - (6) Food and water (availability and consumption).
 - (7) Contact with rescuers (method and time).
- b. Rescue and recovery—
 - (1) Position and time when rescued (location of survivor).
 - (2) Method of rescue (own efforts, rescue service involved and mode of rescue).
 - (3) Difficulties.

Note. Record the personal equipment worn, whether it was effective and, if not, why not. Document any evidence which shows that the equipment was either protective or caused injuries. Record whether it was recovered or not and whether it was intact or damaged.

B-4. Part IV – Individual information

Personal information—

- a. Identification.
 - (1) Name.
 - (2) Rank.
 - (3) Age.
 - (4) Gender.
 - (5) Crew position.
 - (6) Qualifications.
 - (7) Marital status.

- (8) Family and interpersonal relationship.
- (9) Financial problems.
- (10) Non-aviation related activities.
- (11) Experience and flying time on accident aircraft type.
- (12) Mission experience.
- (13) Performance level.
- (14) Assessment of flying skills (obtained from flying records).
- (15) Medical category (including date awarded).
- (16) Review of medical records and other relevant medical history.
- b. Anthropometry (data eventually obtained from existing records).*
 - (1) Height.
 - (2) Weight.
 - (3) Sitting height.
 - (4) Buttock-knee length.
 - (5) Shoulder breadth.
 - (6) Functional reach.
 - (7) Buttock-heel length.
 - (8) Hand dominance.
- c. Physiological—*
 - (1) Sensory or perceptual limitations.
 - (2) Boredom.
 - (3) Fatigue and perturbation of circadian rhythms.
 - (4) History of airsickness.
 - (5) Acceleration tolerance.
 - (6) Somatic – sensory illusions.
 - (7) Sudden incapacitation.
 - (8) Physical fitness.
 - (9) Thermal stress.
- d. Psychological (information obtained by psychologist if necessary)—*
 - (1) Personality development.
 - (2) Professional difficulties.
 - (3) Professional dissatisfaction.
 - (4) Past experiences including previous accident / mishap history.
 - (5) Stress.
 - (6) Ambition.
 - (7) Attitudes to authority.
 - (8) Emotional stability.
 - (9) Personality profile.
 - (10) Judgment.
 - (11) Situational awareness (disorientation).
 - (12) Reaction to emergency.
 - (13) History of consumption of alcohol or drugs (legal or not).
 - (14) Physical/mental task / workload over saturation.
- e. Activity prior to accident—*
 - (1) Brief account of activity in 72 hours prior to the accident.
 - (2) Work/rest history.
 - (3) Food intake.
 - (4) Recent illness.
 - (5) Therapeutic drugs.
 - (6) Ingestion of alcohol or over the counter or other legal/illegal drugs.
 - (7) Quality of recent sleep patterns.
- f. Training and currency—*
 - (1) Flying hours (total, instrument flight, night, night vision, and so forth.)
 - (2) Aeromedical (date last given, scope, spatial disorientation training, and so forth.)
 - (3) Crew resource management training received.

Appendix C

Internal Control Evaluation

C–1. Function

The function covered by this evaluation is the medical aspects of aircraft accident investigation.

C–2. Purpose

The purpose of this evaluation is to assist personnel investigating Army aircraft accidents in evaluating the key internal controls provided by the medical investigation process. It is intended as a guide, and does not cover all controls.

C–3. Instructions

Answers must be based on the actual testing of key internal controls (for example, through document analysis, direct observation, sampling, or other). Answers that indicate deficiencies must be explained, and the corrective action identified in supporting documentation. These internal controls must be evaluated at least once every 5 years. Certification that the evaluation has been conducted must be accomplished on DA Form 11–2 (Internal Control Evaluation Certification).

C–4. Internal control test questions

- a.* Do military treatment facility commanders follow the requirements of paragraph 4*a*?
- b.* Do flight surgeons assigned to safety investigation boards follow the requirements of paragraph 4*b* as submitted in accident reports?
- c.* Do medical portions of safety investigations include the items in appendix B as submitted through accident reporting?

C–5. Supersession

Not applicable.

C–6. Comments

Help make this a better tool for evaluating internal controls. Submit comments to the Office of The Surgeon General (DASG–HCZ), 7700 Arlington Boulevard, Falls Church, VA 22042–5144.

Glossary

Section I

Abbreviations

AFI

Air Force instruction

AFMES

Armed Forces Medical Examiner System

AR

Army Regulation

COMDTINST

Commandant instruction

NATO

North Atlantic Treaty Organization

OPNAVIST

Chief of Naval Operations instruction

STANAG

Standardization agreement

Section II

Terms

Army Accident (Class A, B, or C)

Refer to AR 385–10 for definitions of each accident class.

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PIN 031583-000