# ISO/TR 24971:2020 (E)

## Medical devices — Guidance on the application of ISO 14971

# Contents

Foreword

### Introduction

- 1 Scope
- 2 Normative references
- 3 Terms and definitions
- 4 General requirements for risk management system
  - 4.1 Risk management process
  - 4.2 Management responsibilities
  - 4.2.1 Top management commitment
  - 4.2.2 Policy for establishing criteria for risk acceptability
  - 4.2.3 Suitability of the risk management process
  - 4.3 Competence of personnel
  - 4.4 Risk management plan
  - 4.4.1 General
  - 4.4.2 Scope of the risk management plan
  - 4.4.3 Assignment of responsibilities and authorities
  - 4.4.4 Requirements for review of risk management activities
  - 4.4.5 Criteria for risk acceptability
  - 4.4.6 Method to evaluate overall residual risk and criteria for acceptability
  - 4.4.7 Verification activities
  - 4.4.8 Activities related to collection and review of production and post-production information
  - 4.5 Risk management file

### 5 Risk analysis

- 5.1 Risk analysis process
- 5.2 Intended use and reasonably foreseeable misuse
- 5.3 Identification of characteristics related to safety
- 5.4 Identification of hazards and hazardous situations
- 5.4.1 Hazards
- 5.4.2 Hazardous situations in general
- 5.4.3 Hazardous situations resulting from faults
- 5.4.4 Hazardous situations resulting from random faults
- 5.4.5 Hazardous situations resulting from systematic faults
- 5.4.6 Hazardous situations arising from security vulnerabilities
- 5.4.7 Sequences or combinations of events
- 5.5 Risk estimation
- 5.5.1 General
- 5.5.2 Probability
- 5.5.3 Risks for which probability cannot be estimated
- 5.5.4 Severity
- 5.5.5 Examples
- 6 Risk evaluation
  - Risk control

7

- 7.1 Risk control option analysis
- 7.1.1 Risk control for medical device design
- 7.1.2 Risk control for manufacturing processes

- 7.1.3 Standards and risk control
- 7.2 Implementation of risk control measures
- 7.3 Residual risk evaluation
- 7.4 Benefit-risk analysis
- 7.4.1 General
- 7.4.2 Benefit estimation
- 7.4.3 Criteria for benefit-risk analysis
- 7.4.4 Benefit-risk comparison
- 7.4.5 Examples of benefit-risk analyses
- 7.5 Risks arising from risk control measures
- 7.6 Completeness of risk control
- 8 Evaluation of overall residual risk
  - 8.1 General considerations
  - 8.2 Inputs and other considerations
  - 8.3 Possible approaches
- 9 Risk management review
- 10 Production and post-production activities
  - 10.1 General
  - 10.2 Information collection
  - 10.3 Information review
  - 10.4 Actions

### Annex A (informative) Identification of hazards and characteristics related to safety

- A.1 General
- A.2 Questions
- A.2.1 What is the intended use and how is the medical device to be used?
- A.2.2 Is the medical device intended to be implanted?
- A.2.3 Is the medical device intended to be in contact with the patient or other persons?
- A.2.4 What materials or components are utilized in the medical device or are used with, or are in contact with, the medical device?
- A.2.5 Is energy delivered to or extracted from the patient?
- A.2.6 Are substances delivered to or extracted from the patient?
- A.2.7 Are biological materials processed by the medical device for subsequent reuse, transfusion or transplantation?
- A.2.8 Is the medical device supplied sterile or intended to be sterilized by the user, or are other microbiological controls applicable?
- A.2.9 Is the medical device intended to be routinely cleaned and disinfected by the user?
- A.2.10 Does the medical device modify the patient environment?
- A.2.11 Are measurements taken?
- A.2.12 Is the medical device interpretative?
- A.2.13 Is the medical device intended for use in conjunction with other medical devices, medicines or other medical technologies?
- A.2.14 Are there unwanted outputs of energy or substances?
- A.2.15 Is the medical device susceptible to environmental influences?
- A.2.16 Does the medical device influence the environment?
- A.2.17 Does the medical device require consumables or accessories?
- A.2.18 Is maintenance or calibration necessary?
- A.2.19 Does the medical device contain software?
- A.2.20 Does the medical device allow access to information?
- A.2.21 Does the medical device store data critical to patient care?
- A.2.22 Does the medical device have a restricted shelf life?
- A.2.23 Are there any delayed or long-term use effects?
- A.2.24 To what mechanical forces will the medical device be subjected?
- A.2.25 What determines the lifetime of the medical device?
- A.2.26 Is the medical device intended for single use?
- A.2.27 Is safe decommissioning or disposal of the medical device necessary?
- A.2.28 Does installation or use of the medical device require special training or special skills?
- A.2.29 How will information for safety be provided?
- A.2.30 Are new manufacturing processes established or introduced?
- A.2.31 Is successful application of the medical device dependent on the usability of the user interface?

- A.2.31.1 Can the user interface design features contribute to use error?
- A.2.31.2 Is the medical device used in an environment where distractions can cause use error?
- A.2.31.3 Does the medical device have connecting parts or accessories?
- A.2.31.4 Does the medical device have a control interface?
- A.2.31.5 Does the medical device display information?
- A.2.31.6 Is the medical device controlled by a menu?
- A.2.31.7 Is the successful use of the medical device dependent on a user's knowledge, skills and abilities?
- A.2.31.8 Will the medical device be used by persons with specific needs?
- A.2.31.9 Can the user interface be used to initiate unauthorised actions?
- A.2.32 Does the medical device include an alarm system?
- A.2.33 In what ways might the medical device be misused (deliberately or not)?
- A.2.34 Is the medical device intended to be mobile or portable?
- A.2.35 Does the use of the medical device depend on essential performance?
- A.2.36 Does the medical device have a degree of autonomy?
- A.2.37 Does the medical device produce an output that is used as an input in determining clinical action?
- Annex B (informative) Techniques that support risk analysis
  - B.1 General
  - B.2 Preliminary Hazard Analysis (PHA)
  - B.3 Fault Tree Analysis (FTA)
  - B.4 Event Tree Analysis (ETA)
  - B.5 Failure Mode and Effects Analysis (FMEA)
  - B.6 Hazard and Operability Study (HAZOP)
  - B.7 Hazard Analysis and Critical Control Point (HACCP)
- Annex C (informative) Relation between the policy, criteria for risk acceptability, risk control and risk evaluation
  - C.1 General
  - C.2 Policy for establishing criteria for risk acceptability
  - C.3 Criteria for risk acceptability
  - C.4 Risk control
  - C.5 Risk evaluation
  - C.6 Examples
- Annex D (informative) Information for safety and information on residual risk
  - D.1 General
  - D.2 Information for safety
  - D.3 Disclosure of residual risk
- Annex E (informative) Role of international standards in risk management
  - E.1 General
  - E.2 Use of international product safety standards in risk management
  - E.3 International process standards and ISO 14971
- Annex F (informative) Guidance on risks related to security
  - F.1 General
  - F.2 Terminology used in security risk management
  - F.3 Relation between ISO 14971 and security
  - F.4 Characteristics of security risk management
  - F.5 Prioritizing confidentiality, integrity, and availability
- Annex G (informative) Components and devices designed without using ISO 14971
  - G.1 General
  - G.2 Risk management plan
  - G.3 Risk management file
- Annex H (informative) Guidance for in vitro diagnostic medical devices
  - H.1 General
  - H.1.1 Risk management for IVD medical devices
  - H.1.2 Context for IVD risk management
  - H.2 Risk analysis
  - H.2.1 Intended use and reasonably foreseeable misuse

- H.2.1.1 Analytical and clinical use
- H.2.1.2 Device description
- H.2.1.3 Analytical use
- H.2.1.4 Clinical use
- H.2.2 Characteristics related to patient safety
- H.2.2.1 General considerations
- H.2.2.2 Performance characteristics related to patient safety
- H.2.2.3 Reliability characteristics related to patient safety
- H.2.2.4 Digital information technology characteristics related to patient safety
- H.2.3 Known and foreseeable hazards to patients
- H.2.3.1 Identification of hazards
- H.2.3.2 Identification of hazards from fault conditions
- H.2.3.3 Identification of hazards from normal use
- H.2.3.4 Identification of hazards from use errors
- H.2.3.5 Identification of hazards from reasonably foreseeable misuse
- H.2.4 Identification of potential harms
- H.2.5 Identification of hazardous situations
- H.2.6 Identification of foreseeable sequences of events
- H.2.6.1 General considerations
- H.2.6.2 Description of the sequence of events
- H.2.7 Estimation of the probability of occurrence of harm
- H.2.7.1 General considerations
- H.2.7.2 Particular guidance for using the "P1 x P2" approach
- H.2.7.3 Guidance for estimating the probability of occurrence of harm
- H.3 Risk control
- H.3.1 General
- H.3.2 Inherently safe design and manufacture
- H.3.3 Protective measures in the IVD medical device or manufacturing process
- H.3.4 Information for safety
- H.3.5 Role of standards and analytical performance criteria
- H.3.6 User education and training
- H.4 Benefit-risk analysis
- H.5 Disclosure of the residual risks
- H.5.1 General considerations
- H.5.2 Performance specifications
- H.5.3 Limitations of the IVD medical device
- H.5.4 Generally recognized limitations of use
- H.6 Production and post-production activities
- H.6.1 General considerations
- H.6.2 Monitoring analytical performance
- H.6.3 Monitoring clinical performance
- H.7 Examples of risk scenarios for IVD medical devices
- H.7.1 General
- H.7.2 Automated medical laboratory analyser: incorrect examination result
- H.7.3 Personal (self-testing) device: incorrect classification of glycaemic status
- H.7.4 Portable IVD medical device for the point of care: critical result delayed

Page count: 87