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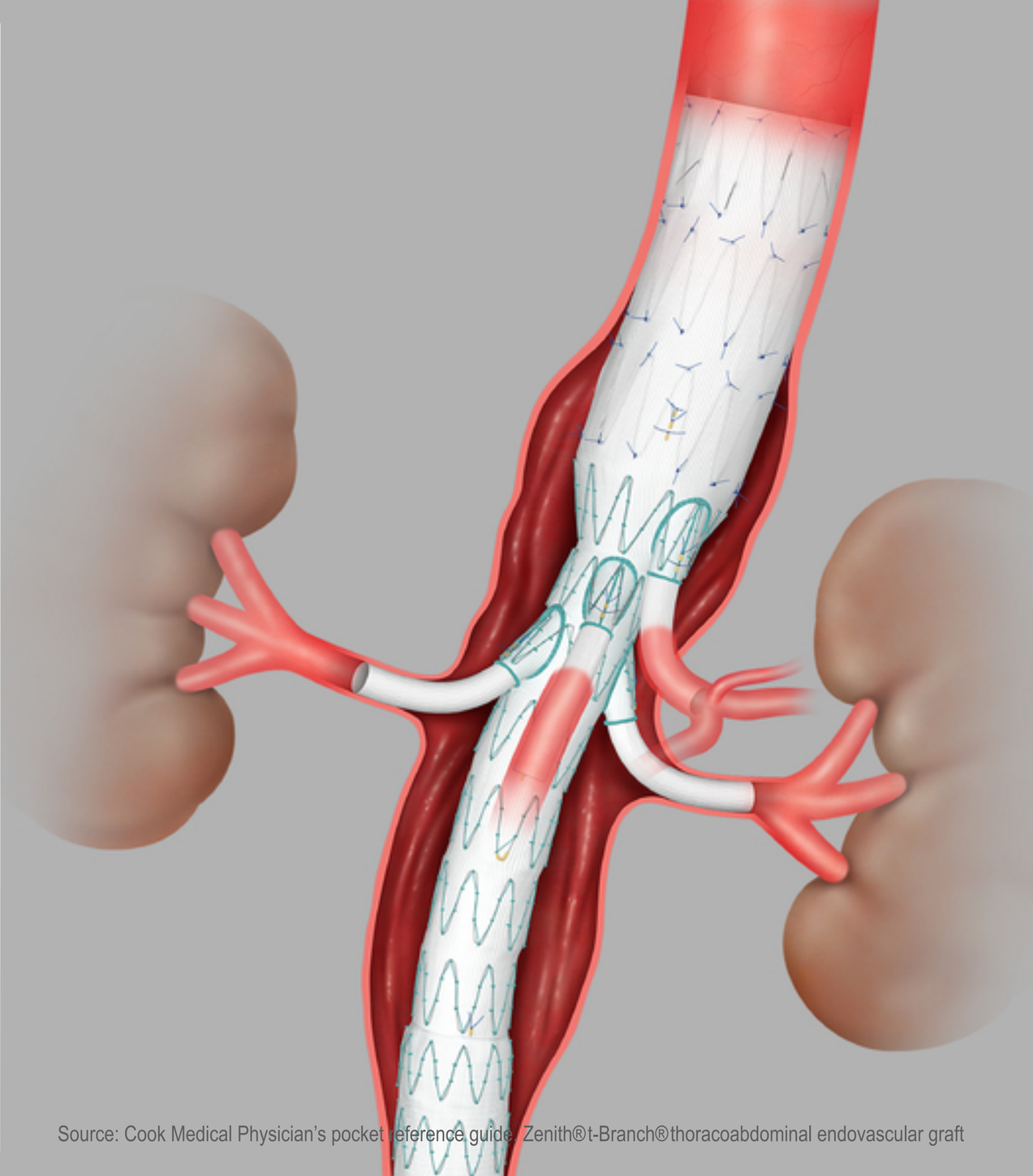
BECAUSE PATIENT SAFETY MATTERS.

Nothing is binding. Everything is required.

IVDR/MDR - “State-of-the-Art”, Standards, Specifications and Guidances

An almost personal story
by
Raymond F. Nistor, MD



Source: Cook Medical Physician’s pocket reference guide, Zenith® t-Branch® thoracoabdominal endovascular graft

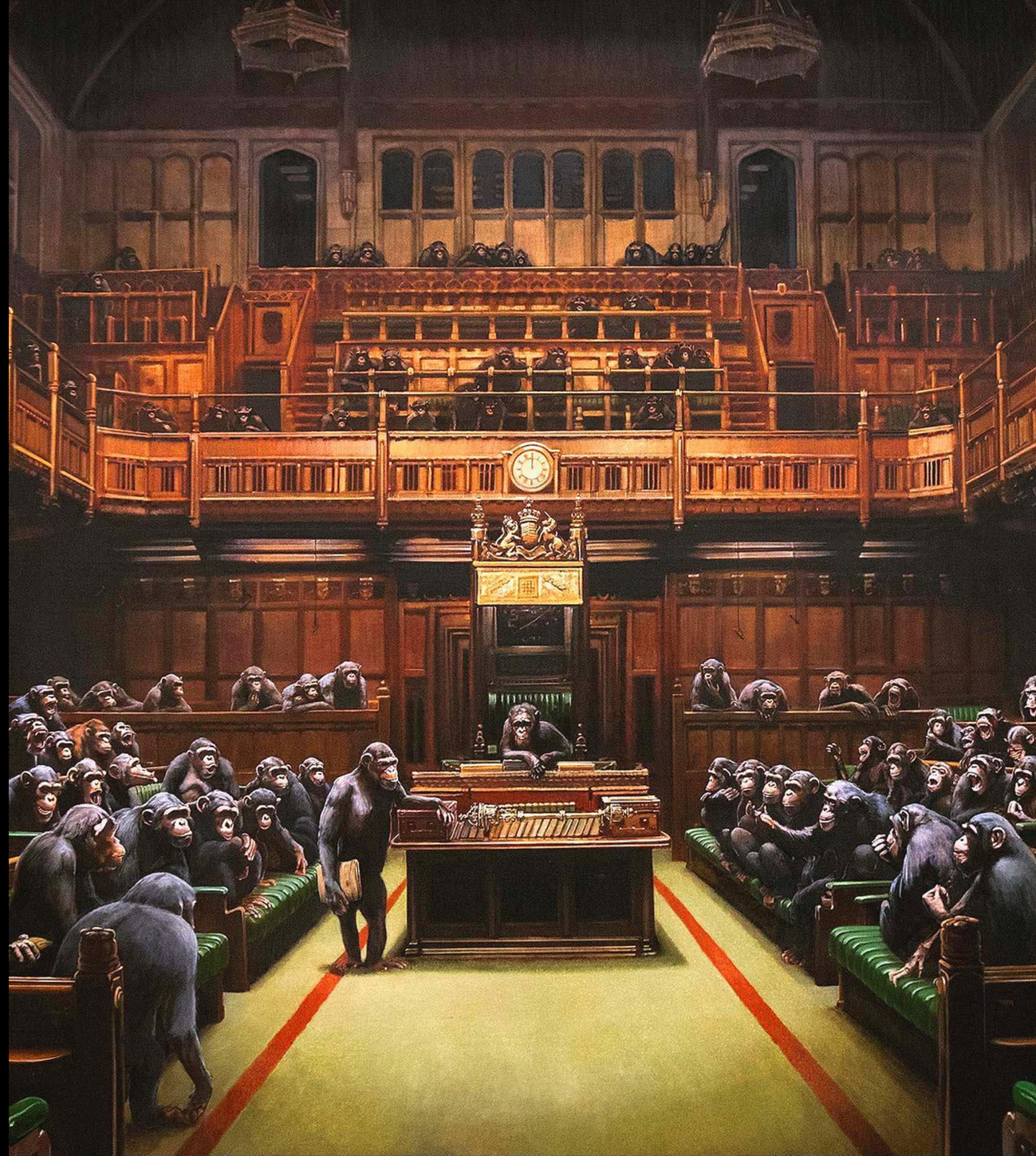
Disclaimer of Liability

This presentation is based on current publicly available information documented in the references in each slide and created to the best of my knowledge as a clinical subject matter expert for medical devices.

This presentation does not reflect the views and processes of QMD Services GmbH and only represents my personal understanding of the regulatory requirements and interpretations thereof for medical devices in the EU jurisdiction.

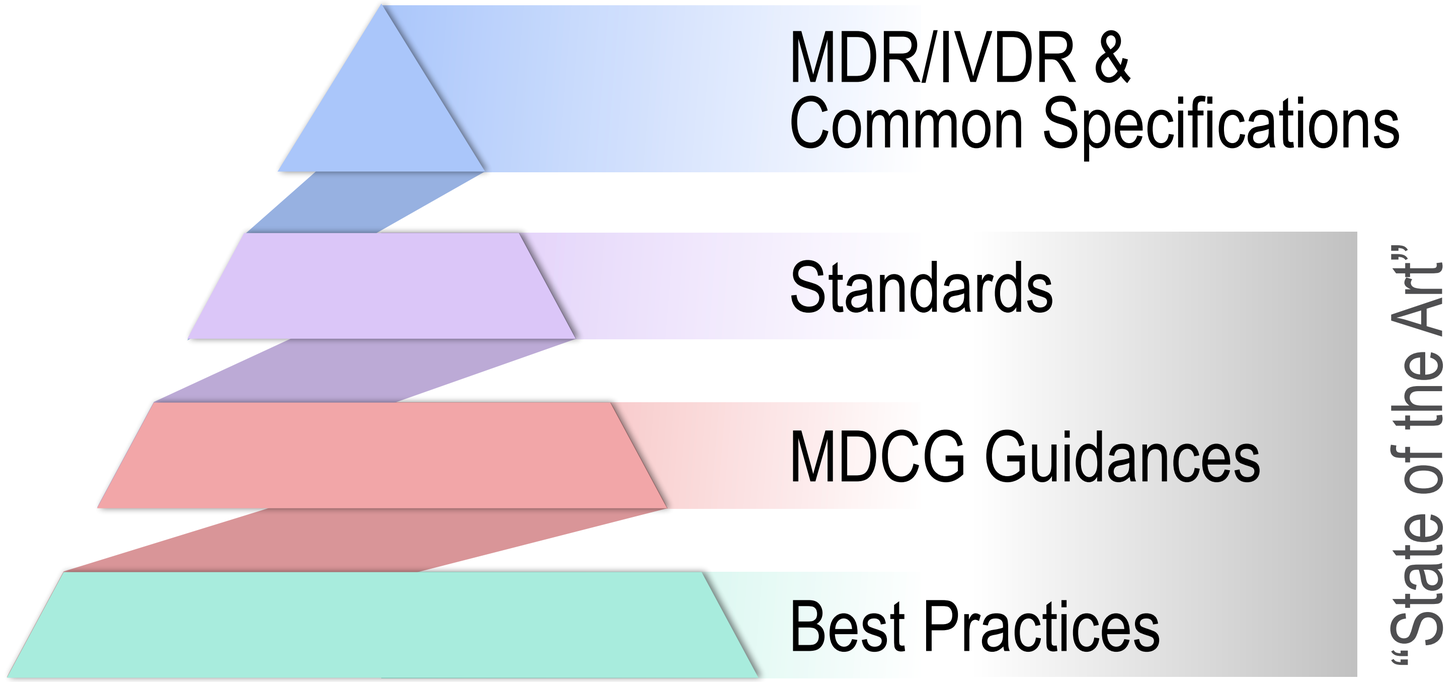
“We learn from history that we do not learn from history.”

Georg Hegel



In the Ideal World

this might be a good concept for all actors



Different Actors. Different Point of Views

how is state of the art perceived by each of these actors?

Regulated	Not regulated
EU Commission (MDCG*)	Patients
National authorities	Academic R&D
Notified bodies	Clinicians/Users
Manufacturers	Consultancy firms
Economic operators	(Public)

* MDCG = Medical Device Coordination Group of the EU Commission

What is State of the Art (SOTA)?

And why is a definition so difficult?

The SOTA Definition of SOTA

why is it so confusing?

No critical mass of harmonized standards available soon

Term is not defined

Term is confusing and inconsistently used *“newest SOTA”, “general acknowledged SOTA”, “current SOTA”*

The term is lost in translation

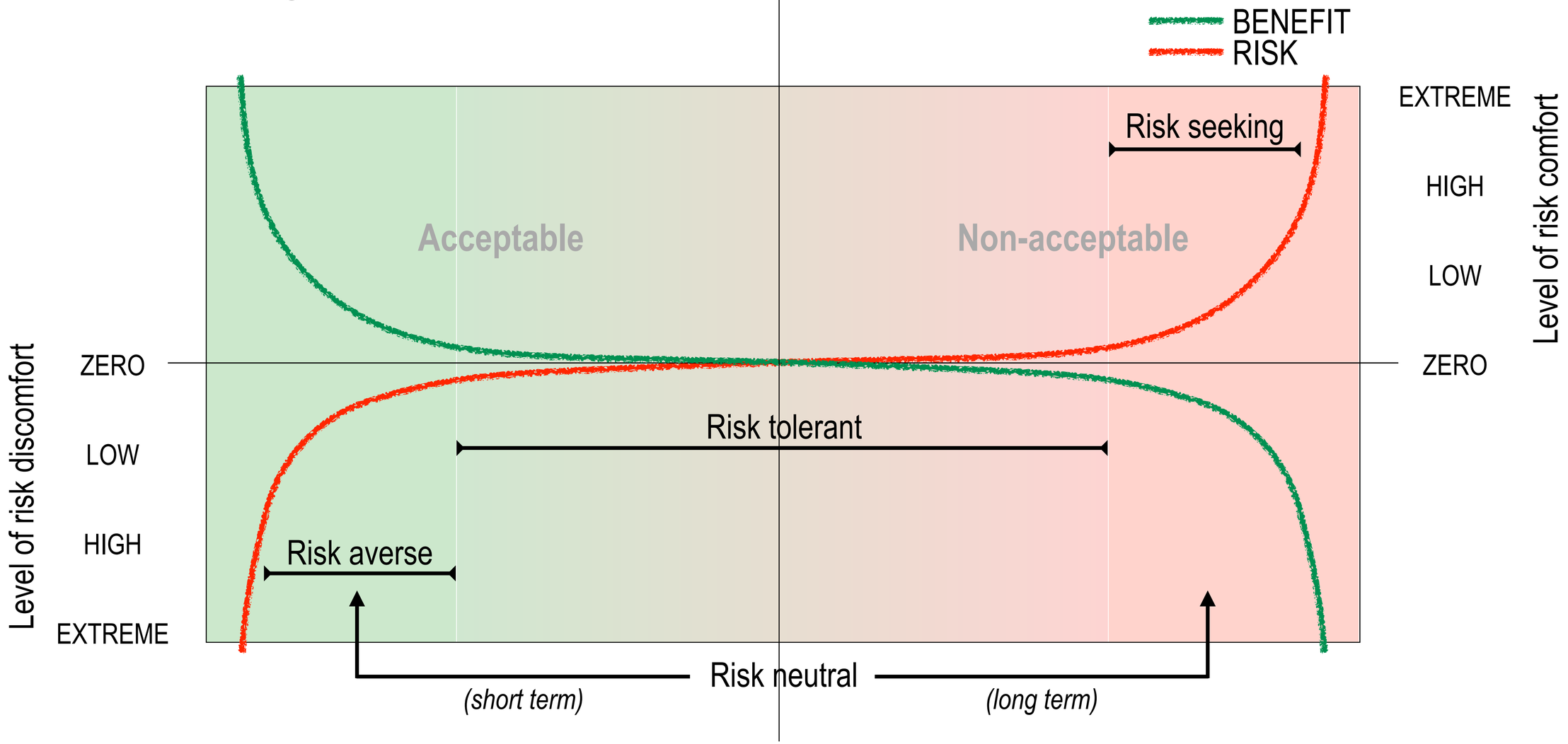
DE: “latest state of knowledge” and “latest state of medical knowledge” - EN: “state of the art”

Understanding of SOTA is different depending which actor is asked

Regulators: were fuzzy
MDCG: MDCG 2021-5 and MDCG 2020-6
Member States: appropriate knowledge and experience of relevant harmonised standards, CS and guidance documents
Notified bodies: cannot or pretend they’re not allowed to make a clear statement

SOTA and Risk acceptability

how does risk management relate to all of this?



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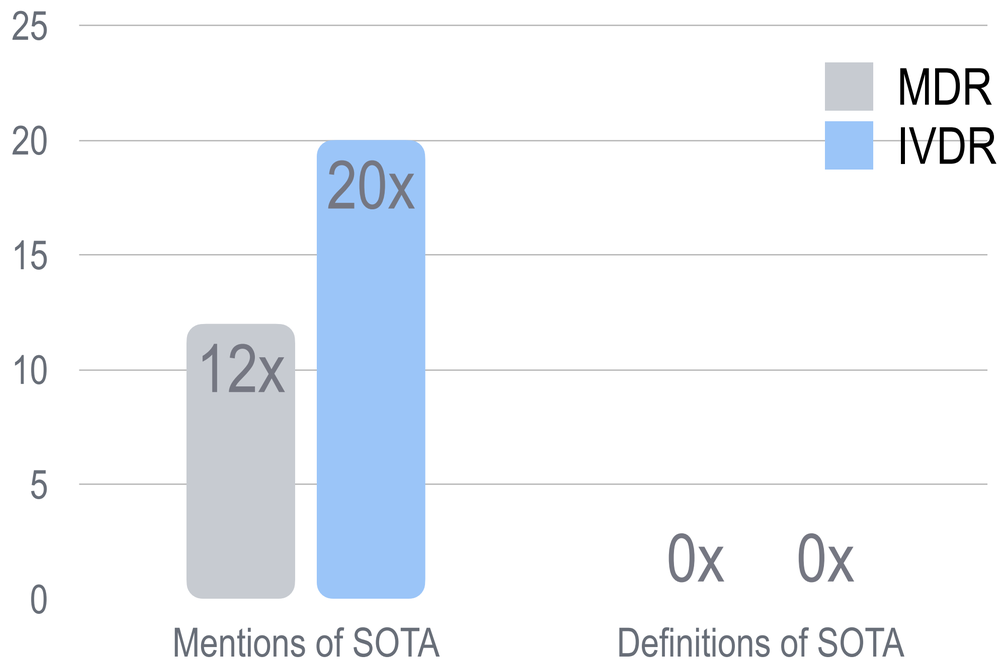
SOTA - What does MDR and IVDR say?

SOTA is mentioned 12 and 20 times in the text

There is no definition of State of the Art

There is no mention of Standard of Care



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ISO 14971:2019 - First Time Ever

A decent definition is given, but limited to “technical capabilities”

State of the Art: Developed stage of technical capability … as regards products, processes and services, based on the relevant consolidated findings of science, technology and experience.

Currently and generally accepted as good practice in technology and medicine.

Does not imply the most technologically advanced solution.

Source: ISO 14971:2019 Medical devices - Application of risk management to medical devices

SOTA - What does MDCG 2020-6 say?

1.2. Additional terms not defined in MDR Article 2 MDR/IVDR

‘state of the art’: IMDRF/GRRP WG/N47 provides the following definition: Developed stage of current technical capability and/or accepted clinical practice in regard to products, processes and patient management, based on the relevant consolidated findings of science, technology and experience.

Sources: MDCG 2020-6 Regulation (EU) 2017/745: Clinical evidence needed for medical devices previously CE marked under Directives 93/42/EEC or 90/385/EEC. A guide for manufacturers and notified bodies April 2020
IMDRF/GRRP WG/N47 (2018) Essential Principles of Safety and Performance of Medical Devices and IVD Medical Devices

SOTA - a Summary

So what does the regulation mean?

Oxford Dictionary	the most advanced, sophisticated, innovative version of a thing
MDR/IVDR	No definition. To comply with EU legal requirements, any medical device on the market must be considered “state-of-the-art.”
MDCG 2020-6	No definition, but refers to IMDRF definition. State-of-the-art does not necessarily imply the most technologically advanced solution; “generally acknowledged state of the art”
ISO 14971:2019	Developed stage of technical capability … based on the relevant consolidated findings of science, technology and experience; accepted as good practice in technology and medicine
IMDRF	Developed stage of current technical capability and/or accepted clinical practice in regard to products, processes, and patient management, based on the relevant consolidated findings of science, technology, and experience

SOTA - the tripple-A

according to common understanding

Acceptable

Accessible

Affordable

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WET*

MDCG 2020-6

SOTA

ISO 14971

Novel Technology

Start-up innovation

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* Well Established Technology: "...sutures, staples, dental fillings, dental braces, tooth crowns, screws, wedges, plates, wires, pins, clips or connectors for which the clinical evaluation is based on sufficient clinical data and is in compliance with the relevant product-specific CS (common specifications), where such a CS is available." Art. 61(6) MDR

WET

MDCG 2020-6

- relatively simple, common and stable designs with little evolution;
- has well-known safety and has not been associated with safety issues in the past;
- well-known clinical performance characteristics and
- are standard of care devices where there is little evolution in indications and the state of the art;
- a long history on the market

SOTA

ISO 14971

Novel Technology

Start-up innovation

EMA
scientific opinion

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What is Standard of Care (SOC)?

This is not equivalent to SOTA, but important for judging treatment alternatives

Standard of Care (SOC) Definition

acc. to National Institute of Cancer

Standard of Care: Treatment that is accepted by medical experts as a proper treatment for a certain type of disease and that is widely used by healthcare professionals. Also called best practice, standard medical care, and standard therapy.

SOC is never mentioned in the Regulation, but occurs repeatedly in MDCG 2020-6 without definition.

Source: definition website of the National Institute of Cancer

Standard of Care Differs with Geography

and is driven by demographical and socioeconomic differences

State of the Art & Clinical Benefit

are interrelated and simple to explain for therapeutic devices

Figure A.5.1
Adjusted patient survival by modality: Incident dialysis patients
from day 91, adjusted for age, sex, and primary renal disease

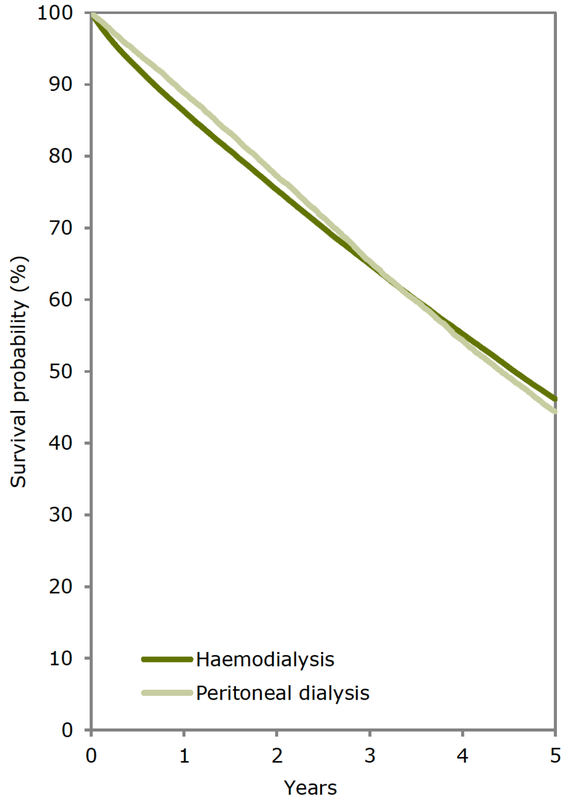


Figure A.5.2
Adjusted patient survival by donor type: Patients receiving a first kidney transplant
from day of transplant, adjusted for age, sex, and primary renal disease

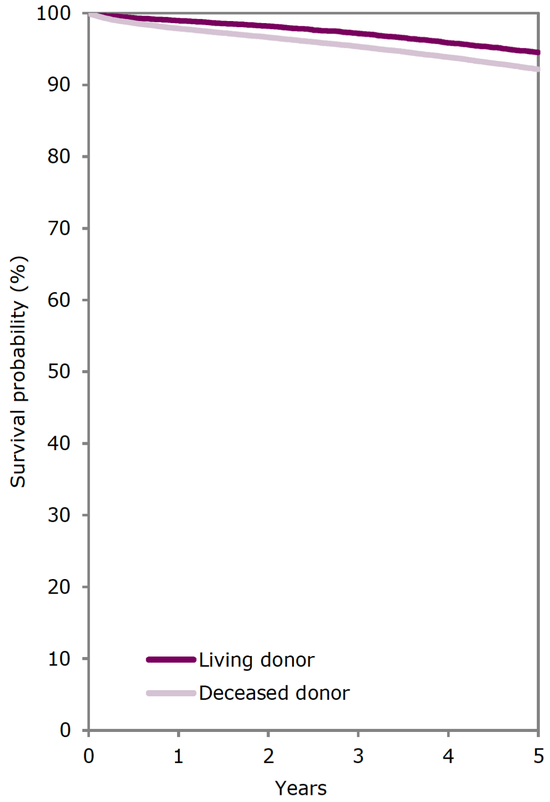
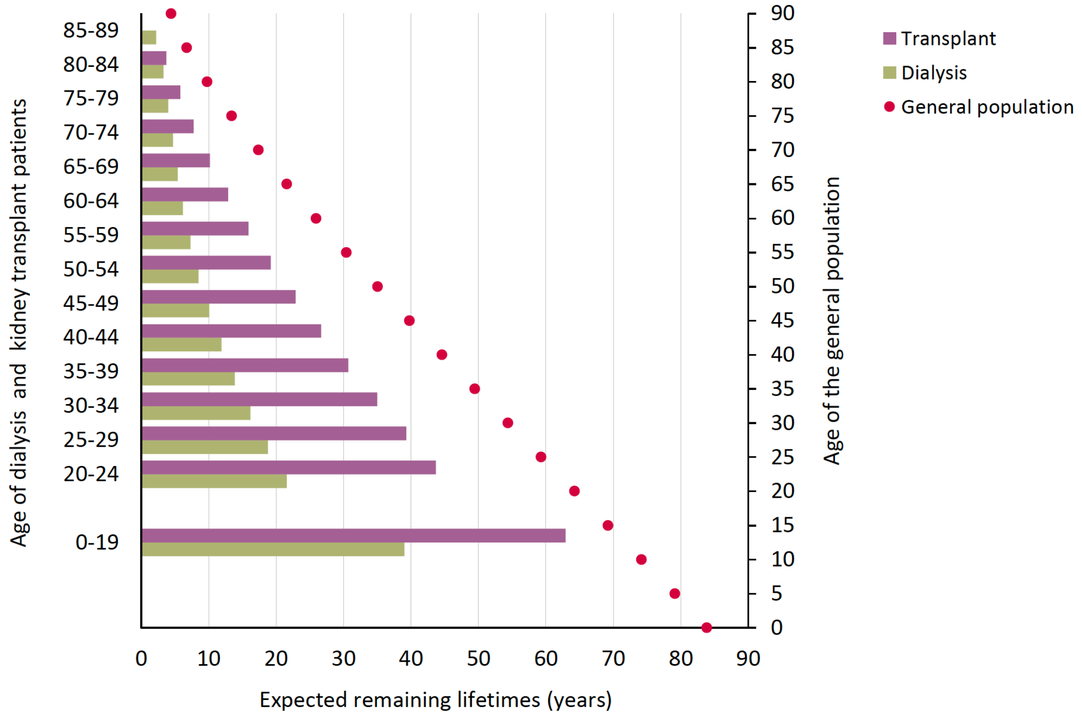


Figure A.6.1
Expected remaining lifetimes (years) of the general population (cohort 2013-2017) and of prevalent dialysis and kidney transplant patients (cohort 2013-2017)
by age and sex



Sourced from: European Renal Association - European Dialysis and Transplant Association (ERA-EDTA) Registry - Annual Report 2019; ISBN 978-90-830309-2-0

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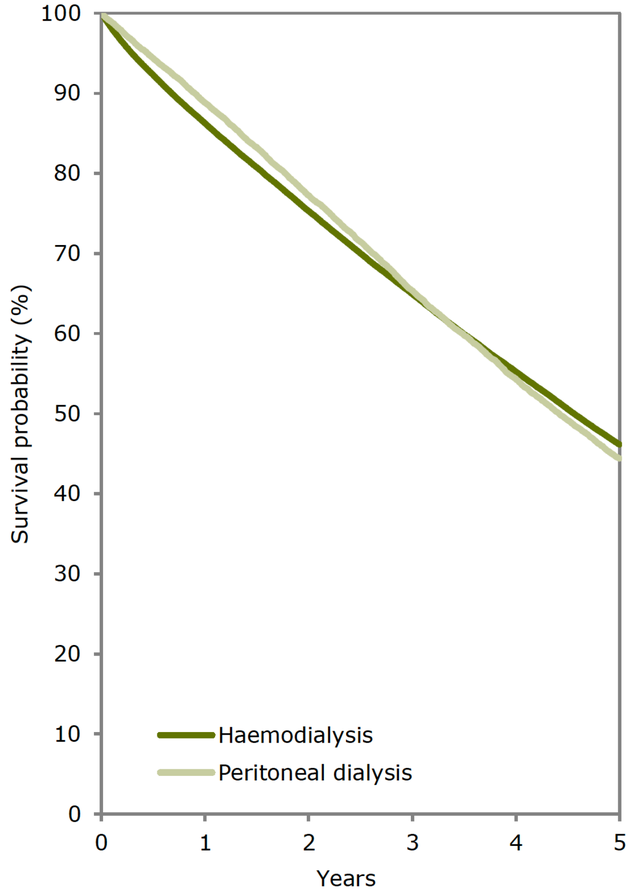
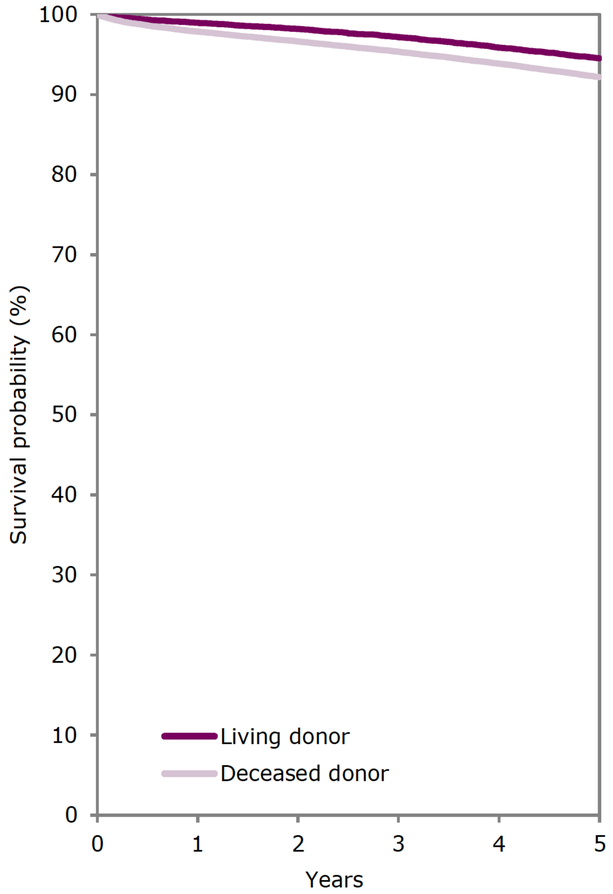
State of the Art Vs. Standard of Care

are interrelated and simple to explain for therapeutic devices

SOTA

According to MDR





SOC

According to Mayo Clinic & ERA-EDTA

Sourced from: European Renal Association - European Dialysis and Transplant Association (ERA-EDTA) Registry - Annual Report 2019; ISBN 978-90-830309-2-0

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1 Guidance documents

2 Harmonized standards

3 Common specifications

4 Expert panels

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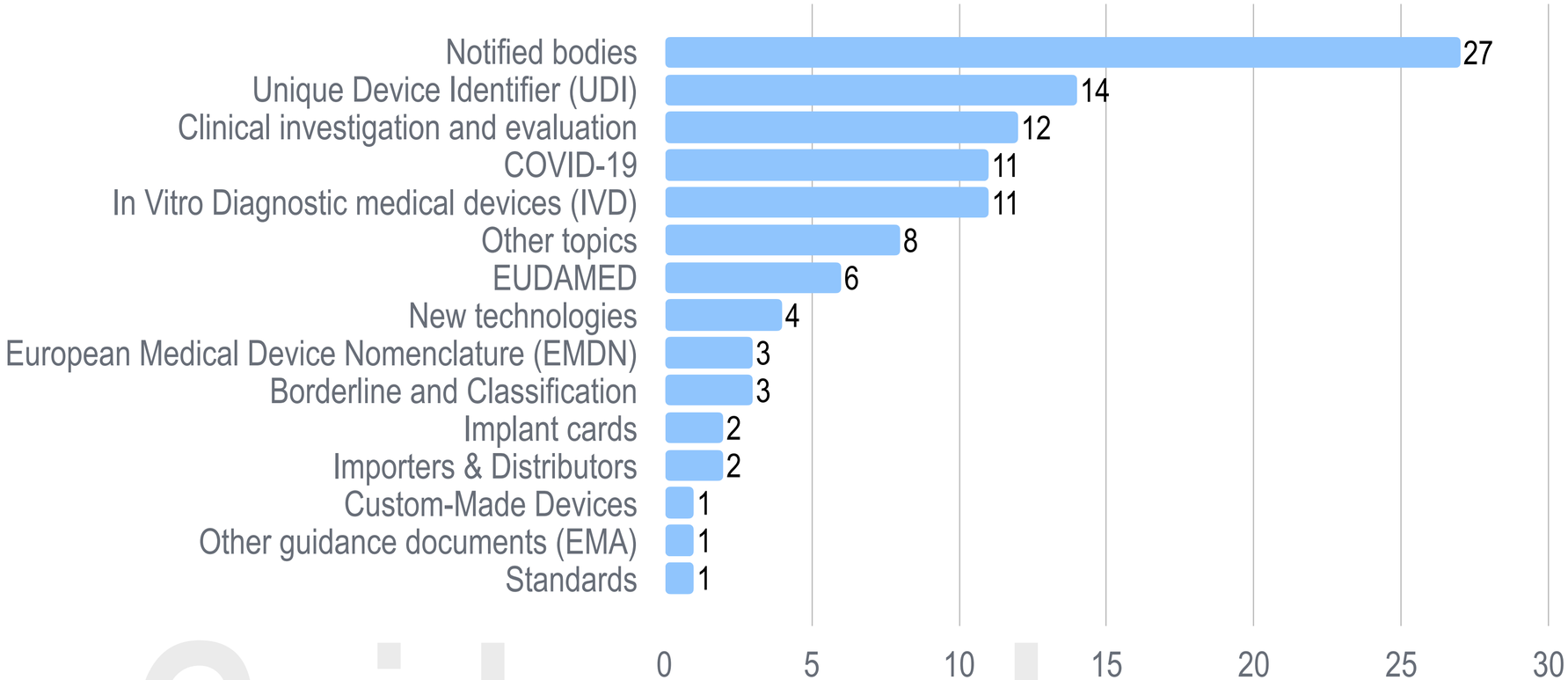
MDCG Guidance Documents

Non-conformities cannot be written up against guidances. Only against the Regulations.

Guidance documents

106 MDCG Guidance Documents

A non-significant analysis



Guidance documents

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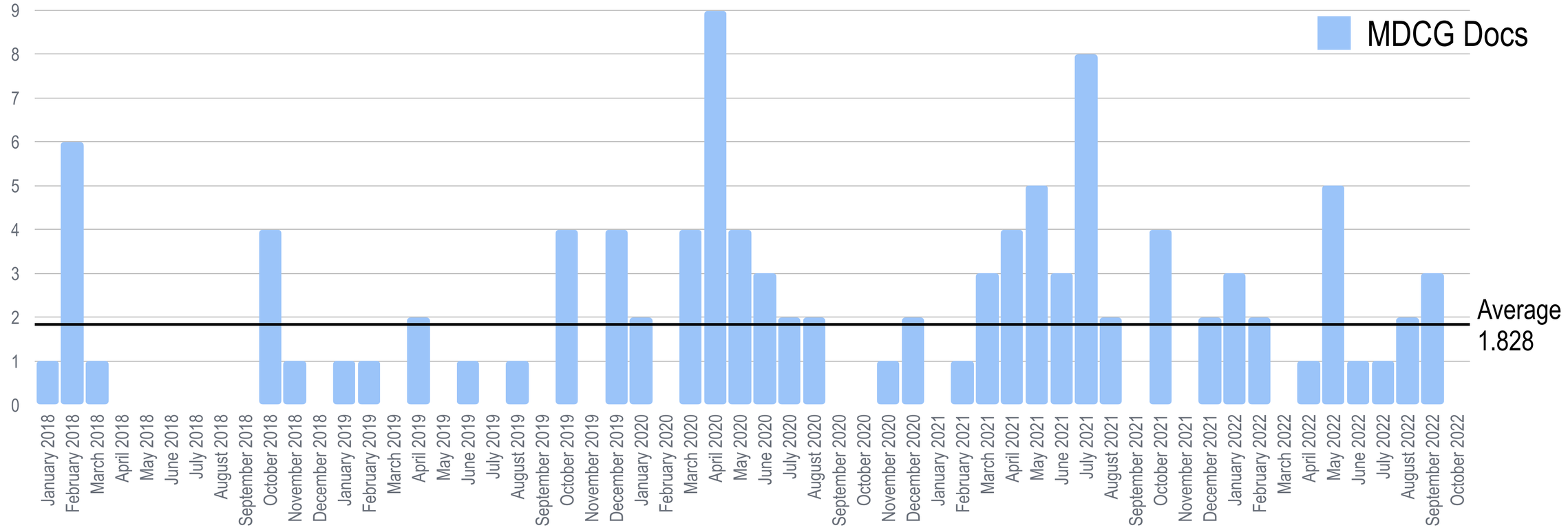
Timeline of Released MDCG Documents

output peaks are correlating with important dates



Guidance documents

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MDCG is Perpetually Interpreting the Regulation

And generating new “requirements”

Member States
Say YES

Lawyers
Say NO

Guidance documents

1 Disturbing and Rather Unlawful

the disclaimer on each MDCG document

September 2022

This document has been endorsed by the Medical Device Coordination Group (MDCG) established by Article 103 of Regulation (EU) 2017/745. The MDCG is composed of representatives of all Member States and it is chaired by a representative of the European Commission.

The document is not a European Commission document and it cannot be regarded as reflecting the official position of the European Commission. Any views expressed in this document are not legally binding and only the Court of Justice of the European Union can give binding interpretations of Union law.

Guidance documents

1 Many do not know…

cause and effect

"In April 2022, 75% of notified bodies indicated that more than 50% of the submitted applications were deemed incomplete"

Source: MDCG 2022-11 Position Paper Notice to manufacturers to ensure timely compliance with MDR requirements; June 2022

MDCG 2022-14

documenting a salvage program

Extension of transitional periods

Permission to sell the products even after the certificate has expired

Application of Article 97

Permission to market inconspicuous, “safe” products longer

"Conditional Certifications"

Introduce registers to assess the safety of legacy devices (rather than through (*de novo* clinical trials)

Quelle: MDCG 2022-14 Transition to the MDR and IVDR - Notified body capacity and availability of medical devices and IVDs; August 2022

A Guidance for the Guidances

a MedTech Europe Position Paper (industry is not sleeping)

1. Recognize that a guidance document is not legally binding and therefore does not need to be applied as if it were mandatory, but instead allows to adopt for use of duly justified solutions which ensure that the overall goal of the guidance document is respected.
2. Minimize the impact of any newly issued guidance document *during* conformity assessment by allowing it to be considered over time in a way that safeguards certification.
3. Avoid that any newly issued guidance document has a negative impact on devices *already* certified by only expecting its content to be first taken into account at the time of re-certification of such devices.

Source: MedTech Europe. Position Paper: Recommendations on the use of Guidance Documents Related to the Medical Device Regulation (MDR) and In vitro Diagnostics Regulation (IVDR) 28 June 2022

Harmonized Standards

We can live without them easily.

Harmonized standards

17 Harmonized Standards

A few from too many

Legislation reference	ESO	Reference number of the standard	Title of the standard	Date of start of presumption of conformity	OJ reference for publication in OJ
2017/745	CEN	EN 285:2015+A1:2021	Sterilization - Steam sterilizers - Large sterilizers	17/05/2022	OJ L 138 - 17/05/2022
2017/745	CEN	EN ISO 10993-12:2021	Biological evaluation of medical devices - Part 12: Sample preparation and reference materials (ISO 10993-12:2021)	05/01/2022	OJ L 1 - 05/01/2022
2017/745	CEN	EN ISO 10993-23:2021	Biological evaluation of medical devices - Part 23: Tests for irritation (ISO 10993-23:2021)	19/07/2021	OJ L 256 - 19/07/2021
2017/745	CEN	EN ISO 10993-9:2021	Biological evaluation of medical devices - Part 9: Framework for identification and quantification of potential degradation products (ISO 10993-9:2019)	05/01/2022	OJ L 1 - 05/01/2022
2017/745 2017/746	CEN	EN ISO 11135:2014, EN ISO 11135:2014/A1:2019	Sterilization of health-care products - Ethylene oxide - Requirements for the development, validation and routine control of a sterilization process for medical devices (ISO 11135:2014)	19/07/2021 20/07/2021	OJ L 256 - 19/07/2021 OJ L 258 - 20/07/2021
2017/745 2017/746	CEN	EN ISO 11137-1:2015, EN ISO 11137-1:2015/A2:2019	Sterilization of health care products - Radiation - Part 1: Requirements for development, validation and routine control of a sterilization process for medical devices (ISO 11137-1:2006, including Amd 1:2013)	19/07/2021 20/07/2021	OJ L 256 - 19/07/2021 OJ L 258 - 20/07/2021
2017/745 2017/746	CEN	EN ISO 11737-1:2018, EN ISO 11737-1:2018/A1:2021	Sterilization of health care products - Microbiological methods - Part 1: Determination of a population of microorganisms on products (ISO 11737-1:2018)	05/01/2022 07/01/2022	OJ L 1 - 05/01/2022 OJ L 4 - 07/01/2022
2017/745 2017/746	CEN	EN ISO 11737-2:2020	Sterilization of health care products - Microbiological methods - Part 2: Tests of sterility performed in the definition, validation and maintenance of a sterilization process (ISO 11737-2:2019)	19/07/2021 20/07/2021	OJ L 256 - 19/07/2021 OJ L 258 - 20/07/2021
2017/745 2017/746	CEN	EN ISO 13408-6:2021	Aseptic processing of health care products - Part 6: Isolator systems (ISO 13408-6:2021)	05/01/2022 07/01/2022	OJ L 1 - 05/01/2022 OJ L 4 - 07/01/2022
2017/745 2017/746	CEN	EN ISO 13485:2016, EN ISO 13485:2016/A11:2021, EN ISO 13485:2016/AC:2018	Medical devices - Quality management systems - Requirements for regulatory purposes (ISO 13485:2016)	17/05/2022 07/01/2022	OJ L 138 - 17/05/2022 OJ L 135 - 12/05/2022
2017/745	CEN	EN ISO 14160:2021	Sterilization of health care products - Liquid chemical sterilizing agents for single-use medical devices utilizing animal tissues and their derivatives - Requirements for characterization, development, validation and routine control of a sterilization process for medical devices (ISO 14160:2020)	05/01/2022	OJ L 1 - 05/01/2022
2017/745 2017/746	CEN	EN ISO 14971:2019, EN ISO 14971:2019/A11:2021	Medical devices - Application of risk management to medical devices (ISO 14971:2019)	17/05/2022 12/05/2022	OJ L 138 - 17/05/2022 OJ L 135 - 12/05/2022
2017/745 2017/746	CEN	EN ISO 15223-1:2021	Medical devices - Symbols to be used with information to be supplied by the manufacturer - Part 1: General requirements (ISO 15223-1:2021)	05/01/2022 07/01/2022	OJ L 1 - 05/01/2022 OJ L 4 - 07/01/2022
2017/746	CEN	EN ISO 17511:2021	In vitro diagnostic medical devices - Requirements for establishing metrological traceability of values assigned to calibrators, trueness control materials and human samples (ISO 17511:2020)	07/01/2022	OJ L 4 - 07/01/2022
2017/745	CEN	EN ISO 17664-1:2021	Processing of health care products - Information to be provided by the medical device manufacturer for the processing of medical devices - Part 1: Critical and semi-critical medical devices (ISO 17664-1:2021)	05/01/2022	OJ L 1 - 05/01/2022
2017/745 2017/746	CEN	EN ISO 25424:2019	Sterilization of health care products - Low temperature steam and formaldehyde - Requirements for development, validation and routine control of a sterilization process for medical devices (ISO 25424:2018)	19/07/2021 20/07/2021	OJ L 256 - 19/07/2021 OJ L 258 - 20/07/2021
2017/745	Cenelec	EN IEC 60601-2-83:2020, EN IEC 60601-2-83:2020/A11:2021	Medical electrical equipment - Part 2-83: Particular requirements for the basic safety and essential performance of home light therapy equipment	05/01/2022	OJ L 1 - 05/01/2022

MDR - 713 Standards, (CS) and Guidances

and this is what is considered “knowledge requirements”

	A	B	C	D	E	F	G
1	**Standard / Guidance Developing Organization**	**Standard Designation No. And Date**	**Standard/Guidance Title**	**Category**	**Specialty/Group Area**	**MDA/MDN**	**MDA/MDN subgroup (comment)**
693	EC	Regulation (EU) 2021/2282	EU Regulation on Health Technology Assessment and amending Directive 2011/24/EU	GEN	Clinical investigation and evaluation		
694	MDCG	SCHEER guidelines	Guidelines on the benefit-risk assessment of the presence of phthalates in certain medical devices covering phthalates which are carcinogenic, mutagenic, toxic to reproduction (CMR) or have endocrine-disrupting (ED) properties	SQ	Biocompatibility		Phthalates - Any code if direct patient or liquid pathway contact
695	ANSI/AAMI	ST67	Sterilisation of healthcare products. Requirements and guidance for selecting a sterility assurance level (SAL) for products labelled “sterile”		Sterility		Sterility assurance level
696	AAMI	TIR17: 2017	Compatibility Of Materials Subject To Sterilization	SQ	Sterility		
697	AAMI	TIR28: 2016	Product Adoption And Process Equivalence For Ethylene Oxide Sterilization	SQ	Sterility-EtO		
698	ANSI	UL2900-2-1	Software Cybersecurity For Network-Connectable Products, Part 2-1: Particular Requirements For Network Connectable Components Of Healthcare And Wellness Systems	DSP	Software (cybersecurity)	MDA 0315(PreClin)	
699	UN	UN_38.3	UN Recommendations on the Transport of Dangerous Goods (Specific see Section 38.3) [Lithium Batteries]	GEN	Dangerous goods (batteries)	MDA 02XX; MDA 03XX	If device is battery powered
700	SOTA	PI-14	Compression Test Hip Ball static/dynamic	DSP	Orthopedic implants	MDN 1102	Hip joint prostheses
701	SOTA	PI-3	Luxation test without stem-cup contact (accredited procedure)	DSP	Orthopedic implants	MDN 1102	Hip joint prostheses
702	SOTA	PI-11: 2010-08	Static/Dynamic Compressive Load Hip Insert	DSP	Orthopedic implants	MDN 1102	Hip joint prostheses
703	SOTA	PI-64	Total hip joint prostheses – 3D Frictional torque	DSP	Orthopedic implants	MDN 1102	Hip joint prostheses
704	SOTA	PI-52	Expulsion test – spinal implants (accredited procedure)	DSP	Orthopedic implants	MDN 1102	Spinal implants
705	SOTA	PI-76: (WK45142)	Standard Practice for Mechanical Characterization of Spinous Process Plates	DSP	Orthopedic implants	MDN 1102	Spinal implants
706	SOTA	PI-17	Determination of Total Knee Implant Contact Pressure	DSP	Orthopedic implants	MDN 1102	Total knee-joint prostheses
707	SOTA	PI-73: (WK51649)	Standard Test Method for Fatigue Testing of Total Knee Femoral Components under Closing Conditions	DSP	Orthopedic implants	MDN 1102	Total knee-joint prostheses
708	SOTA	PI-53	Fatigue testing of stemmed femoral TKA components	DSP	Orthopedic implants	MDN 1102	Total knee-joint prostheses
709	SOTA	PI-55	Femoral condyle fatigue test	DSP	Orthopedic implants	MDN 1102	Total knee-joint prostheses
710	MDCG		The CND nomenclature – Background and general principles	GEN	EUDAMED		
711	MDCG		The EMDN – The nomenclature of use in EUDAMED	GEN	EUDAMED		
712	MDCG		Helsinki Procedure 2021 - Exchange of information between medical device competent authorities on borderline and classification cases (version 23 June 2021)	GEN	Notified bodies		
713	MDCG	MDCG B&C and Background Note	Manual on borderline and classification for medical devices under Regulation (EU) 2017/745 on medical devices and Regulation (EU) 2017/746 on *in vitro* diagnostic medical devices	GEN	Classification and Borderline		
	MDCG	MDCG 2022-14	Transition to the MDR and IVDR - Notified body capacity and availability of medical devices and IVDs	GEN	Notified bodies		

713

Breakdown: 646 standards (16 harmonized); 6 EC documents (CR, CIR, Directives), and 61 MDCG applicable guidances

Standards

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2 Proficiency - an Interpretation

proficiency cannot be trained

1. Awareness of standards and guidances (coded as “A”) means the persons knows the standard and its scope. … has practical skills in working with the standard list and is able to filter the relevant standards and guidances to the topic to be assessed.
2. Overview of standards and guidances (coded as “O”) means basic knowledge of the scope and content of respective standards and guidances.
3. Proficiency in specific standards and guidances (coded with “P”) means first-hand experience in using the standards and/or guidances as part of work experience.

Sourced from: a CAB knowledge management SOP

Standards

2 Standards for a Hip Joint Prostheses

MDN 1102: Non-active osteo- and orthopedic implants

Type of document	No. of relevant documents
Non-harmonized standards	45-70
Harmonized standards	0
Common specifications	0
MDCG guidances	37*

* Applicable MDCG Documents: 1 C&B, 12 CIE, 5 EUDAMED, 3 EMDN, 2 implant cards, 4 other topics, and 10 UDI

Standards

Common Specifications (CS)

We need them desperately

Common specifications

Common Specifications

the holly grail that will solve all our problems

common specifications* (CS) means a set of technical and/or clinical requirements, other than a standard, that provides a means of complying with the legal obligations applicable to a device, process or system.

Sourced from: MDR Art. 2(71) and Art. 9.; IVDR Art 2(74), and Art. 9

Common Specifications - First in History

Finally some binding requirements for certain class D devices - July 4, 2022

5.7.2022 EN Official Journal of the European Union L 178/3

COMMISSION IMPLEMENTING REGULATION (EU) 2022/1107

of 4 July 2022

laying down common specifications for certain class D *in vitro* diagnostic medical devices in accordance with Regulation (EU) 2017/746 of the European Parliament and of the Council

Commission Implementing Regulation (EU) 2022/1107 contains 13 annexes.

Annex 1 lays down general common specifications as ‘Requirements for performance characteristics of devices’ presented in two parts

Annex 2-13 set out common specifications for specific types of IVDs, which are:

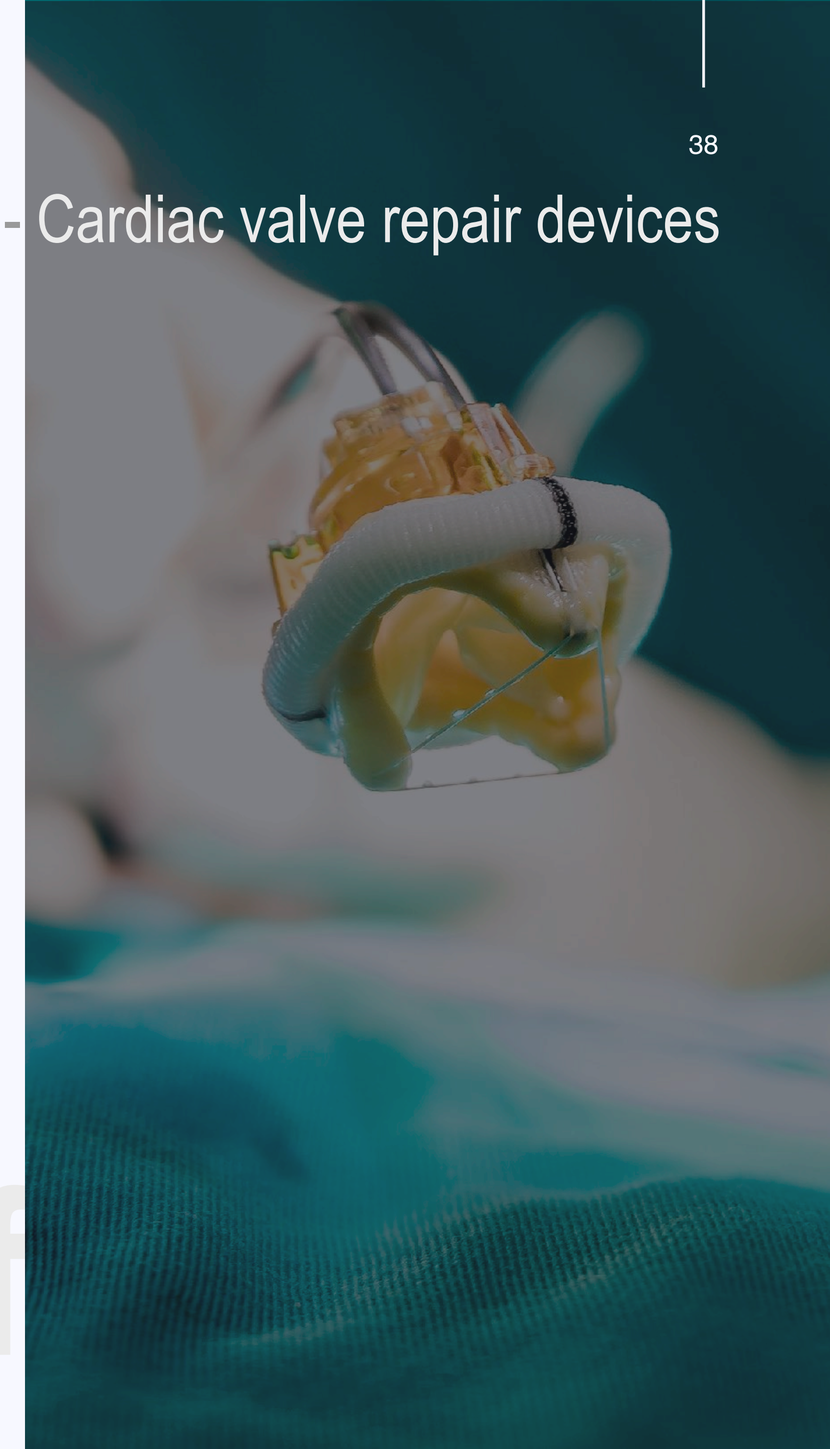
- blood group antigen detection devices for ABO, Rh, Kell, Duffy and Kidd blood group systems
- devices for detection or quantification of markers of human immunodeficiency virus (HIV), human T-cell lymphotropic virus (HTLV), hepatitis C virus (HCV), hepatitis B virus (HBV), hepatitis D virus (HDV), Creutzfeldt-Jakob disease (vCJD), cytomegalovirus (CMV), Epstein-Barr virus infection (EBV), Treponema pallidum, Trypanosoma cruzi, and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection.

Sourced from: Commission Implementing Regulation (EU) 2022/1107

A Few Devices Have “Unofficial” CS

ISO 5910:2018 Cardiovascular implants and extracorporeal systems - Cardiac valve repair devices

- describes the validation and verification of the design and manufacture of a heart valve repair system through risk management (derived from the risk assessment)
- also the requirements for preclinical in vivo evaluation and clinical testing of the finished heart valve repair system to assess safety and efficacy
- describes exactly the necessary size of the study population, the number of centers required and the years of follow-up (PMCF requirements)



MDCG. Or may be EMA?

Are we experiencing already a paradigm shift?

Expert panels

4 The Expert Panels

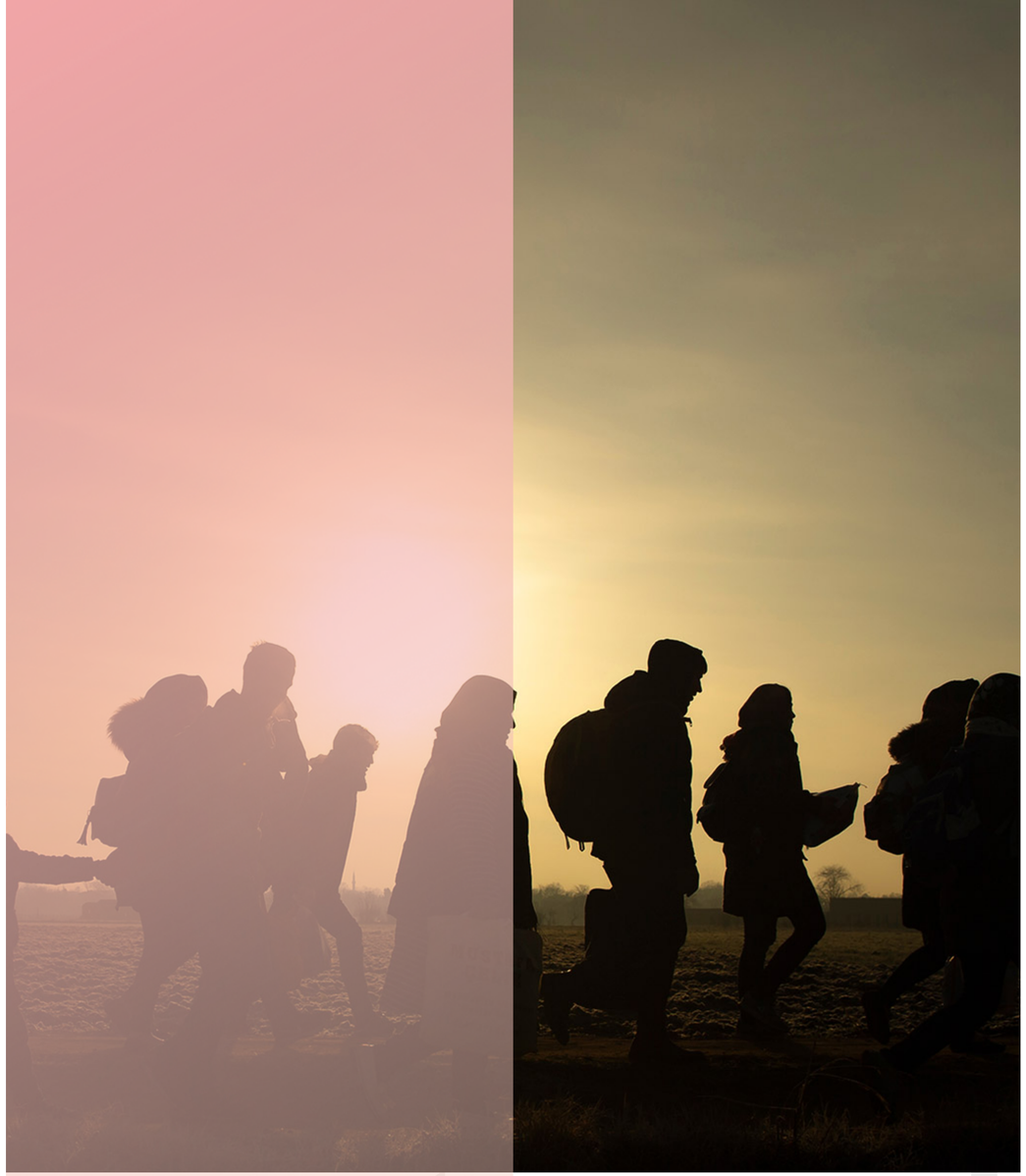
the refugees of the Regulations

WHAT: On 1 March, the Commission's expert panels (MDR/IVDR) has been handed over from the Commission's Joint Research Centre (JRC) to the European Medicines Agency (EMA).

HOW: The JRC had been entrusted by DG SANTE to establish the panels, define guidance documents, operational workflows and necessary IT tools as well as to launch their main advisory functions.

WHY: the extended mandate of EMA on crisis preparedness and management of medicinal products and medical devices (Regulation (EU) 2022/123)

EXPECTATION: a more integrated, coherent approach to the management of availability of medicinal products, medical devices and in vitro diagnostic medical devices at Union level, and of the scientific panels for medical devices.



Expert panels

Experts panels experts are authorities in their clinical area of specialization, required by law to provide a scientific opinion. They are not regulatory experts.

Art.106(12) “The Commission shall publish the scientific opinion and advice delivered in accordance with paragraphs 9 and 11 of this Article, ensuring consideration of aspects of confidentiality as set out in Article 109. The clinical evaluation guidance referred to in point (c) of paragraph 10 shall be published following consultation with the MDCG.“

The Expamed document 2021-000201_NB0483 from June 16, 2021 on a maxillofacial bone substitute released by the panel 6 (General and plastic surgery and dentistry) contains a reproducible confusion of the panelists between intended purpose and clinical indication for use.

Expert panels

State of the Art is not Well Established Technology (WET)

State of the Art and well-established technologies in MDCG 2020-6 and MEDDEV 2.7./1 rev. 4

Industry - Consultants - Medical Societies

circumventing Art. 61(8) on well established technologies?

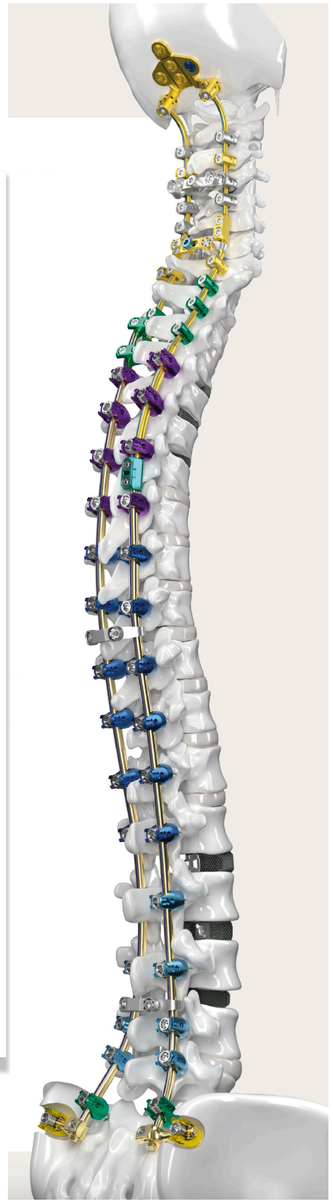
Clinical evidence requirements for spinal fusion devices: Action required to ensure essential devices are not removed from the EU Market

AD Smirthwaite[1], E Caton[2], RGHH Nelissen[3], D Nettles[1], A Sedrakyan[4], A Tarnaris[1], JK Tucker[4], RJP van der Wal[3], CLA Vleggeert-Lankamp[3]
[1] RQM+
[2] Orthopaedic Data Evaluation Panel
[3] Leiden University Medical Center
[4] Weill Cornell Medical College

Endorsement by the Presidential Line of EUROSPINE:

The EU MDR is intended to improve quality and transparency of data for medical devices placed on the EU market. However, due to limitations with respect to practical elements of data collection and interpretation, there is a risk that essential spinal devices which are both safe and effective will be unnecessarily removed from the market. We support the recommendations of this paper, which aims to ensure that essential devices remain available, whilst continuously monitoring patient care and safety.

C. Siepe (Secretary), E. Munting (Past President), M. Teli (Vice President), T. Blattert *(President) and* A. Alanay (President-elect) *on behalf of the Presidential Line of EUROSPINE*



Source: a non-peer-reviewed opinion shared on LinkedIn by a medical device consultancy firm

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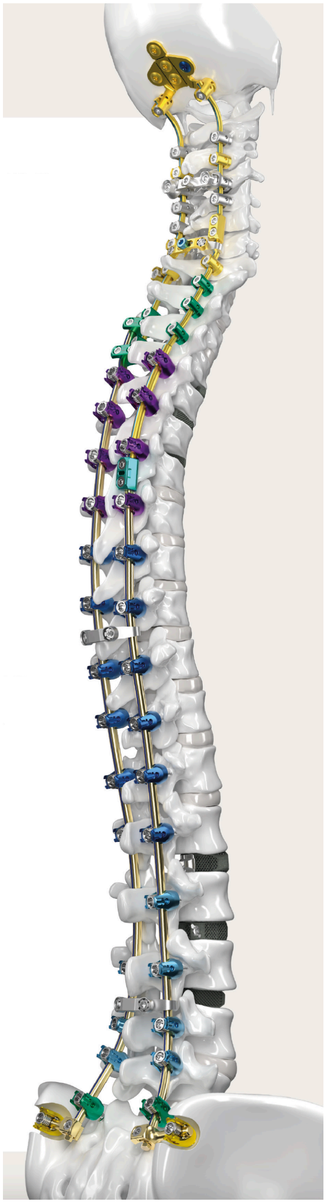
circumventing Art. 61(8) on well established technologies?



“sufficient clinical evidence” for initial certification should be based on a combination of design validation and proactive clinical data collection to demonstrate:

- lack of novelty via literature review and comparison of design features to similar well-established devices
- compliance with relevant material and testing standards
- no significant vigilance concerns or trends over the device history > 10 years
- availability of clinical evidence for similar devices, where needed, to address key safety, performance and clinical benefit outcomes
- proactive post-market data collection to support conclusions that expected clinical performance and benefit objectives can be achieved, and that there are no signals to suggest significant deviation from outcomes achievable with other SOTA devices with the same intended purpose
- appropriate PMCF plan to gather larger real world data sets over the lifetime of the devices, for example through proactive engagement with national registries.

EUROSPINE and the Network of Orthopaedic Registries of Europe (NORE) could work with the MDR Orthopaedic Expert Panel as the registries continue to gather data, to help further develop guidelines for expected clinical data sets per product type.

Source: a non-peer-reviewed opinion shared on LinkedIn by a medical device consultancy firm

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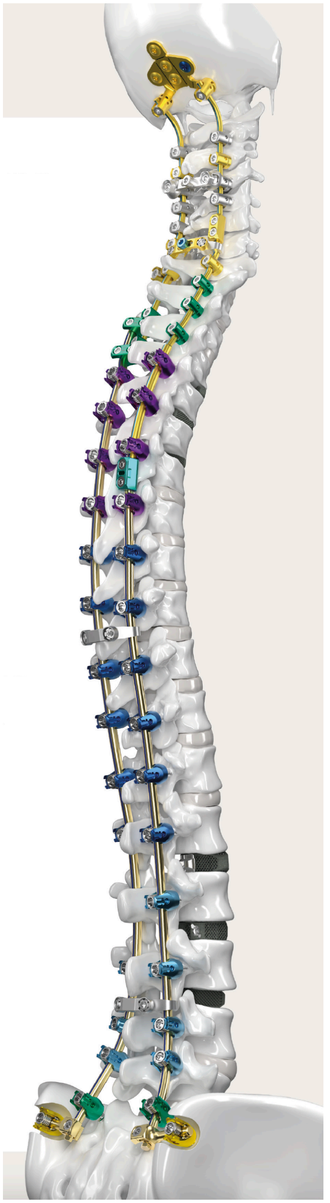
outcomes can be generalized with appropriate justification

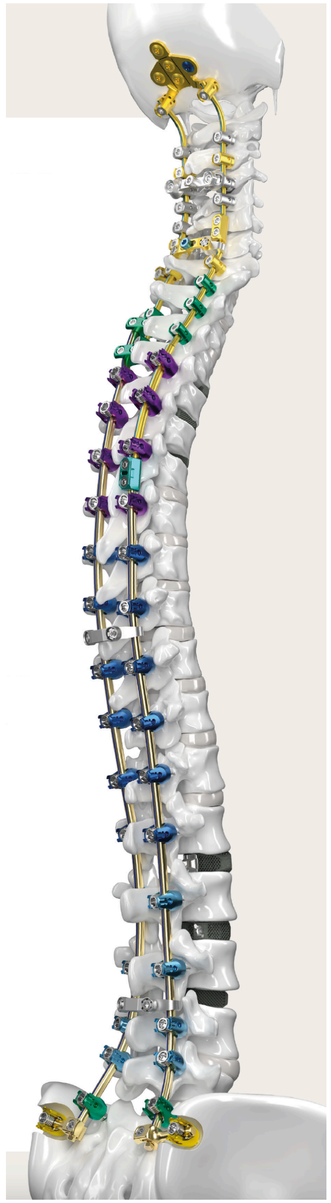


"It may be presumed that good outcomes can be generalised with appropriate justification for applicability of data (eg similarity of design and intended purpose). The latter is stressed even more since surgical indication and surgical technique are the major determinants of outcome (including failure)"

Source: a non-peer-reviewed opinion shared on LinkedIn by a medical device consultancy firm

Eurospine 2022 - 110 sponsors from industry

all is incredibly innovative, but WET



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A Hands-on Exercise

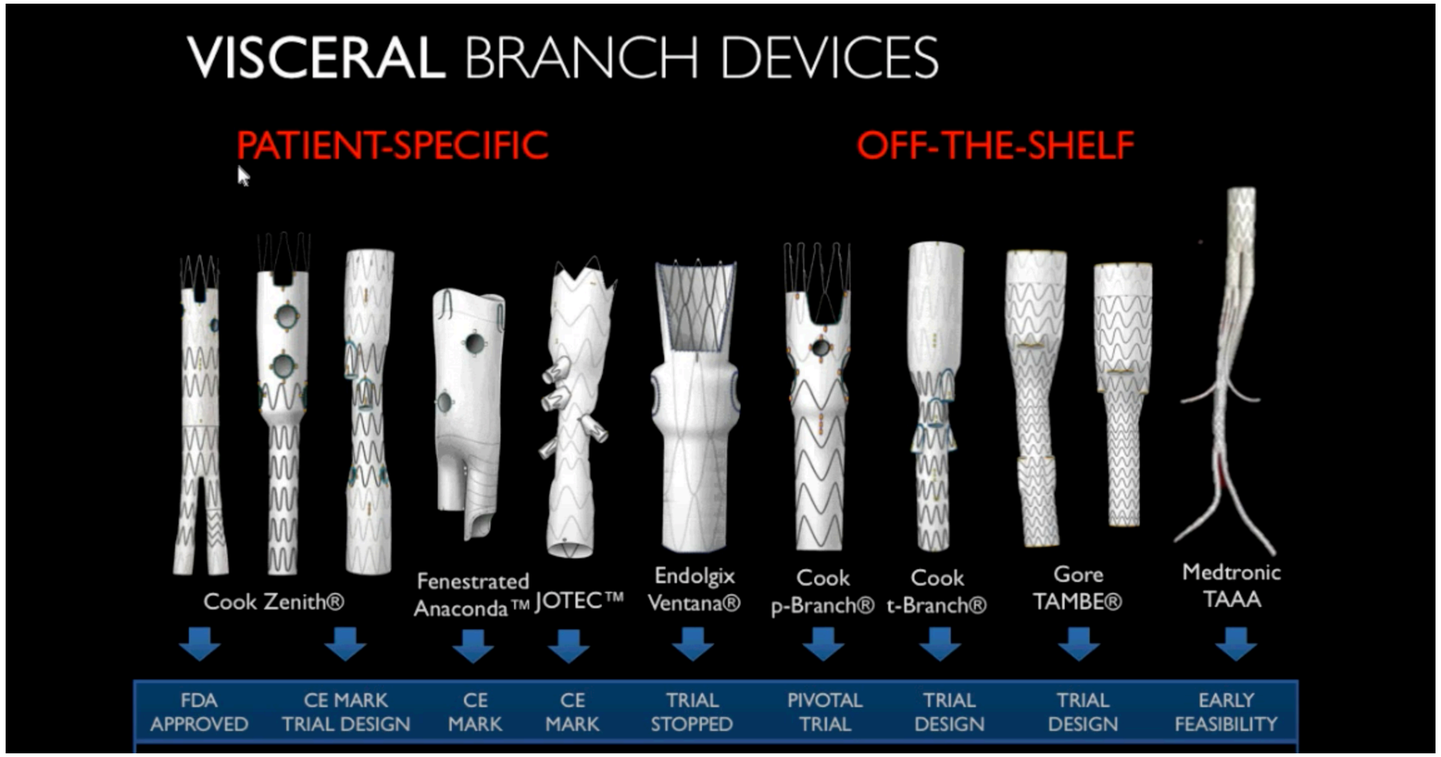
Let’s have a look to a practical example

Fenestrated endovascular aortic repair (FEVAR)

Let’s talk State of the Art and Standard of Care

A Hands-On Example

Visceral branch devices on the market (not MDS 1013)

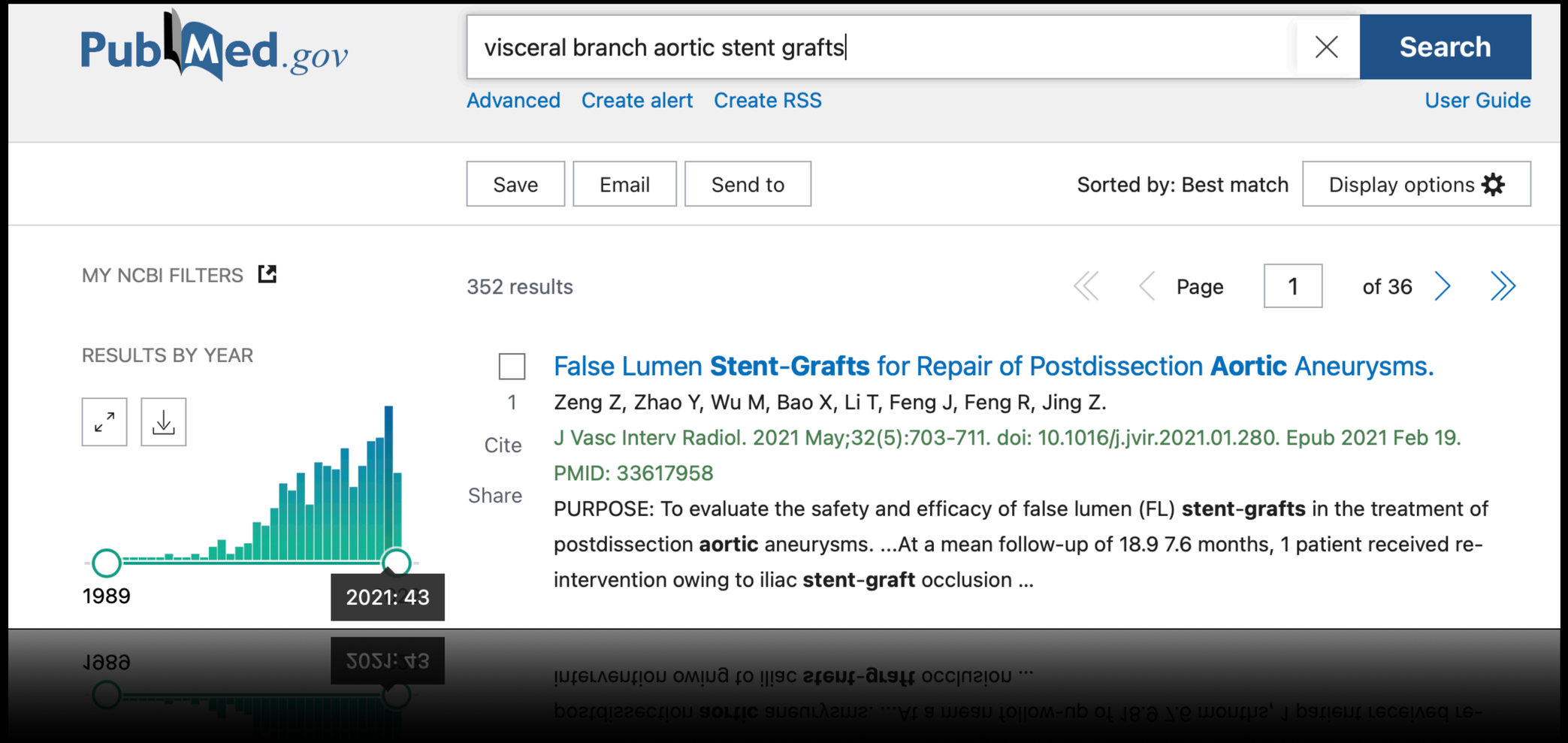


MDN 1101
MDN 1203
MDS 1005
MDS 1011
MDT 2001
MDT 2002
MDT 2003
MDT 2008
MDT 2011

Standards: 127 (9 of which are harmonized) and 37 applicable MDCG guidances
In addition also the clinical and risk management state of the art requires consideration

… and there is one more thing

clinical SOTA biases



This is how “State of the Art” looks like

You may use your mobile device to access!

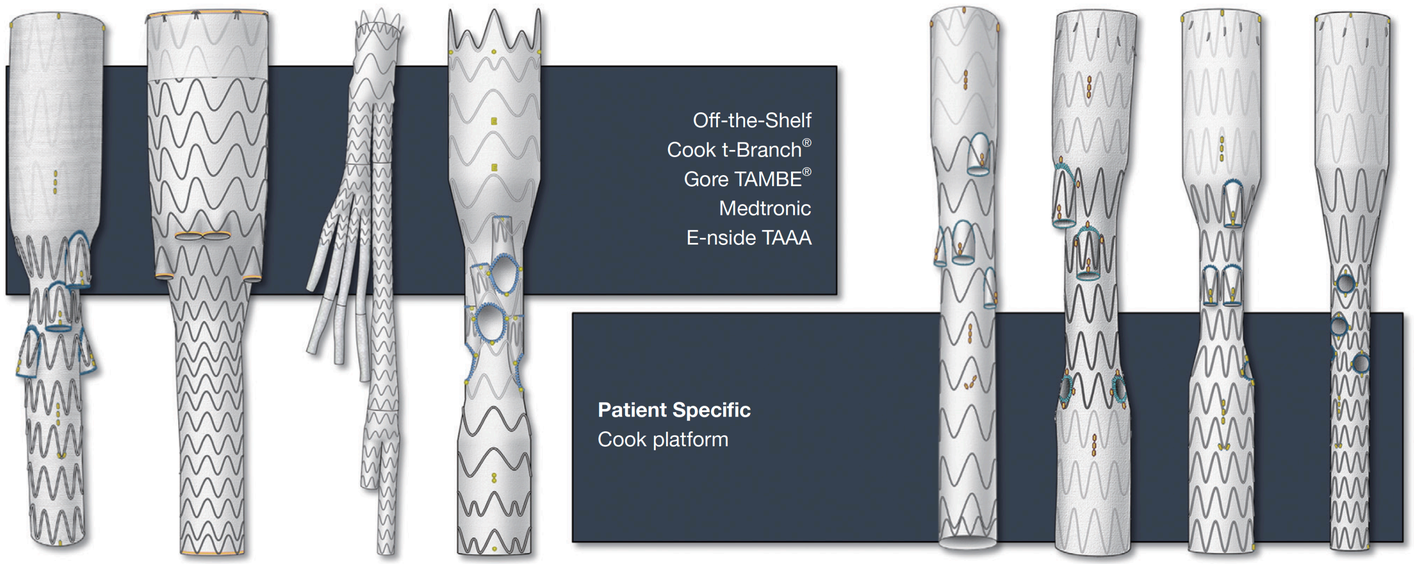


Figure 2 Illustrations of the current off-the-shelf devices and the patient-specific platform for endovascular thoracoabdominal aortic aneurysm repair.

Monitoring of SOTA is only functional if all actors (regulated or not) in this highly responsible processs talk together and listen to each other.

Source: Tenorio ER, Dias-Neto MF, Lima GBB, Estrera AL, Oderich GS. Endovascular repair for thoracoabdominal aortic aneurysms: current status and future challenges. Ann Cardiothorac Surg. 2021 Nov;10(6):744-767. doi: 10.21037/acs-2021-taes-24. PMID: 34926178; PMCID: PMC8640886.

So what to do?

the takeaway slide

Technology SOTA

Standards if possible harmonized
The most recent version of standard
One year grace time is acceptable
MDCG 2021-5

Clinical SOTA & SOC

SOTA literature analysis
Standard of care
Consensus papers
MDCG clinical guidances

Procedural SOTA

MDCG Regulatory Guidances
MDCG clinical-regulatory guidances

Risk management SOTA

ISO 14971:2019
ISO/TR 24971

WET

MDCG 2020-6
Cannot be established by manufactured
Only the regulator may add to the list

MDCG 2021-5 has an acceptable answer

a good guidance to start with

- the most recent published editions of standards should be considered as reflecting state of the art, regardless of whether they are referenced in the Official Journal.
- compliance with the most recent version of a standard does not automatically imply compliance with the requirements of the applicable EU legislation
- the use of standards is voluntary. Therefore, the use of a specific standard in the conformity assessment of a product cannot be imposed, not even based on “compliance with the state of the art”

Source: MDCG 2021-5 Guidance on standardisation for medical devices

Guidance documents

SOTA of your device is perpetually changing

So what would be SOTA for AI and machine learning in neural networks?

- The state of the art for a medical device/IVD is not a constant. Regulatory science is changing. Technology is advancing. Standard of care is changing. Risk acceptability is changing.
- Manufacturers are obliged to revisit the state of the art continually, usually at least annually. Manufacturers can fulfill this obligation as part of their post-market surveillance in well structured PMCF/PMPF programs.

Latest (good) news

Just released by the Team NB

- BPG Technical Documentation - Best Practice Guidance for the Submission of Technical Documentation under Annex II and III of Medical Device Regulation (EU) 2017/745 bodies

Link to document

“He was never driven by Apple’s stock price, but by the fundamental, violent believe that making the best products will take care of the rest. And he changed the world (and the stock price).”

Walter Isaacson, 2011

Source: Steve Jobs' "authorized" biography by Walter Isaacson, 2011

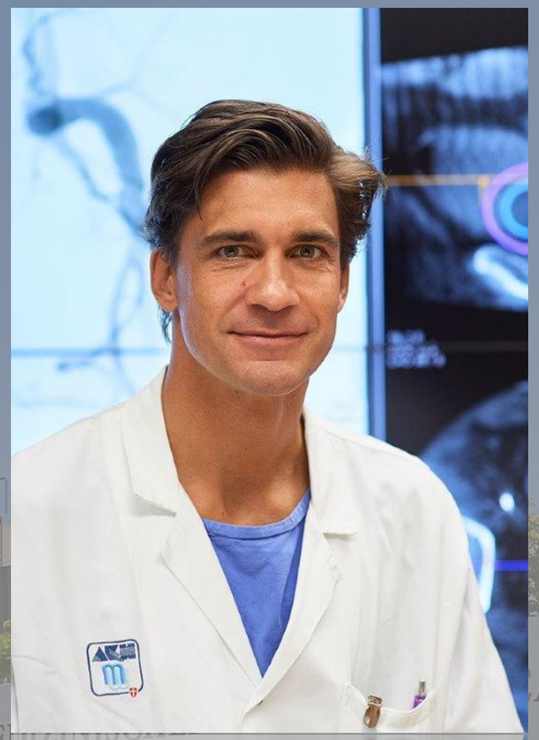
What would Steve Jobs say?

in reference to MDR and state of the art

“Most of us are searching for the holly grail of compliance with imperfection. Instead we should focus on certifying safe medical devices fast. And doing so we are incredibly compliant already”

Dedicated to a great EVAR Team in Vienna

And as Steve said “Technology alone is not enough. It’s technology married with the liberal arts, married with the humanities, that yields the results that makes our hearts sing.”



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