Australian Government

Department of Health

Therapeutic Goods Administration

Consultation: Proposed regulatory scheme for personalised medical devices, including 3D-printed devices

February 2019

TGA Health Safety Regulation

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Contents

Introduction

The Australian Government is undertaking a significant program of reform to the regulation of medicines and medical devices in Australia. As part of the Australian Government Department of Health, the Therapeutic Goods Administration (TGA) regulates these products, and is responsible for implementing the Government's reforms.

This consultation

The Therapeutic Goods Administration (TGA) is seeking feedback on how personalised medical devices are regulated in Australia. Consultation questions and information on how to make a submission are provided at How to submit on page 17.

> **The purpose of this paper**, which follows on from an earlier public consultation and public forums in 2017 and 2018, is to understand the impact that the proposed changes will have on the medical devices industry, health care professionals and patients.

The previous consultation undertaken in 2017 confirmed that the public supports the efforts to reform the current regulatory requirements for personalised medical devices, which were recognised as being too broad and no longer fit for purpose under the current provisions for custom-made medical devices. Two areas from the previous consultation required further clarification and are addressed in this paper.

1. The **definitions for personalised medical devices** that were proposed in 2017 were not well understood. These are replaced in this paper by the more clearly defined, and globally harmonised, definitions published at the end of 2018 by the International Medical Device Regulators Forum.
2. **The concept of a medical device production system** was introduced in the 2017 consultation. Submissions to the consultation had questions about this concept, and so it has been further clarified in this paper.

This document is focused on regulatory reforms for medical devices that are manufactured for particular patients and the impact of these reforms. These are devices that are currently captured under the *custom-made medical device definition*[1], and its corresponding exemption[2], as well as devices that are referred to in the definition of *manufacturer*[3] as devices already supplied but intended to be assembled or adapted to suit an individual. It does not cover the technical considerations for designing, manufacturing and testing such devices.

The term *personalised medical devices* includes 3D-printed medical devices manufactured for a particular patient, but it also applies to such devices manufactured through other methods.

[1] Therapeutic Goods (Medical Devices) Regulations 2002, Dictionary
[2] Therapeutic Goods (Medical Devices) Regulations 2002, Schedule 4, Item 1.5
[3] Therapeutic Goods Act 1989, s41BG(3)

Background

Over the past two decades, rapid advances in computing technology and materials science have driven exponential change in medical imaging technology, manufacturing technology, and (as a result) medical device technology.

The problem

Advancing technology such as 3D printing is allowing more complex and, in some cases, higher risk medical devices to be manufactured for an individual patient, and is also allowing point of care manufacture of these personalised medical devices.

Personalised medical devices are considered to be **custom-made medical devices** under the current regulatory framework.

Manufacturers and sponsors of custom-made medical devices are exempt from certain regulatory requirements such as inspections of manufacturers' premises and the requirement for third party certification of their devices' safety and performance.

The current regulations can result in some significant risks for patients receiving high risk custom-made devices such as permanent implants, as they do not have the same level of regulatory oversight as similar conventionally-manufactured devices.

Do the Regulations need to change?

The current provisions for custom-made medical devices were based on the premise that these devices would largely comprise low risk products such as glass eyes, prosthetic limbs, prescription lenses, etc. More recently custom-made devices encompassed small numbers of high risk devices when there were no other options to treat a patient. This assumption regarding risk classification and scale was accurate at the time the current custom-made medical device provisions were introduced, but the situation has evolved significantly in recent years.

Today, ever growing numbers of patients are receiving higher risk classification medical devices to meet particular needs, under custom-made medical device exemptions.

High risk implantable devices are generally manufactured under strictly controlled conditions and are subject to rigorous premarket testing and regulatory oversight to ensure that they comply with the essential principles for safety and performance. However, strict regulatory oversight does not apply to the majority of similarly high risk 3D-printed implants[4] in Australia, which are currently captured under the exemptions for custom-made medical devices.

It is proposed to introduce appropriate regulatory controls for this emerging field of personalised medical devices.

[4] It is important to note that, like conventionally manufactured mass-produced medical devices, 3D-printed mass-produced medical devices do not meet the definition of custom-made medical devices and are regulated under the existing risk-based framework.

Proposed regulatory amendments

Summary of proposed changes

The following changes to better regulate personalised medical devices are proposed for introduction. These changes were the subject of the 2017 consultation, and received solid stakeholder support:

1. introduce new definitions for personalised medical devices
2. change the requirements for supplying custom-made medical devices in Australia, so that additional information must be provided to the TGA and to patients and, to allow the TGA to inspect manufacturing sites
3. introduce a framework for regulating a medical device production system which will allow healthcare providers to produce lower risk personalised devices for treating their patients, without the need for manufacturing certification
4. update the classification rule for medical devices that record diagnostic images so that it includes any device for this purpose and not just X-rays, for example 3D-printed models of patient anatomy
5. regulate medical devices with a human origin component, for example a 3D-printed implant incorporating cells from the patient, as *medical devices with a biological component* rather than as pure *biologicals*, and
6. clarify that any modifications or adaptations to personalise a medical device that has already been supplied must have been intended by the original manufacturer of the device.

Details of proposed changes

1. Introduce new definitions for personalised medical devices

The consultation conducted at the end of 2017 proposed some new definitions for personalised medical devices. The responses to the consultation indicated that there was some confusion about these definitions. This was apparent in the requests for further explanation and for examples of the various definitions.

What would change?

We now propose to introduce new definitions for personalised medical devices which are internationally harmonised and have recently been published by the International Medical Device Regulators Forum (IMDRF)[5]. These definitions are similar to the ones proposed in the 2017 consultation; however, the IMDRF document contains more detailed descriptions as well as examples. It can be found on the IMDRF technical documents page and a direct link (pdf) can be found in footnote 5 below. The definitions and examples from this document have been reproduced in Attachment 1.

[5] http://imdrf.org/docs/imdrf/final/technical/imdrf-tech-181018-pmd-definitions-n49.pdf

What would this mean?

Adopting the IMDRF definitions will result in personalised medical devices being grouped into three categories:

- custom-made medical devices
- patient-matched medical devices, and
- adaptable medical devices.

Medical devices that fit the harmonised definition of custom-made, which is more detailed than the current Australian definition, will still be eligible for the exempt status, with limited regulatory oversight.

The patient-matched category of devices, which currently falls under the custom-made definition in Australia, will no longer be eligible for this exemption, and instead will require third party regulatory oversight according to the device risk classification.

The regulation of adaptable medical devices will not change. The definition is new and formalising it will help to ensure clear understanding of which devices are in this category.

2. Change the requirements for supplying custom-made medical devices in Australia, so that additional information must be provided to the TGA and to patients and, to allow the TGA to inspect manufacturing sites

At present, for custom-made devices supplied in Australia, the regulations require a manufacturer in Australia or a sponsor of a manufacturer overseas to notify the TGA of the specific kind of custom-made device they are supplying. This is a one-time notification for the category of the device, not an individual notification every time one is supplied.

In addition, the manufacturer of a custom-made device must prepare a written statement about the device, including whether or not it complies with the essential principles. The regulations only require the manufacturer to keep this statement; under the current requirements in Europe the manufacturer or an authorised representative must also provide this information to the patient.

There is currently no requirement for any third party assessment of custom-made devices or of their manufacture. The TGA may request information about the devices, however, the legislation does not provide the TGA with the power to enter and inspect manufacturing sites for custom-made devices. Additionally, in Australia the manufacturer is only required to keep documentation about a custom-made device for five (5) years after supplying the device. We consider this to be an inadequate period of time for an implantable device due to its long expected lifetime; in other jurisdictions, such as Europe, this period is specified as fifteen (15) years.

What would change?

It is **proposed to change the regulatory requirements for custom-made devices** to require:

- that the manufacturer's statement about a custom-made device is provided to the patient receiving the device
- that the TGA be allowed to enter and inspect custom-made device manufacturing sites, in accordance with the authority it has to inspect all other medical device manufacturers
- that a manufacturer in Australia, or a sponsor of an overseas-manufactured custom-made device, provides an annual report to the TGA of the custom-made devices it has supplied, and

- that documentation about an implantable custom-made device is retained for a minimum period of fifteen (15) years; as the current specification of a five (5)-year retention period is considered inadequate.

What would this mean?

These changes would result in greater transparency for patients receiving custom-made medical devices. Making the manufacturer's statement about the device available to a patient would assist with ensuring that the patient understood the custom-made nature of the device and may also improve the informed consent process. The other changes would provide greater transparency to the TGA about the manufacture and supply of custom-made medical devices in Australia, improving the TGA's ability to monitor quality, safety and performance of these devices.

Note

The conformity assessment procedure for custom-made medical devices will be further considered in the TGA's upcoming consultation on all conformity assessment procedures.

3. Introduce a framework for regulating medical device production systems which will allow healthcare providers to produce lower risk personalised devices for treating their patients, without the need for manufacturing certification

A *medical device production system* (MDPS) is a collection of the raw materials and main production equipment intended to be used by a healthcare provider, or healthcare facility, to produce a specific type of medical device at the point of care, for treating their patients. A MDPS includes the medical device it is intended to produce.

- The MDPS may require the use of ancillary equipment or other specified input, however, all components must be validated as a production process to consistently produce the intended medical device with the use of the supplied instructions.
- The MDPS is limited to low risk products only, this includes medical devices that are Class IIa and below.

What would change?

MDPSs, like other systems, would be considered to be medical devices and would be included in the ARTG. They would be classified and assessed according to the device they are intended to produce. The production equipment and consumable raw materials used in a MDPS would not be considered to be medical devices on their own, unless they fit the definition of medical device in their own right.

What would this mean?

Healthcare providers or healthcare facilities that use MDPSs to produce medical devices for treating their patients would not be considered as manufacturers under the regulatory framework in relation to those systems. This means healthcare providers would not need conformity assessment certification for manufacturing with a MDPS.

4. Update the classification rule for medical devices that record diagnostic images so that it includes any device for this purpose and not just X-rays, for example 3D-printed models of patient anatomy

Currently, there is a special classification rule (Schedule 2, Item 5.4) that states:

> ***5.4 Non active medical devices intended to record X-ray diagnostic images***
>
> *A non-active medical device that is intended by the manufacturer to be used to record X-ray diagnostic images is classified as Class IIa.*

Due to changing technology for patient imaging, and the advent of medical device 3D printing, we believe that this rule should be updated. Anatomical models that are manufactured by 3D printing of a patient's digital images for consideration by a specialist in diagnosing a condition or planning a surgery are also medical devices that are used to record diagnostic images (but not necessarily from an X-ray source). It is reasonable to think that these anatomical models should require the same regulatory oversight as X-rays, to mitigate the risk of inaccuracy and to ensure they are a true representation of the patient's anatomy of sufficient quality for their diagnostic purpose. Software that records patient diagnostic images should also be captured by this rule.

What would change?

It is proposed that the existing rule for X-ray film as Class IIa should be changed to the following:

> ***5.4 Medical devices intended to record diagnostic images***
>
> *A medical device that is intended by the manufacturer to be used to record diagnostic images is classified as Class IIa. This includes software and anatomical models intended for diagnosis or investigation of the anatomy.*

What would this mean?

Manufacturers of anatomical models would be required to hold appropriate conformity assessment evidence for a Class IIa device. This would not apply to manufacturers of models that are intended purely for training or education purposes, as these are not considered to be medical devices. It would apply only to manufacturers whose models are intended to be used for diagnosis or investigation of the anatomy. The requirement for conformity assessment evidence would not apply to hospitals or healthcare practitioners if they used a medical device production system to produce the anatomical models for treating their patients, and the medical device production system was included in the ARTG.

Manufacturers of software that is intended to be used to record patient imaging for diagnosis or investigation of the anatomy will be required to hold appropriate conformity assessment evidence for a Class IIa device.

5. Regulate medical devices with a human origin component, for example a 3D-printed implant incorporating cells from the patient, as medical devices with a biological component rather than as pure biologicals

3D 'bioprinting,' or printing of patient specific implants that incorporate human origin material, is increasing and likely to be on a commercial scale in the near future. Some jurisdictions, including Canada, Europe and the USA, regulate medical devices with human origin material as

medical devices. In contrast, the *Therapeutic Goods Act 1989* specifies that any product that comprises, contains or is derived from human cells or human tissues is a *biological* and is thus regulated through the biologicals framework. This arrangement is not ideal for 3D-printed implantable scaffolds with human materials, as they are analogous, from a design, engineering, production and assessment perspective, to current implantable scaffolds with incorporated medicine, or animal origin material and, which are regulated as medical devices. The current regulatory arrangements in Australia, means they are likely to be subject to different regulatory pathways in other jurisdictions.

What would change?

Medical devices that contain as a component, but that are not wholly comprised of, human origin material would not be regulated as biologicals; rather, they would be Class III medical devices with a biological component. Conformity assessment certification by the TGA, for these medical devices that contain a biological (human origin) component, would be required. Accordingly, the biological component would be required to meet all applicable regulatory requirements and a fee for the assessment of the biological component during the design examination process would be necessary.

This change would allow better alignment with other jurisdictions, such as Europe and Canada, which allow human material in medical devices, and would allow for the possibility of abridged assessment of the device components in accordance with current procedures. It is proposed that this change should apply to both viable and non-viable human origin components, because the TGA has the in-house expertise to evaluate both as a component of a medical device.

What would this mean?

This change would mean that a medical device incorporating materials of human origin would be regulated as a medical device and not as a biological, more closely aligning the Australian framework with those of other jurisdictions. The manufacturers of this new group of medical devices would be required to hold TGA conformity assessment certification. Manufacturers would also need to comply with relevant regulatory requirements, such as therapeutic goods orders for controlling infectious disease transmission, for the biological components of their devices.

6. Make it clear that any modifications or adaptations to personalise a medical device that has already been supplied must have been intended by the original manufacturer of the device

Under the current definition of manufacturer, a person is not the manufacturer of a medical device if the person assembles or adapts the device for an individual patient; the device has already been supplied by another person; and, the assembly or adaptation does not change the purpose intended for the device.

An example where this exclusion is currently applied is in dental resins for treating patients in the repair of teeth, where the resin material is included in the ARTG. We consider that the dentist assembles and/or adapts the resin material for an individual patient, as intended by the manufacturer of the resin in accordance with the instructions for mixing, forming, curing, etc. the resin. The dentist does not require conformity assessment certification for manufacturing a dental restoration; the regulatory obligations apply to the manufacturer and the sponsor of the resin material.

The assurance that the final assembled or adapted device will perform as intended comes from the validated instructions provided by the original manufacturer. This means the manufacturer will have tested the performance of samples of its device, when adapted or assembled according to its instructions. In the dental resin example, the original manufacturer makes certain

specifications for the use of its product, such as the mixing constituents, the mixing ratio, the type and size of defect to which the resin should be applied and how long it needs to cure. When the dentist follows these instructions, the dental restoration will perform as intended by the manufacturer of the resin.

The proposal is to clarify that any assembly or adaptation of a device under this provision should be in accordance with the validated instructions from the original manufacturer. This is because any modifications or adaptations outside of what has been specified by the original manufacturer may impact on the device's compliance with the essential principles and would add risk for health and safety. A person who does not follow the original manufacturer's instructions should therefore no longer receive the benefit of the exclusion from being considered a manufacturer and ought to assume all of the responsibilities of the manufacturer, including applying the appropriate conformity assessment procedure. The compliance and enforcement regime should also apply for noncompliance with those manufacturer's obligations

Clarifying this issue in the context of 3D-printed devices is important because there are now options for healthcare providers to 3D print medical devices. We do not consider that the same approach that is currently being applied to dental resin material in the ARTG ought to be applied to raw materials for 3D printing, in that, we do not believe it is sufficient to only regulate the raw material for a 3D printer to ensure that the final device will comply with the essential principles. This is because 3D printing involves more than assembling or adapting a device for a particular patient; it is a complex multifactorial process that has an impact on the finished device's compliance with the essential principles. Moreover, a 3D printing raw material, as with any other manufacturing raw material, is not a medical device as it is not directly used for treating or diagnosing a patient. Some additional clarification around these issues is therefore required.

What would change?

Additional text will be added to the regulatory framework to ensure that it is clear that a person will not be considered a manufacturer in circumstances where a medical device has been assembled or adapted for an individual patient and the assembly or adaptation is in accordance with validated instructions provided by the manufacturer of the relevant device. However, if an individual modifies or adapts a device which has already been placed on the market or put into service in such a way that compliance with the essential principles may be affected, that person shall assume the obligations incumbent on manufacturers and will be subject to the compliance and enforcement regime on that basis.

The need for the provision of validated instructions by the original manufacturer will also be reinforced.

What would this mean?

The effect of these changes will be to clarify the circumstances in which an entity holds responsibilities as a medical device manufacturer.

Benefits of the proposed regulatory changes

The proposed regulatory changes are intended to align with the objectives for regulating personalised medical devices, including 3D-printed devices, which are:

1. minimising public health and safety risks
2. maintaining consumer confidence in the regulation of medical devices
3. aligning, as far as possible, with international best practice, and

4. minimising unnecessary regulatory burden.

The proposed changes are expected to provide benefits to patients being treated with personalised medical devices and to healthcare providers who use personalised medical devices in their practices. The strengthening of regulation for personalised medical devices will ensure that an appropriate level of third party oversight is in place, which will minimise the risk of harm to patients. This will also give healthcare providers more assurance that the medical devices will perform as intended.

Additionally, the proposed changes are expected to provide benefits to the regulated industry sector. Some devices currently covered under the Australian custom-made exemption will require third party assessment to make them eligible for inclusion in the ARTG. This facilitates reimbursement processes for some devices and also provides a degree of public confidence in the products. The changes will also level the playing field for manufacturers by making the device categories and requirements clearer and more consistent. Manufacturers, particularly of patient-matched devices, who are already ensuring their devices comply with the essential principles for safety and performance, will not be unfairly competing against manufacturers who may be cutting corners in the absence of regulatory oversight.

Most of these changes will move the regulation of personalised medical devices in the direction of international alignment. For example, regulatory oversight or approval of patient-matched medical devices is already required in multiple jurisdictions including the USA and Canada. Australian manufacturers who are currently using the custom-made exemption for their patient-matched medical devices may find that complying with the new arrangements opens up additional markets for their products.

Finally, changing the Australian regulatory pathway for medical devices with human origin material, such as 3D-bioprinted devices will better align with other jurisdictions. This is expected to benefit manufacturers because it will reduce the regulatory burden of complying with the requirements of multiple jurisdictions.

Regulatory impact of the proposed changes

This paper is seeking to understand the impact of the proposed changes, and to gather feedback that will be used to guide the development of transition arrangements.

As part of the consideration of potential changes presented in this document, a regulatory impact assessment may be required. This will assist the government decision-making process for the proposal. Your input to this process will assist us with understanding the benefits and potential burdens of the proposed changes, and will help to ensure that the impact analysis is as accurate as possible.

Many new regulations or changes to existing regulations need to have the regulatory costs imposed on businesses, community organisations and individuals quantified. When quantifying the regulatory cost of the proposed amendments, the following compliance costs are included in its calculations:

- administrative costs – costs incurred by regulated entities primarily to demonstrate compliance with the regulation (usually record keeping and reporting costs); these may include:
  - time taken for sponsors/manufacturers to become aware of definition changes and decide if they need to make any changes

  - time taken by sponsors to educate/familiarise themselves with the conformity assessment procedure i.e. reading new information/guidance (this would be a one-off cost)
  - time taken by sponsors/manufacturers to complete the process.
- substantive compliance costs – costs incurred to deliver the regulated outcomes being sought (usually purchase and maintenance costs); these may include:
  - changes to record management systems that will be needed to demonstrate compliance
  - any equipment that will need to be purchased and maintained.

The approach used by Australian departments and agencies excludes the following costs from its calculations:

- direct financial costs i.e. fees and charges
- indirect costs i.e. changes in market structure and competition impact
- opportunity costs
- business-as-usual costs
- noncompliance and enforcement costs
- government to government costs.

Further information on the quantification of regulation is provided in the Australian Government's Regulatory Burden Measurement Framework Guidance Note.

When framing your feedback, it may be useful to consider the practical implications of the new requirements for your situation as well as for other stakeholders.

Custom-made medical devices

For manufacturers

Manufacturers of medical devices that meet the definition of a **custom-made medical device**[6] will be required to:

- submit an annual report to the TGA regarding the devices they have supplied in the preceding year (this can be through their sponsor if they are an overseas manufacturer)
- provide the statement about their devices to patients; maintain records for implantable devices for fifteen (15) instead of five (5) years, and
- allow the TGA to enter and inspect manufacturing sites. It is envisioned that such inspections will not be routinely held but will be risk-based according to the implications for health and safety.

For sponsors

Sponsors of medical devices that meet the definition of a custom-made medical device will be required to submit an annual report to the TGA.

[6] IMDRF Document - Definitions for Personalized Medical Devices – definition 4.2

Patient-matched medical devices

For manufacturers

Manufacturers of medical devices that meet the new definition for **patient-matched medical devices**[7] will be required to apply standard conformity assessment procedures (not the special procedure for custom-made devices) according to the classification of their medical devices. This means that for devices that are classified above Class I, conformity assessment evidence from a recognised third party (such as the TGA or a notified body) will be required. The manufacturer will be required to apply for this evidence and, once received, maintain its currency through complying with post-market requirements such as annual inspections by the issuing agency. These requirements are the same as those for mass-produced medical devices.

Australian manufacturers of patient-matched medical devices will also be required to include their medical devices in the ARTG and to comply with the requirements for maintaining the inclusion.

For sponsors

Sponsors of medical devices that meet the new definition for patient-matched medical devices will be required to include these medical devices in the ARTG, and to comply with the requirements for maintaining the inclusion.

Adaptable medical devices

For manufacturers

Manufacturers of medical devices that meet the new definition for **adaptable medical devices**[8] already apply the standard conformity assessment procedures (not the special procedure for custom-made) according to the classification of their medical devices because these types of devices are mass-produced. This means, that for devices that are classified above Class I, they already hold appropriate conformity assessment evidence.

The new requirements will specify that manufacturers of adaptable medical devices should supply validated instructions for their devices to be adapted, assembled or adjusted to suit a particular individual. This should already be the case and so the new requirements will be an express confirmation of the existing arrangements.

Australian manufacturers of adaptable medical devices will also be required to include their medical devices in the ARTG and to comply with the requirements for maintaining the inclusion. Again, this should already be the case.

For sponsors

Sponsors of imported medical devices that meet the new definition for adaptable medical devices are required to include these medical devices in the ARTG, and to comply with the requirements for maintaining the inclusion. There are already many examples of these kinds of medical devices included in the ARTG, so the new requirements should not represent a change for this group of stakeholders.

[7] IMDRF Document - Definitions for Personalized Medical Devices – definition 4.3
[8] IMDRF Document - Definitions for Personalized Medical Devices – definition 4.4

Medical Device Production Systems (MDPS)

For manufacturers

Manufacturers of systems that are intended to produce a medical device that is classified as Class IIa or below and to be used by a healthcare provider at the point of care (for example, a 3D printer, its associated raw material and specified inputs), will be required to hold conformity assessment evidence for the device to be produced based on the specified system.

Australian manufacturers of MDPSs will also be required to include their system in the ARTG and to comply with the requirements for maintaining the inclusion.

For sponsors

Sponsors of imported MDPSs will be required to include their system in the ARTG and to comply with the requirements for maintaining the inclusion.

For hospitals or healthcare providers who manufacture medical devices that do not fit the definition of custom-made medical device

Hospitals or healthcare providers who fit into this category will be required to hold appropriate conformity assessment certification according to the classification of the medical devices being manufactured. If the manufacturing is accomplished through the use of an MDPS that is included in the ARTG, then the hospital or healthcare provider is not required to hold conformity assessment certification.

Personalised medical devices intended to record diagnostic images

For manufacturers

Manufacturers of **devices that are intended to record diagnostic images** will be required to hold conformity assessment evidence for a Class IIa medical device. This includes the physical 3D representations of patient images that are often referred to as anatomical models.

Manufacturers of **anatomical models** that are only intended for teaching or training purposes are not required to hold conformity assessment evidence because these types of models do not fit the definition of a medical device. When the models are intended to be used for diagnosis or investigation of the anatomy, such as in planning surgeries, they are considered to be medical devices.

Australian manufacturers of **medical devices intended to record diagnostic images** will also be required to include their medical devices in the ARTG and to comply with the requirements for maintaining the inclusion.

For sponsors

Sponsors of medical devices intended to record diagnostic images will be required to include their medical devices in the ARTG and to comply with the requirements for maintaining the inclusion.

Consultation

Our formal engagement on this subject started at a targeted workshop for fifty invited participants including representatives from the medical device industry (both large and small organisations), hospitals, surgeons, researchers, patients and government in August 2017. The workshop outcome was consensus on the need to reform the current medical device regulatory frameworks for custom-made devices, especially high risk (permanently implantable) devices, enabled by 3D printing. In November 2017 we released a consultation paper - Proposed regulatory changes related to personalised and 3D printed medical devices. The consultation was available through the TGA website for a six week period and closed on 22 December 2017.

The paper proposed ways to address the increasing trend for personalised medical devices. While the regulatory changes were not limited to 3D-printed medical devices, 3D printing was one of the main themes, as this technology enables personalisation of medical devices in a fast and potentially upscalable manner.

Outcome of 2017 Consultation

The responses to the consultation paper showed broad stakeholder support for the proposed reforms and a strong awareness of the need for improvements to the regulation of personalised medical devices. Twenty-four submissions were received, from industry and industry representatives, healthcare practitioners and organisations, government, universities and consumer representatives.

The submissions indicated that there is still need for greater clarity in particular regarding the proposed definitions. The need for clarification was especially evident regarding the boundary between the proposed 'custom-made' and the proposed 'patient-specific' definitions and there were multiple requests for explanatory examples. There were also several submissions indicating uncertainty, and requesting further explanation of what exactly would be seen as a medical device production system.

2019 Consultation - What we invite you to do

In order to obtain additional feedback, we invite comments on the proposed options. Specifically, we are seeking your feedback on the suitability and potential impact that any proposed changes to the regulations will have on you or your organisation.

In your submission, we ask you to consider the questions below and to provide comments related to any other matters outlined in this consultation paper. Submissions must be relevant to the proposed changes for regulating personalised medical devices.

Questions

1. Do you support the proposal to change the way personalised medical devices are regulated? Why or why not? If you do not support the proposal, do you have any suggestions for an alternative that would be acceptable to you?
2. What do you consider to be the benefits and disadvantages of particular proposals for change?
3. Do you believe there will be any unintended consequences arising from the proposed changes?

4. What changes would you need to make (if any) to meet the new arrangements? If not, what are the impediments?
5. What financial impact (both costs and savings) would implementing the proposed amendments have for you? If possible please provide a breakdown of the impacts. This information will be used to quantify the financial impact to all affected stakeholders.
6. What period would be needed for your organisation to implement the proposed changes? This information will be used to inform any transitional arrangements.

How to submit

Complete the online consultation submission form to upload your submission in either pdf or word format.

You can also submit your feedback directly to the TGA by email at: devicereforms@tga.gov.au. If you do so, **please ensure your submission is accompanied by a cover sheet**.

This consultation closes on 31 March 2019.

Enquiries

If you have any questions relating to submissions please direct them to: devicereforms@tga.gov.au.

Attachment 1 – IMDRF Definitions (and examples) for personalised medical devices

The following is taken from IMDRF Final Document: Definitions for Personalized Medical Devices *(IMDRF PMD WG/N49 FINAL: 2018)*[9]

Definitions

Personalized medical device

A generic term to describe any of the types of medical devices that are intended for a particular individual, which could be either a custom-made, patient-matched, or adaptable medical device.

Custom-made medical device

A medical device that, at a minimum, meets the following requirements:

- it is intended for the sole use of a particular individual (which could be a patient or healthcare professional); and
- it is specifically made in accordance with a written request of an authorized professional, which gives, under their responsibility, specific design characteristics; even though the design may be developed in consultation with a manufacturer; and
- it is intended to address the specific anatomo-physiological features or pathological condition of the individual for whom it is intended.

Note 1: Medical devices that are patient-matched, adaptable or mass-produced shall not be considered to be custom-made.

Note 2: A custom made device is intended for a case where an individual's specific needs cannot be met, or cannot be met at the appropriate level of performance, by an alternative device available on the market.

Patient-matched medical device

A medical device that meets the following requirements:

- it is matched to a patient's anatomy within a specified design envelope using techniques such as scaling of the device based on anatomic references, or by using the full anatomic features from patient imaging; and
- it is typically produced in a batch through a process that is capable of being validated and reproduced; and
- it is designed and produced under the responsibility of a manufacturer even though the design may be developed in consultation with an authorized healthcare professional.

Note 1: A written request from an authorized healthcare professional may be present; but is not mandatory.

Note 2: The number and type of design inputs in consultation with a healthcare professional may vary depending on the medical devices to be manufactured.

Note 3: The design must remain within the validated parameters of the specified design envelope.

[9] http://imdrf.org/docs/imdrf/final/technical/imdrf-tech-181018-pmd-definitions-n49.pdf

Adaptable medical device

A medical device that meets the following requirements:

- it is mass-produced; and
- it is adapted, adjusted, assembled or shaped at the point of care, in accordance with the manufacturer's validated instructions, to suit an individual patient's specific anatomo-physiologic features prior to use.

Batch

One or more components or finished devices that are produced using the same lot of raw material, the same method of manufacture, having the same probability of chemical or microbial contamination, and that are intended to have uniform characteristics and quality within specified limits.

DICOM files

Patient imaging files, typically produced by computed tomography (CT) or magnetic resonance (MR), that are saved in the Digital Imaging and Communications in Medicine format.

Homogenous batch

A production group of equivalent parts or materials manufactured and/or tested in the same manner, without interruption, typically on the same day or in the same time period, and produced by the same person, or with the same machine/equipment set-up and fulfil the same specifications [Ref MEDDEV 2.5/6 Rev. 1 http://ec.europa.eu/DocsRoom/documents/10287/attachments/1/translations].

Mass-produced medical device

A medical device that is:

- based on standardized dimensions/designs;
- not designed for a particular individual; and
- typically produced in a continuous production run or homogenous batch.

Specific design characteristics

Unique design specifications, necessary to produce custom-made devices, that are based on an individual's specific anatomo-physiological features and/or pathological condition; and that cannot be proposed by a manufacturer without the involvement of a healthcare professional.

For example, transmitting only dimensions/geometric parameters (such as DICOM files from CT scans) to a manufacturer prior to the production of a medical device, is not sufficient to be considered as giving specific design characteristics. Additional information, such as the thickness and trajectory of a plate, the number, type and positions of fixation screws, would also need to be provided.

Specified design envelope

Minimum and maximum dimensions, mechanical performance limits, and other relevant factors, that characterize a medical device for production purposes, which may be based on a standard device template model.

Examples

Custom-made medical devices

- Artificial cervical disc replacement, requested by a spinal surgeon, for reconstruction of the cervical disc following cervical discectomy to treat cervical radiculopathy in a 7'2" male patient. In this example, the osseous dimensions of this patient's cervical spine exceed those which an available artificial cervical disc would accommodate; therefore the individual's specific needs cannot be met by an alternative device available on the market. The surgeon has provided, under his/her responsibility, unique design specifications that are based on the individual's specific anatomo-physiological features and pathological condition to the manufacturer.
- An acetabular cup implant requested by an orthopaedist who, in addition to DICOM-compliant scan images, sends to a 3D printing implant manufacturer specific requirements for acetabulum reconstruction by bridging the areas of acetabular bone loss. These include the thickness and trajectory of the cup mounting flange, and the number, type and positions of fixation screws. In this example these requirements are outside of the manufacturer's validated design envelope for this type of device. The required dimensions for bridging exceed those that have been validated under worst case parameters; and the number and location of screw holes are also beyond the limits modelled and/or tested.
- An endoscope with a modified steering mechanism requested by a gastroenterologist to address a loss in manual dexterity caused by a disability. In this example the individual's specific needs cannot be met by an alternative device available on the market. The relevant healthcare professional for the gastroenterologist provides under his/her responsibility shape and force design requirements to the endoscope manufacturer that address the special requirements related to the disability.

Patient-specific medical devices

- Acetabular guide designed to assist a surgeon with pre-operatively planned placement of the acetabular cup component of a total hip replacement. The guide is based upon CT images of a patient's specific anatomy and pre-operatively planned placement of the acetabular cup. The device manufacturing processes, as well as the pre-operative planning process upon which the design of the patient-specific guide is based, are validated within a certain range of anatomical parameters. In this example the guide is produced under the responsibility of the manufacturer in consultation with, and input from, the surgeon.
- Mandibular implants produced by a 3D printing manufacturer, from a template model and DICOM files. In this example the manufacturer provides software to the healthcare professional for the development of the 3D print file of the implant (based on the DICOM file from patient CT scans). The surgeon has received training from the manufacturer to use the software to tailor the 3D model for the patient within validated parameters. The manufacturer uses the 3D print file to produce, under its responsibility, the implant.
- An externally worn orthosis to shape the skull of an infant to prevent plagiocephaly, based on 3D external images of the patient's head. In this example the images are produced by a prosthetist and sent to a manufacturer. The manufacturer produces, under its responsibility, a patient specific helmet within validated parameters.

Adaptable medical devices

- Thoracolumbar pedicle screw system, which consists of multiple mass-produced components from a single manufacturer, that allows the surgeon to build an implant system, at the point of care, to fit the patient's anatomical and physiological requirements in accordance with validated instructions provided by the manufacturer. In this example the surgeon assembles a combination of hooks, screws, longitudinal members (e.g., plates, rods, plate/rod combinations), transverse or cross connectors, and interconnection mechanisms (e.g., rod-to-rod connectors, offset connectors). Additionally, longitudinal members require intraoperative contouring, in accordance with the manufacturer's validated instructions, in order to fit the individual patient's spinal curvature.
- Mass-produced polymer surgical implants for cranial reconstruction that are supplied sterile and are intended to be thermoformed during the surgical procedure. The manufacturer's validated instructions provide details for heating and shaping the implant to suit a patient's particular anatomy.
- Mandibular advancement orthosis for the treatment of sleep apnea, which is adapted to the dentition through thermoforming, and is adjusted by the patient in accordance with the manufacturer's validated instructions.

Version history

Version	Description of change	Author	Effective date
V1.0	Original publication	Medical Devices Branch, Therapeutic Goods Administration	February 2019

Therapeutic Goods Administration

PO Box 100 Woden ACT 2606 Australia
Email: info@tga.gov.au Phone: 1800 020 653 Fax: 02 6203 1605
https://www.tga.gov.au

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