Johner Institute

Recycling and Disposal of Medical Devices

With Prof. Dipl.-Phys. Werner Lorke, Prof. Dr. Christian Johner

Transcript

00:00:05 Speaker 1

Medical Device Insights, a podcast by the Johner Institute for medical device manufacturers, authorities and notified bodies.

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Many medical device regulations require manufacturers to consider the entire product life cycle.

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Here in the podcast we have so far mainly focused on

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took care of the questions of production, design and the downstream phase.

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Today we want to take a look at a completely different area, namely the phase of the end of the life cycles of these products.

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So, this is about questions about recycling and I have invited Professor Lorke, who has been dealing with this topic for some time.

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Mr. Lorke, could you briefly introduce yourself and tell our listeners,

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how you are already involved in the recycling of medical devices.

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Yes, thank you very much.

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Gladly, I'm happy to do it.

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Also thank you very much for the opportunity.

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our work of our IRED Institute.

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So we are explicitly dealing with the question of recycling and the design of products and especially for 5 years with medical devices, primarily disposable at first.

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Instruments, i.e. surgical instruments.

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And in cooperation with the IWKS Fraunhofer in Alzenau, we have extended this to the overall question of medical devices, what happens after their use.

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So, that's our focus and we've developed, for example, collection systems that can also be used in

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Germany, Austria and Switzerland, especially for contaminated instruments, in order to ensure that these materials are obtained while integrating hygiene and health protection on the one hand, but also avoiding them from being introduced into the waste stream.

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Yes, with that you have already opened the door to my next question, namely all the problems that arise in the

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context of recycling and disposal of medical devices.

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So, it's probably problems now that not only the manufacturers, but also the clinics have.

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Which of these problems are you currently observing in the context of medical devices?

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Well, of course, it is very important that the health protection of employees and hygiene regulations are also taken into account and complied with for patients.

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Hygiene

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Regulations also mean that explicit disposable instruments are increasingly used, i.e. not only surgical, but also endoscopic.

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This means that all the products that are temporarily introduced into the body should perhaps never have been in another body before.

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That is, this question

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resterilization and similar things often come into conflict with the stricter hygiene regulations.

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But these are not problems after all, they are also solutions to a certain extent by saying, yes, we can guarantee health protection and hygiene by using more disposable products.

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But are there also problems for the clinics with these disposable products or due to the fact that they are being given more and more importance?

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Yes, of course.

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So on the one hand, of course, you have increased amounts of waste that have to be disposed of, which also have to be disposed of according to the specifications.

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So here, too, appropriate hygiene regulations apply, which must be observed.

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There are costs associated with this.

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But there is also a second factor, that of course you have to use resources first.

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unused, so to speak, devalued, i.e. not used or reused to the extent that they actually correspond to the value that these materials or these materials have.

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And there is another one, let's call it a psychological factor, where there is a lack of discrimination on the part of the public, especially on the part of the employees, but

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There are certain concerns about simply throwing these medical devices, which are both visually and factually valuable, in the trash.

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What kind of materials are these that are thrown away, where you then have special concerns about not recovering them?

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Mhm, it's priority

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Metals that are also relatively easy to recycle and quite high-quality plastics.

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In the case of metals, it is mainly stainless steels, but also titanium or zirconium that are used there.

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And on the plastic side, there are silicones, high-density polyethylene, i.e. a high-density polyethylene.

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and P.T.F.E., i.e. what is commonly known under the term Teflon and that in itself, i.e. as new products, they are all extremely expensive and very important today that more and more electronic components are being added and they also contain very valuable raw materials, as you know from the discussion about mobile phones and things like that.

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Are the manufacturers allowed to do it just like that?

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Don't we have regulatory requirements in this context, which may even prohibit designing such products in such a way that they have to be thrown away?

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Yes, of course, there is exactly this conflict of goals in the regulatory area as well.

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So on the one hand there are the requirements of health and hygiene protection and on the other hand there is the Circular Economy Act, which

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of course, it stipulates that these things should be preserved, that they should be designed in such a way that they can be recycled, that they can be easily taken apart and that they are basically preserved with the great goal of a circular economy.

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But this conflict of goals is still dealt with in practice today, let's say, with the primacy of hygiene

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very clearly, namely one prefers to throw away or in fact then one defuses this hygienic situation by burning this waste.

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You have now talked about the requirements that are now more likely to affect manufacturers.

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Are there also requirements in the context of waste that are specifically aimed at hospitals?

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Of course, because the clinics act here as formally as waste producers and that means that it is up to them to choose the category under which this waste falls and must be disposed of.

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Of course, there is this big difference between hazardous and non-hazardous waste and

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For this waste, there is the so-called recommendation of the storage facilities, i.e. the State Working Group on Waste M18, which regulates the handling of waste from health care companies.

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And there is also a distinction between dangerous and harmless, i.e. infectiously contaminated, I'll say normally contaminated.

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On the one hand, there is of course the regulation, the technical regulations or guidelines for the handling of biological waste, i.e. TRBA 250, which is essentially oriented towards the protection of employees or has an eye on it.

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And then, of course, there is general health protection, which applies to this, for example, when this waste has to be transported.

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In other words, via public roads, i.e. coming into potential contact with the public or then in further processing.

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So in the case of recycling, the recyclers or disposal companies must also have certain certificates or certifications.

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This means that employees must be protected accordingly.

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So that's the way they are, so to speak, that the hospitals actually determine by assigning the waste key.

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Yes, this means that we already know which regulatory requirements will be imposed on medical device

manufacturers and which on hospitals.

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And you have already described that there is a conflict of goals, namely between hygiene on the one hand and the desire to be able to reuse raw materials on the other, and that this conflict of goals is usually due to the

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What ultimately happens to these substances, to these materials, to these products, what does the disposal company do with them?

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So the usual procedure, which is still common today, is that everything is subsumed under a waste key, in fact collected in a large trough, i.e. a steel trough, and then incinerated.

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That is,

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In Germany, the waste-to-energy plants or the like, so ultimately, what is usually called a waste incineration plant, is the final goal.

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There, these things are basically burned.

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Of course, metals do not burn and plastics do.

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P.T.F.E.

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doesn't really burn either and then it ends up as a residue in the slag, so-called rust slag.

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But of course, everything else that is incinerated in the waste incineration plant ends up there.

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And this means that these slags can only be recycled at the lowest material level, if at all.

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Very often they end up somewhere as an underlining of roads and similar things.

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So this slag is also partially disposed of, must be disposed of for a fee.

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So the recyclables are on a first-name basis, quite simply.

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Mhm.

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Yes, of course, that's exactly what you don't want.

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What would be your suggestion on how to resolve this conflict of goals between hygiene on the other hand and the reuse of these raw materials?

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What can manufacturers, for example, do in concrete terms?

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Of course, the manufacturers can ensure that the design of the components that are primarily hygienic

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are basically supposed to be very clean, so replaced by, if you will, individual components, but not the entire device.

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For example, if you have electronic components with you, there are power tools that you throw away completely, you can at best still pull the battery, but everything else ends up in the trash.

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or endoscopes, which could, for example, make the part that actually enters the body easily removable again and replace it with new ones.

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That's one thing and the other is actually something, what, what the, what the manufacturers or the waste producers can do.

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Of course, they can also ensure in a certain way that it does not end up in this general waste stream in the first place.

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This is generally the recycling approach that is also practiced outside hospitals.

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So, you can collect everything in the sense of the lowest common denominator or you can prevent it from getting into this general stream.

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And that's actually our answer.

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You have to take care of that and ultimately you have to develop other collection systems that allow you to

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and of course not an immensely large additional workload for the staff to make this separation.

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That sounds like the terms you already mentioned to me in the preliminary talk, the Design for Recycling and the Design for Reassembly, is that correct?

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Right, so not reassembly, but first disassembly and then reassembly again.

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Yes, so that is certainly clearly a key, where you don‘t have to wait until the end

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At the end of the life cycle, as you also said in the introduction, say: „Oh, what are we going to do with it now?“ But something in the sense, if you will, of an understanding of the cycle in advance.

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Already look, how do you actually have to design a product that you can use afterwards.

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Parts of it or as much of it as possible can be reused in the sense of the recycling of such products, which is declared to work technically well with metals and also works to a high percentage.

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Are manufacturers interested in it at all?

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One could perhaps maliciously insinuate that the more is thrown away, the more can be produced again.

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Are there any financial interests that they

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could motivate manufacturers to invest in this recycling or design for recycling, in this design for disassembly.

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Yes, those who see it differently from a business point of view, i.e. by saying, O.

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K., we, I'll put it exaggeratedly, we only rent or we only make our products available for one use and then get them back, of course we also offer the provider or the user in a correspondingly practicable way

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Possibilities of this this return, then of course you can, because you have already bought these raw materials for your product, you could of course reuse.

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And since you know your products very well yourself and there are no third-party products in them, you can of course calculate this quite well from a business point of view.

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But this requires a rethink

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in advance, that we get away from this linear concept and say that it makes much more sense that we don't have to buy materials that we have already bought again, even as a company, but also design our products in such a way that we can use them again.

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As we have just learned,

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So as a manufacturer, you can take 2 approaches, once via a redesign of the products and once via a redesign of the business models.

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Professor Lorge, what would you recommend to manufacturers now as very concrete next steps?

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So it is precisely in this sense that you first think about how far a concrete individual product is in your portfolio.

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must be redesigned or slightly modified so that this requirement or recycling is more successful and more successful of components.

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then, in the next step, to consider whether a perhaps somewhat standardized recycling system works for the entire portfolio that you offer, which, by the way, may also mean greater profitability for the manufacturer, because he also takes a look at the components that may appear together in different products in his portfolio and that can then be changed accordingly.

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or even reuse.

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And then as a third thing, that you might look a little beyond your own nose and also talk to the competition or your competitor and say, what are the solutions that only make sense financially, economically, if many people participate in them.

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And here

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In a way, it jumps over the shadow and says that we actually have to join forces here, because we serve a common market that also generates a certain waste stream together today, and we can only achieve this together and we as IRED and with our partner IWKS

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have both know-how and a certain amount of planning, actually very concrete.

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This means that in spring 2021, for example, we are doing a pilot project here in the Rhine-Main-Neckar area, where we want to test exactly what we want to test for the waste producers, i.e. solutions that are simple in terms of work processes, to see that there can be

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the products from all kinds of manufacturers are thrown in or placed, so to speak, are then also picked up and sorted by certified disposal companies to see whether, for example, such a platform approach is actually practicable.

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And that would also be something for someone who is interested in it as a medical device manufacturer or even as a clinic, where we would of course be happy if we could also offer appropriate

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would get inquiries or reactions, so to speak.

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Yes, I would even encourage the manufacturers to contact you.

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As always, we will link the contact details below in the descriptions, also the page of I.

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Rep, maybe also the site of the Fraunhofer.

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So the I.

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is the Fraunhofer Institute, which together with this I.

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Rep are working on this pilot project.

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And I think that's exactly the right approach, just the

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to expand the scope, from a single product to a complete product portfolio and then to many manufacturers, because it is also the common problems of our planet that we want to solve here.

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Professor, thank you very much for joining us.