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foot & shoe

THE INTERNATIONAL JOURNAL FOR FOOT ORTHOTICS

Diabetic Foot

German risk classification revised

Assistive Devices

Incorporating user practices into the design

ORTHOPÄDIE SCHUH TECHNIK 2025

The meeting place for pedorthists

Official organ of the
“International Association for
Orthopaedic Footwear” (IVO).

foot & shoe
THE INTERNATIONAL JOURNAL FOR FOOT ORTHOTICS

6.5 Creating a negative plaster mold

More than 80% of custom-made orthotic footwear is created in this or a similar way (Fig. 6–8).

An essential basic task for the pedorthist is creating an exact negative plaster mold of the foot. Prerequisite to this is a correct, manual examination of the active and passive musculoskeletal system of the lower extremities (see Chapter 22). This provides information about the optimal position of the foot in the shoe. Ideally, the patient will have already been treated by a physiotherapist so that an optimal range of motion can be used when creating the mold.

The mobility of the ankle is tested based on the corrected hindfoot, the position of which is paramount to treatment (Fig. 1 a – d). The calcaneal tuberosity is maximally corrected for a non-contracted valgus hindfoot. An equinus foot deformity is tolerated. The procedure is similar for a clubfoot: maximum hindfoot correction, plantigrade adjustment of the ankle. To achieve a consistent left-right result in the plaster mold, the deformed foot is plastered first and then the healthier foot is adjusted.

Preparations:
1. Welcome.
2. Medical history.
3. Findings.
4. Foot as non-edematous as possible.
5. Optimal patient positioning (on a chair, in bed, on a seat shell, on mother's lap, ...).
6. Explain and define treatment goals.

Material (Fig. 7):
1. Original/planned footwear (socks, compression stocking, bandage...).
2. Plaster area.
3. Plaster bandages (4 cm x 12cm).
4. Insulating foil.
5. Scalpel, knife.
6. Cutting mat.
7. Container with water.
8. Latex gloves, sized appropriately.
9. Block for the heel pitch.

Procedure (Fig. 7, 8):
1. Wrap foot with foil from distal to proximal in the intended direction of correction: On the one hand, the edema is pressed
2. Fix the
3. Put on
4. Hold p squeez
5. Wrap foot ar reache
6. Spread
7. Adapt
8. Foot c forefo

Fig. 7 Set up the plaster working area.

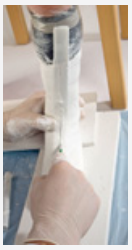
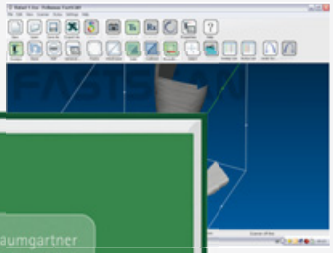


Fig. 8 Cut open plaster on the cutting mat with scalpel.

Fig. 9 Finished plaster negative.



9. Allow the plaster to harden.
10. Cut open with the knife.
11. Carefully pull off the negative mold.
12. Close with a strip of plaster.
13. Remove foil and clean area.
14. Make the next appointment and explain the further procedure before seeing the patient out.

6.6 3D foot scan

3D scan technology is becoming more and more important (Fig. 10 – 12). A distinction is made between:

A Scanning in the box: The patient is put into a position where the foot can be scanned from every side. The surface of the skin is registered. Corrections are not possible for patients requiring custom orthotics. It is easier to treat patients when the frontal median is not important and a template is available from the shoe last archive or the digital last library.

B Hand scanners have the advantage that they can be used around the patient, allowing the patient to maintain a more relaxed posture. Good corrections, however, are not always possible with these (Fig. 11, 12). Newer and smaller scanners are available from the company Gebiom, among others.

6.7 Plaster negative and scan technology

One way to take advantage of the positive correction capabilities of the plaster cast and the advantages of scanning is to combine these two methods. A plaster cast is first made as described above, and subsequently scanned. For this method, it is also possible to use a last from the shoe last archive. The virtually generated raw lasts can also be modeled on the computer with the aid of suitable software, and then milled.

6.8 Foot foam and scan technology

With special software, the data from different scans can be combined and assembled into a virtual object. In this way, the foot-sole mold can be scanned from the corrected foot foam and then mirrored (Fig. 13, 14). The dorsal portion of the foot and lower leg is scanned directly on the patient. The object to be scanned should move as little as possible. Subsequently, the two virtual halves are joined to form the complete foot. The changeover from manual work to virtual computer modeling is particularly challenging in this case.

Fig. 11 Scanner (manufacturer: Gebiom).

Fig. 12 Scanning a positive shoe last (manufacturer: Spenle).

Fig. 13 Scanning the foot in the foot foam.

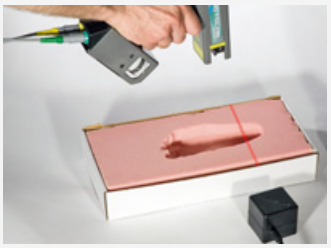


Fig. 14 Scanning the corrected foot foam.

Assistive devices must actually be in use

Orthopaedic assistive devices only help if they are worn. This may sound like a cliché, but in practice it is often an underestimated problem. This is particularly true in the treatment of patients with diabetic foot syndrome. Foot injuries, sometimes with serious complications, occur when patients do not wear the shoes prescribed by their doctor to relieve pressure on vulnerable areas of the foot.

In addition to stage-appropriate footwear (see article on page 12), the focus is therefore increasingly on the patient's willingness – which is sometimes non-existent – to actively participate in therapy and use the prescribed devices.

But it is not just people with diabetes who do not wear their assistive devices. In fact, it seems to be a common phenomenon that individual devices that have been produced at great expense end up in the patient's cupboard instead of on their feet.

One reason for this could be that the needs of patients have not been sufficiently taken into account. Not the medical requirements, but the way the patient wants to use the device. Fred Holtkamp explains in his article on "User Practices" (starting on page 23) that every patient has different areas of life in which they want to use their device. Very often, however, the different types of use do not play a role in the design of the device. As a study from the Netherlands showed, this is rarely asked during patient consultations – and patients do not explicitly formulate their requirements for the device.

So there is still a lot of potential to improve the communication between craftsmen and patients – and therefore the assistive devices.

Wolfgang Best

P.S.: On 24 and 25 October 2025, the new edition of ORTHOPÄDIE SCHUH TECHNIK will take place in Cologne, Germany, which has become the world's most important meeting place for pedorthists and the associated supply industry. You can find the key information about the event on page 11.

Photo: C. Maurer Fachmedien

Photo: Stumpf

IVO-Congress 2024 Page 6

With visitors from many different countries and a trade fair, the IVO Congress 2024 took place on October 24 and 25, 2024 in Fribourg, Switzerland. The congress brought together experts and representatives from all over the world.

Diabetic foot Page 14

In 2006, a risk classification for diabetic foot syndrome (DFS) and analogous neuro-angio-arthropathies was developed in Germany. This classification has now been revised

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User practises Page 23

How can we ensure that patients actually use their assistive devices? An important aspect is that the design also takes into account how the patient wants to use the device.

Imprint

foot & shoe
(ISSN: 2193-9780) is the English edition of the journal ORTHOPÄDIE-SCHUHTECHNIK. It is published twice a year and distributed worldwide.

Publisher:
C. Maurer Fachmedien GmbH & Co.
Schubartstr. 21, 73312 Geislingen (Steige), Germany
Phone: (+49) 07331/30708-0
Fax: (+49) 07331/30708-69 and 30708-68
Internet: www.maurer-fachmedien.de
www.foot-and-shoe.com

Executive Publisher:
Carl Otto Maurer

Organ:
Official organ of the "International Association for Orthopaedic Footwear" (IVO).

Production:
C. Maurer GmbH & Co. KG, Geislingen (Steige), Germany
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Layout: C. Maurer

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Ad Rate List No. 15 valid from 1 January 2025

There is no claim for subsequent delivery or compensation if the magazine is not published due to force majeure.

Subscription Support:
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DEUTSCHE FACHPRESSE

Orthopädie SCHUHTECHNIK

IVO Congress 2024: international, interdisciplinary, innovative

WOLFGANG BEST

With visitors from many different countries and a trade fair, the IVO Congress 2024 took place on October 24 and 25, 2024 in Fribourg, Switzerland. The congress brought together experts and representatives from various regions, including delegates from all over Europe, Australia, Canada, Japan and the USA.

Almost 500 participants - including experts from medicine, P&O, pedorthics, physiotherapy, occupational therapy and industry - used the congress as a platform for professional exchange. During the two days of the congress, visitors were treated to an extensive program with many lectures and workshops from a total of 36 speakers. Over 40 companies presented themselves on an exhibition area of 500 square meters.
The congress organizers – the Swiss Working Group for Prostheses and Orthoses (APO) and the Swiss Foot & Shoe Association – were committed to interdisciplinarity and innovation. Congress President Dr. Martin Berli was therefore able to announce a varied program that highlighted the requirements of technical orthopaedics from a wide variety of perspectives.

Interdisciplinary: talking to each other

The speakers demonstrated in many ways the importance and significance of both fields. Who is in the boat when it comes to interdisciplinary cooperation – and are we rowing in the same direction? This was the topic of Patrick Meier, Deputy Head of Technical Orthopaedics at the Bellikon Rehabilitation Clinic. He pointed out that it is not only the medical aspects that need to be taken into account, but also the environment and the interests of patients, payers and service providers. Patients are naturally focused on receiving the best possible care and are also influenced by their family, social environment and the media. In the case of payers, administrators are accountable to their superiors or committees for compliance with all regulations and requirements. Nor can service providers work completely independently. They have to provide their services not only according to the wishes of the patient, but also according to the requirements of the doctors and the contracts, and they often have to cooperate with other disciplines. With this breakdown, Meier impressively demonstrated who is involved in the provision of assistive devices and how difficult it often is for everyone to row in the same direction in the interests of the patient.

Interdisciplinarity is an advantage for the patient, emphasised physiotherapist Thomas Koller. Every patient has individual needs or challenges in terms of stability, mobility, neuromuscular control or gait parame-

Over 40 companies presented themselves at the well-attended trade fair.

ters. And several professions are usually involved in addressing these needs. Koller encouraged people to seek dialogue in the interest of the best patient care, rather than stubbornly implementing their own treatment concepts. In doing so, it is perfectly acceptable to try approaches that are outside the mainstream of care. There should be room for all points of view. Koller's advice was to observe and evaluate together.

Myths about children's feet

The need for cooperation was also highlighted by the interdisciplinary panel discussion on myths and facts about children's feet. Using various case studies, Dr. Pia Ferrat, Dr. Carlo Camathias, prosthetist&orthotist Michael Bär, pedorthist Marc-André Villiger and physiotherapist Michael Wiedenmann discussed which treatments are appropriate for children's feet and when they are indicated. The initial consensus was that asymptomatic children's planovalgus feet should not be treated until school age, as they usually resolve themselves. It becomes more difficult with possible late consequences of planovalgus feet in later childhood, which, according to the theory, then cause foot, knee and hip pain,

Dr. Carlo Camathias reported that he often sees this in practice. However, the evidence for this is limited, reported Dr. Bernhard Speth, who presented the "myths" and led the discussion.

Do foot orthoses help with planovalgus foot? Here, too, the studies are sparse, but there was agreement that, as Marc-André Villiger put it, pain is a reason for orthoses. The foot orthoses provide relief, but the shape of the foot does not change, Dr. Pia Ferrat interjected. It remains a planovalgus foot. But supportive orthoses, said Carlo Camathias, could of course help to prevent overloading of the posterior tibialis muscle, which tries to straighten the foot.

Whether good footwear can have a positive influence on the development of a planovalgus foot appears doubtful based on the available studies.However, the participants in the discussion agreed that bad shoes can make the situation worse. The focus here was on sneakers that do not offer sufficient support in the heel and encourage the deformity due to their soft soles. Another problem is that some shoes are no longer laced at all.

There is certainly evidence that physiotherapy helps, but there is often a failure to implement the training, says Bernhard Speth. In conclusion, Speth was able to state that many myths are based on outdated or inaccurate approaches. The spontaneous progression of children's fallen arches is predominantly positive, which is why treatment should focus on symptomatic feet or functional problems.

What is evidence-based and what is a "myth" in the care of children's feet? The interdisciplinary panel discussion on children's feet provided answers to these questions.

Technical orthopaedics in other countries

The presentations by Bernd Franke, Filippo Nishino and Hanna Baumgartner offered an insight into the support for technical orthopaedics and pedorthics in other countries.

Bernd Franke reported on his work in a center in Rwanda, where he trained local specialists in pedorthics and his work in Ukraine. His first task there was to set up a workshop in a rehabilitation center and then to organize pedorthic care for war injured soldiers. Filippo Nishino presented the work of the "Swiss Limbs" organization, which supports the training and provision of orthopaedic devices in many countries. Hanna Baumgartner reported on her work as a physiotherapist in Uganda. The "Pro Uganda" association helped make her stay of several months possible.

Franz Fischer, Chairman of the educational association Praeparatio e.V., gave an insight into the services offered by the association, which has set itself the goal of accompanying journeymen on their way to becoming master craftsmen. Wolfgang Best, editor-in-chief of the magazine Orthopädieschuhtechnik, addressed the shortage of skilled workers in pedorthics. This is forcing many companies to use new technologies or outsource the production of assistive devices. As the shortage of skilled workers will not disappear any time soon, it will be important to use modern technologies in the future, while continuing to teach manual skills in apprenticeships.

Innovations in therapy and technology

In terms of innovations, the topics ranged from the automated modeling of assistive devices and the use of AI in physiotherapy to therapeutic shoes for diabetes

One of the highlights of the congress was the apprentice competition organized by the Fuß&Schuh association, which was celebrating its 150th anniversary on the occasion of the congress. The learners were given the task of interpreting a shoe from a time before the association was founded in a contemporary way using new materials and technologies. For two days, the congress participants had the opportunity to marvel at the extraordinary models created by the 15 participants with the highest level of craftsmanship. The jury had a lot of hard work to do and in the end there were three second prizes in addition to a first prize - although Association President Stefan Friemel emphasized at the award ceremony that everyone actually deserved a prize.

patients. Sarah Hemler from the University of Geneva presented a newly developed shoe for diabetes patients in which the foot bedding automatically adapts to the required pressure redistribution. This is made possible by electronically adjustable stamps under the footbed.

Nezar Housni presented a new way to automatically go from a scan to a design proposal using an algorithm. Florian Haufe presented a model in which physiotherapy can be continued independently at home with the help of artificial intelligence (AI). The AI is supposed to recognize whether the exercises are being performed correctly and provide feedback to the patient if necessary.

Christian Roth and Valentin Matt presented an interesting approach to the sustainable production of assistive devices. They use old snowboards as the basis for functional elements in orthoses.

Roland Vorhammer and Torben Weiss from Orthoteam reported on the multi-professional treatment of diabetic feet. Among other things, they used a patient story in a film to illustrate how many people are involved in the treatment and how important it is for everyone involved to exchange information.

The diabetic foot was also the topic of Dr. Sayed Ahmed from Australia. He presented the results of his dissertation, which show that it is not just a question of providing the right medical care for diabetes patients. The patient's social and cultural background must also be taken into account if the device is to be accepted.

Making knowledge transparent

In his introductory speech, OST editor-in-chief Wolfgang Best gave an insight into the history of pedorthics. He also discussed how technologies and knowledge in the trade have developed in recent years and what the challenges for the future are.

One of these is to capture the wealth of knowledge available in the industry. Fred Holtkamp and Jessica Hohenschon expanded on this requirement. In their presentation, they noted that craftsmen have an incredible amount of knowledge and usually make the right decisions in the supply process. However, they are often unable to explain why they do things exactly the way they do and not differently. Holtkamp and Hohenschon's aim is to formulate this knowledge and make it transparent so that, on the one hand, the care processes become more comprehensible, but also so that the knowledge can be passed on more easily to future generations.

Insights into orthopaedic technology

This year's IVO Congress also offered pedorthists the opportunity to gain an insight into the neighboring trade of Prosthetis&Orthotics. Reto Togni from the Laboratory for Movement Biomechanics at ETH Zurich presented a wheelchair with innovative mechanical steering technology that can also be controlled with the torso by shifting weight. This makes it much easier to drive straight ahead on inclined surfaces and saves a lot of energy.

The 150th anniversary of the Fuß&Schuh association was duly celebrated with a festive evening. Association members, friends of the association and of course the congress guests enjoyed a wonderful evening in the Salle Grenette in Fribourg, where the cultural program included a reference to Swiss tradition. The interlude with alphorns and flag-wavers was given a special touch by the fact that two professional colleagues were involved. Photos: C. Maurer Fachmedien

Bruno Friemel honored with the IVO Award/Siegfried Stinus Medal 2024

The IVO Award was presented at the IVO Congress for the second time since 2022. The prize, endowed with 3000 euros, was donated by Siegfried Stinus, who himself was President of the IVO from 1981 to 1987.

The IVO Award/Siegfried Stinus Medal recognizes outstanding services to international cooperation and the further development of the pedorthic trade. This year's winner, Bruno Friemel from Zurich, is a pedorthist who experienced the development of international cooperation in pedorthics from the very beginning and later played a key role in shaping it.

While still an apprentice, he helped his father who, as chairman of the Swiss shoemakers association, organized the first post-war exhibition of the "Bureau International de Cuir et de la Chaussure" (BIC) in Zurich in 1950. Orthopaedic works from other countries were also exhibited there.

After his training and years of traveling in Lausanne, Paris and Strasbourg, as well as commercial and business management training, he qualified as a master orthopaedic shoemaker. In 1959, he took over his father's business and expanded it over the following decades to become one of the leading pedorthic companies in Switzerland.

As early as the 1950s, Bruno Friemel ventured across the border to South Baden. His German colleagues there had begun to organize regular conferences. Bruno Friemel was not the only pedorthist from Switzerland to come to South Baden. The professional contacts turned into friendships across the border and a circle of friends was formed between pedorthists from South Baden and Switzerland.

This circle of friends was to provide significant impetus for the founding of the International Association of Orthopaedic Shoemakers (IAO) in 1966, which set itself the goal of exchanging experience and knowledge and personal encounters across national borders.

In 1970, Bruno Friemel and René Baumgartner organized a conference at the annual meeting of the Swiss Association for Prostheses and Orthoses (APO) on pedorthics, which later resulted in a successful publication. This initial collaboration was to develop into a lifelong professional partnership and personal friendship. Just one year later, the two organized the IAO symposium in Zurich with numerous specialist lectures at Balgrist University Hospital. Following the conference, the decisive course for the foundation of the IVO was set at a meeting.

Sabine Stinus-Sandhacker presented the certificate and the Siegfried Stinus Medal for the IVO Award. Photo: R. Musio

With the inaugural meeting on 27 October 1973 in Cologne, the pedorthic trade created its own organization to look after its interests internationally. Since 1975, 22 congresses have been organized with ever-changing national associations. One of these, the first in Switzerland, was organized by Bruno Friemel in Davos in 1985. He was supported by René Baumgartner with the technical program. Friemel was to lead the IVO as president from 1987 to 1991.

During his long professional career, Bruno Friemel was also President of the Swiss Shoemakers' and Orthopaedic Shoemakers' Association, where he worked on countless committees and was instrumental in setting up the OSM tariff in Switzerland, among other things. In this way, he also shaped the development of his profession at a national level.

"With Bruno Friemel," said OST Editor-in-Chief Wolfgang Best in his laudatory speech, "an outstanding representative of his profession is being honored. With extraordinary commitment, curiosity, a thirst for knowledge and great expertise, he has not only represented pedorthics nationally and internationally, but has also made a significant contribution to its positive development over many years."

IVO General Assembly: Problems similar in all countries

The International Association of Orthopaedic Shoemakers (IVO) used the congress in Fribourg for its general meeting. Delegates from France, Australia, Japan, the Netherlands, Canada, Austria, Switzerland and individual members from Slovenia and Portugal were represented. One new member comes from Italy, who unfortunately was unable to attend the meeting. All those present regretted that the German association, one of the founding members of the IVO, was no longer represented. The Zentralverband Orthopädieschuhtechnik has been disbanded and the successor association, the Spitzenverband Orthopädieschuhtechnik, is not (yet) a member of the IVO.

The reports from the member countries showed that many problems exist in all countries: the difficult negotiations with insurers, increased costs – including for energy and the shortage of skilled workers.

At the meeting, Franz Gerlinger from Austria was bid farewell as delegate; he handed over his mandate to Matthias Jansohn, who had recently been elected as the new chairman of the Austrian association. A very positive response was given to the fact that Austria in particular has shown how attractive voluntary work in an association is, so that many young people want to follow in positions of responsibility and get involved.

Jonathan Strauss, Managing Director of the Pedorthic Association of Canada, reported on the progress of the latest edition of the "Clinical practice guidelines". This handbook brings together the best available knowledge and scientific evidence on the treatment of foot problems. The project started in September 2024 and is being carried out together with the Australian Pedorthic Association (PAA). The IVO will support this project financially over the next three years. According to Jonathan Strauss, the support will significantly improve the academic and scientific accuracy of these guidelines. IVO members are invited to participate, including as authors.

Katharina Körbes can look back on 25 years of work for the IVO. Franz Gerlinger (l.) and Olav Toornend congratulated her. Photo: Toornend

The IVO would also like to intensify its contacts with the International Society for Prosthetics & Orthotics (ISPO). The fact that there is hardly any contact between the two associations, despite repeated attempts to establish cooperation in the past, was generally regretted.

IVO President Olav Toornend was delighted to congratulate IVO Secretary General Katharina Körbes on her 25th anniversary of service. In 1999, the IVO decided to set up its own office in Hanover on the premises of the Federal Guild Association. Katharina Körbes started work in the same year and has been working for the IVO without interruption ever since. IVO President Olav Toornend took the opportunity to thank her with a small gift for her many years of commitment and loyalty to the IVO.

In their presentation, Mary Kern and Jonas Merian from the Bellikon Rehabilitation Clinic vividly illustrated the "Herculean task" of rehabilitating bilateral transfemoral amputees. Even if everyone received a prosthesis, most of them would still become wheelchair users and not pedestrians. In order for mobilization and, ideally, professional integration to succeed, not only good prostheses but also a lot of training and optimal support - sometimes also psychological - are necessary.

The specialist lectures were supplemented by presentations and workshops from the industry. In workshops on the subject of taking measurements and sensorimotor orthotic fitting, important basics were taught to the next generation of professionals.

At the end of the congress, Michel Fournasier showed how children with a physical deficit can be strengthened. Together with partners, he developed comics in which heroes overcome such deficits with assistive devices.

The congress president Martin Berli was able to draw a positive conclusion at the end, as the congress not only offered a wide range of specialist knowledge, but also focused on professional exchange. ■

Shaping the future: See you in Cologne!

WOLFGANG BEST

On October 24 and 25, Cologne will once again be the meeting place for the worldwide community of pedorthists. All important partners from the industry will be presenting their products and services at ORTHOPÄDIE SCHUH TECHNIK. Scientific findings on foot care will be presented at the congress and future strategies for the trade will be discussed.

ORTHOPÄDIE SCHUH TECHNIK has developed into the world's most important trade fair dedicated exclusively to orthopedic footwear technology. Since its launch in 2011, the number of visitors and exhibitors has increased continuously. Pedorthists from all over the world will meet again at the 8th edition in 2025 to find out about the latest trends in technology and the treatment of foot problems.

At the trade fair, you will find a large selection of national and international suppliers from the industry: from materials, aids, machine technology and new measurement and production technologies to comfort shoes, podiatry suppliers and service providers from the industry. The two-day congress with about 25 specialist lectures and almost as many seminars offers a complete overview of orthopedic footwear technology and provides decisive impulses for the further development of the trade and the link to related fields of work.

Congress

This year, the congress will focus on two main topics:

Myths and facts

The treatment of foot problems is based on ideas about how the foot functions biomechanically and what effect can be expected from interventions - medical or pedorthist – based on this understanding.

But are our ideas about the foot and its function still in line with current research findings? Which of our ideas about the foot and the correct treatment are still tenable according to current scientific findings, or do they need to be reconsidered or abandoned? And what consequences does this have for pedorthists in the treatment of foot problems?

Shaping the future

Pedorthics faces many challenges: Health insurance companies and therefore reimbursement prices are under pressure in many countries. In many places, there is a shortage of skilled workers, which is forcing new solutions in the manufacture of assistive devices.

Digital technologies can be helpful here, but they are also increasingly enabling providers and investors from outside the industry to enter this market. How is the trade changing as a result? What are the qualifications of pedorthists if their products can also be manufactured by machines or external service providers?

Despite all the challenges, the chances are very good that the pedorthist will continue to play the main role in the treatment of foot problems in the future. This is because he is the specialist for movement, combining medical and biomechanical knowledge with expertise and experience of materials and the many ways of manufacturing an assistive device individually for a patient. Instead of complaining about the current situation, it is therefore important to shape the future with a new self-image as a trade. We will shed light on these questions with renowned experts from science and the trade. Be part of it. Bring your knowledge up to date and join in the discussion.

Call for abstracts

A congress thrives on the quality of the presentations and the diversity of the topics. C. Maurer Fachmedien as the organizer therefore invites all pedorthists, physicians and scientists to present and discuss their experiences and findings on the topic of assistive devices for the foot. Field reports from the practice of orthotic fitting are just as welcome as new findings from medicine and science or reports on new therapeutic approaches.

As at previous events, there will be lecture blocks reserved specifically for submitted free papers. Presenters will have the opportunity to present their topic to an international audience.

The congress language is German. Submissions and presentations may also be in English. Interpreters will be available in the congress area.

Presentations must be submitted by May 28. 2025. Announcement of accepted papers will be made on June 20, 2025. Speakers whose paper is accepted will receive a free congress ticket.

For submission, please use the submission form on the congress-Homepage. If you have any questions, please feel free to contact Wolfgang Best, who is responsible for the organization of the congress program (wolfgang.best@ostechnik.de). ■

Legal breakthrough for NVOS/Orthobanda

The Dutch professional association NVOS-Orthobanda , which brings together orthopaedic shoemakers and prosthetists & orthotists, is delighted that a legal breakthrough was achieved for the pedorthic industry at the end of last year.

The ruling by the Zeeland-West Brabant District Court on 6 November 2024 in a case brought by a number of healthcare providers against health insurer CZ - and an earlier summary proceedings against health insurer VGZ - shows that a collective approach is effective in securing realistic, cost-covering rates for healthcare providers.' So says Michiel van Campen, general chairman of the orthopaedic technology industry association.

The summary proceedings against VGZ resulted in a settlement in which a rate increase of more than 20% was agreed. This will take effect from 1 January 2025. In addition, some burdensome conditions were removed from the health insurer's policy.

The Zeeland-West Brabant court handed down a judgment that contains many valuable points for healthcare providers. For example, health insurer CZ must increase rates by 16% for December 2024 and 20% for the year 2025.

Market-based fees

'Healthcare entrepreneurs in medical orthopaedic devices, such as custom-made shoes, are members of NVOS-Orthobanda. As an industry association, we attach great importance to realistic reimbursements, which are necessary for our economic health,' Van Campen said.

'Our members provide home-based device care to over 1.5 million patients with severe functional or mobility problems. We make a national case for the interests of our members and the industry. That includes fair risk allocation and reimbursements that are in line with the market.'

Together for quality of care

'The accessibility of appropriate resource care is a right of patients. Insurers have a duty of care and this should not be compromised or passed on to our members. The court intervention, supports us in this position,' Van Campen stated. 'The rulings pave the way to get back to having the conversation with all stakeholders at the negotiating tables about ensuring quality of care. That is positive. At the same time, NVOS-Orthobanda remains alert: device care is under great pressure, also given demographic and economic developments. Especially in these times, it is good to realise that quality of care does not always go hand in hand with the lowest possible health insurance premiums. Good care simply costs money and that includes fair prices.' ■

Focus day on the forefoot

On Monday, 8 September 2025, the Swiss Foot & Shoe Association will be holding a Focus Day at the Vocational School Zofingen.

This year the focus will be on forefoot problems. In the morning there will be a theoretical block with three speakers, and in the afternoon there will be practical work in groups at three different stations. The specific program is still being developed, but will certainly look at the topic from different angles. Possible approaches include silicone orthoses, pressure measurement, medical and podiatric perspectives, etc. The course languages will be German and French.

The Focus Day brings together the majority of Swiss pedorthists and is organised as a small congress with exhibitors. As a result, there is always a group in the exhibition during the afternoon group rotation. The Focus Days are very popular with both delegates and exhibitors. There are usually between 70 and 100 people in total.

The day is open to all interested attendees and exhibitors. Places are limited. More information is available at https://www.fussundschuh.ch/weiterbildungsprogramm

New training video

The Swiss association has also produced a training video explaining the "Basic examination and assessment of the child's foot". A trailer can be viewed on YouTube (https://youtu.be/T2GXXJZ4-og). The video can be ordered from the association. ■

Pedorthists Recognised in OSCA

Pedorthists have been formally recognised as an occupation in the Occupation Standard Classification for Australia. This marks another important step in the recognition of the profession in Australia.

The Australian Bureau of Statistics (ABS) has announced the publication of the new Occupation Standard Classification for Australia (OSCA), marking the first major update to Australia's occupation classification system in 20 years. This milestone reflects the evolving nature of occupations and their critical roles in the workforce.

The Pedorthic Association of Australia is thrilled to share that pedorthists have been formally recognised as an occupation in the updated OSCA. This significant development underscores the expertise and professionalism of pedorthists, say the PAA. Pedorthrthists are now classified within Occupation Group "Allied Health Physical and Sensory Therapy Professionals not elsewhere classified (nec)" on Skill Level 1 (requiring a Bachelor Degree, higher qualification, or at least five years of relevant experience).

Pedorthists can now be searched in OSCA via the ABS website, offering a clear and accessible pathway to official information. "This recognition is the result of the PAA's steadfast advocacy and determination, ensuring that the vital contributions of pedorthists to health, mobility and well-being are formally acknowledged in Australia's national standards", says the PAA. "This updated classification will influence official labour market statistics starting in September 2026 and will also feature in outputs from the 2026 Census data. Importantly, the ABS has committed to ongoing updates and welcomes feedback to ensure OSCA continues to reflect the dynamic nature of Australia's workforce." ■

Understanding walking: Why foot anatomy and biomechanics are essential to the footwear industry

Each step we take is a complex interplay of muscles, tendons and bones. But how does footwear affect this process? The answers lie in the biomechanics of walking – crucial to the footwear industry.

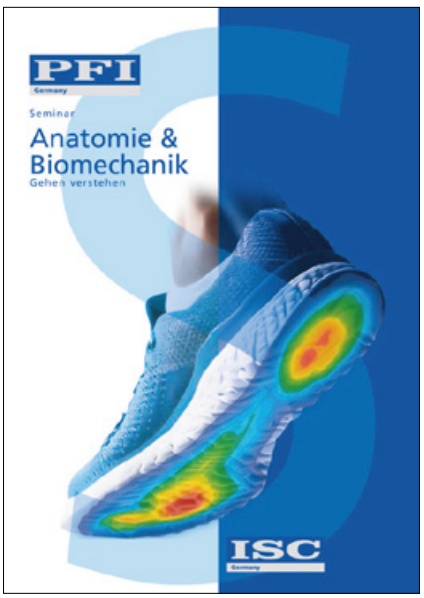
The anatomy of the foot: a marvel of nature
The human foot is an evolutionary masterpiece: 28 bones, over 100 ligaments and numerous muscles provide stability and flexibility. This structure enables us to walk upright, absorb shocks, and distribute body weight efficiently. However, natural variations in shape, instep height, and toe position influence shoe fit. Many foot problems such as flat feet, splayfeet or hallux valgus can be caused by incorrect footwear. This is particularly problematic when shoes influence body posture, change load distribution or restrict movement.

From theory to practice: the importance of gait analysis
How feet behave in motion and under load bearing depends on their anatomical structure and factors such as cushioning, stability and flexibility have a significant influence on gait behaviour. Modern gait analyses in the biomechanics laboratory, for example with pressure plates or treadmill analyses, provide valuable insights into how shoes can be optimally adapted to natural movement patterns.
This is not just about orthopaedic shoes – these findings also play a central role in the sports and fashion shoe sector. However, finding the right balance between design, function and comfort requires in-depth knowledge.

Knowledge is the key to innovation
For manufacturers, designers and retailers in the footwear industry, in-depth knowledge of anatomy and biomechanics is essential to develop shoes that look good and offer health benefits. The International Shoe Competence Centre (ISC) imparts this knowledge in a practical seminar:

Anatomy & Biomechanics – Understanding Walking
Dates: 2. 9. – 3. 9. 2025
Location: Marie-Curie Street 20, 66953 Pirmasens
Costs: € 697 net (incl. training documents, drinks & lunch)

Whether product design, production or retail – anyone who wants to develop shoes with an optimal fit should understand the mechanics of walking. Take the opportunity to deepen your expertise and adapt your products to the requirements of the future.



More information & registration:
info@isc-germany.com

New risk group classification for diabetic foot syndrome (DFS) and the analogous neuro-angio-arthropathies

BERNHARD GREITEMANN[1] | KARL ZINK[2] | JÜRGEN STUMPF[3]

In 2006, a risk classification for diabetic foot syndrome (DFS) and analogous neuro-angio-arthropathies was developed for the first time in Germany, which was intended to make the provision of foot bedding, shoes and orthoses more transparent and easier for everyone involved. This risk group classification has now been revised and approved on April 21, 2024 by the DDG Foot Working Group and the DGOOC Advisory Committee for Pedorthics. The new version replaces the version in force since 2006.

The classification of possible pedorthic treatments into the eight main groups (0 - 7) and the corresponding direct assignment to the respective manifestation of DFS is intended to provide prescribing physicians, pedorthists, health insurance companies and the medical advisory service of health insurance companies with a common basis for the prescription, approval and implementation of treatment based on current international studies [1].

Unchanged risk groups

Risk group 0
This group includes patients with diabetes without secondary complications and without relevant orthopaedic foot changes. They should be advised at an early stage about ‚foot-friendly' off-the-shelf footwear and the need for consistent shoe and foot hygiene, as well as specialist treatment to avoid footwear-related foot changes such as hallux valgus, as feet with foot deformities require much more complex treatment than non-deformed feet in the event of subsequent complications such as PNP or PAOD. However, in this risk group there is often a lack of understanding or insight when it comes to giving up valued fashion aspects when choosing shoes.

Risk group I
This group includes patients without diabetes-related foot complications, but with orthopaedic problems ranging from simple splayfeet to complex deformities such as a clubfoot. Treatment is based purely on orthopaedic considerations.

Changed risk groups

Risk group II
Previously, this group included patients with sensitivity loss and/or significant peripheral arterial occlusive disease (PAoD). The standard of care was the „diabetic protective shoe with removable ready-made soft cushion insole". As the incidence of lesions in this entire risk group is estimated to be approx. 2-4% per year [2], the assumption of costs by the statutory health insurance for preventive care in this risk group has not become established in practice. However, to meet the justified demand of many experts to prevent the development of a first ulcer in particularly vulnerable patients in this risk group, risk group II has been divided into two subgroups based on expert opinion and the available evidence [1].

Risk group IIa
Risk groups IIa and IIb share a loss of sensitivity due to PNP and/or relevant peripheral arterial occlusive disease (PAOD). Risk group IIa includes patients without the additional risk factors of group IIb. However, as there is a high risk of unnoticed foot injuries, for example due to inappropriate footwear, special information is required. Patients should wear shoes suitable for DFS, with sufficient internal volume and removable soft padded insoles. There must be enough room for the foot and soft padded insoles. This treatment is not covered by the national health insurance (Fig. 1).

1 Example of a foot-friendly ready-made shoe (FinnComfort). Photo: Stumpf

1 Chairman of the DGOOC Advisory Committee for Pedorthics
2 Deputy Spokesman of the Management Board team of the DDG Diabetic Foot Working Group
3 Member of the DGOOC Advisory Committee for Pedorthics

Risk group IIb

Additional risk factors such as impending dorsal ulcers with insufficient toe clearance in insole-compatible ready-made/comfortable shoes, for example in the case of pronounced claw or hammer toes, pre-ulcerative changes such as clavi or bled hyperkeratosis, or the presence of renal insufficiency requiring dialysis classify patients in this subgroup. Due to the increased risk of ulcer development, they are given "special shoes for the diabetic foot syndrome" (Fig. 2) - this is the new name for the previously designated "diabetic protective shoes" - with a diabetes-adapted footbed (DAF) (Fig. 3). The special shoes for diabetic foot syndrome and diabetes-adapted footbeds are subject to precise specifications in the German list of assistive devices (Product Group 31), are therefore prescribable and are generally reimbursed by the statutory health insurance funds up to the statutory co-payment after submission of a cost estimate.

Risk group III

This risk group includes all patients who have a statistically very high risk of recurrence of approximately 35-40% per year following a healed ulcer [2]. As in risk group IIb, these patients are also entitled to special diabetic foot syndrome shoes with diabetes-adapted foot bedding. If necessary, special diabetic foot syndrome shoes should be adapted to the biomechanical requirements in order to achieve the necessary pressure relief. In particular, this could be the alignment of the roll's crest line in the case of a highly internally or externally rotated gait pattern or, for example, an inner or outer edge elevation in the case of knee malalignment.

2 Special shoe for DFS (Stuppy). Photo: Stumpf

3 Diabetes-adapted footbed. Photo: IETEC

Risk group IV

This group includes patients in risk groups II and III with deformities or dysproportions (Figs. 4 and 5) who cannot be treated with off-the-shelf lasts (e.g. special diabetic footwear) and therefore require custom-made shoes (Fig. 6) with diabetes-adapted footbeds (Fig. 7). It goes without saying that the orthopaedic custom-made shoes also have the appropriate additional orthopaedic features required for diabetic feet, such as a roll-off sole, sole reinforcement and appropriate upper processing. The decision as to whether a patient can be treated with orthopaedic shoes or special diabetic footwear depends heavily on the models available on the market and can sometimes only be made on an individual basis by the specialist trying on the off-the-shelf special shoes. For example, if the specialist finds that the patient's feet fit well in the forefoot area of the shoe, but not in the heel area, because the heel is too narrow and the shoe slips, this indicates a disproportion and an indication for orthopaedic custom-made shoes.

Risk group V

Risk group V continues to include patients with inactive Charcot neuro-osteoarthropathy (CNO). The term CNO has been adopted in accordance with the IWGDF guideline and replaces the previous terms DNOAP/Charcot foot. However, the definition of CNO has been somewhat specified by the addition of „recognisable radiological joint and/or bone destruction,

4 Pronounced deformity with hallux valgus and claw toes. Photo: Iurii/Adobe Stock

5 Cavus foot with pronounced toe misaligment. Photo: Praewphan/Adobe Stock

6 Custom-made orthopedic shoe. Photo: IETEC

7 Diabetes-adapted footbed for custom-made orthopedic shoes. Photo: IETEC

pseudoexostosis and malalignment". The minimum standard of care is a custom-made ankle-high shoe with DAF. In exceptional cases of less deformed feet with preserved weight bearing capacity, special shoes for DFS with DAF can

8 Inactive CNO foot. Photo: Stumpf

9 Custom-made orthopedic shoe for inactive CNO with bimalleolar ankle support
Photo: Stumpf

10 Inner shoe fitting with custom-made orthopedic shoes.
Photo: Stumpf

be used. Depending on the severity and location of the deformity, for example in the hindfoot (Fig. 8), and the associated reduced weight-bearing capacity or vertical deviation, additional upper reinforcement such as bimalleolar ankle supports (Fig. 9), arthrodesis caps or, if necessary, inner shoes/orthoses (Fig. 10) have to be prescribed.

Risk group VI

This group includes patients with partial foot amputations at least at the transmetatarsal level. Patients who have only had their toes amputated can be treated with special diabetic foot syndrome shoes in conjunction with diabetes-adapted footbeds, provided there are no additional complications. The minimum treatment for transmetatarsal amputations (Fig. 11) is a custom-made orthopaedic shoe with a precisely modelled, diabetes-adapted foot bed, an effective roll-off sole with a crest line proximal to the end of the residual limb, insole reinforcement, and a cosmetic forefoot replacement made of soft material.

Depending on the shortness and bearing capacity of the residual limb, appropriate additions to the custom-made orthopaedic shoe may be required, such as support straps and heel counters with raised rear caps (Fig. 12).

In the case of very short tarsal stumps or unstable or poorly bearing stumps (Fig. 13), special forefoot replacement prostheses (Fig. 14) are required that are high on the lower leg or extend to the knee.

The basic aim of treatment in this risk group is to prevent foot wounds by providing optimum protection for the particularly vulnerable residual limb with its reduced weight-bearing surface, by avoiding pressure peaks, for example in the distal area of the residual limb, and also by avoiding shearing forces. This means that there is generally no complete cosmetic compensation for the loss of the footpart. A reduction in stride length due to failure to restore the forefoot lever is also consciously accepted. By reducing the stride length, the dynamics of the gait are reduced and at the same time the forces acting on the residual limb are reduced [3].

Restructured risk group VII

The biggest change has been made to risk group VII, which has been adapted to the current guidelines of the International Working Group on the Diabetic Foot (IWGDF). The division into four further subgroups a - d has provided greater clarity in the treatment of acute foot wounds and active CNOs. In the entire Risk Group VII, any surgical intervention that may be required must

11 Load-bearing foot stump. Photo:

13 Poorly weight bearing short tarsal stump. Photo: Stumpf

12 Orthopedic custom-made shoe with support flap and short peroneal cap as built-in part with DAF.
Photo: Stumpf

14 Botta prosthesis
Photo: Stumpf

be considered before prescribing devices - whether removal of the biomechanical problem that is causing and possibly perpetuating the wound is an option. Interventions range from Achilles tendon lengthening, repositioning osteotomies, tendon cutting and lengthening to removal of pseudoexostoses.

Risk group VIIa

Patients with non-plantar lesions (Fig. 15) receive ready-made bandage shoes (Fig. 16) to protect the ulcerated area from pressure. In case of sufficient pedorthic treatment with shoes which, in conjunction with the dressing, have sufficient volume to relieve pressure on the ulcer area, this can continue to be used.

Risk group VIIb

This risk group includes patients with active CNO without a lesion who have a very high risk of impending sintering of the bony structures (Fig. 17). (For an explanation of the distinction between active and inactive CNO, see the additional criteria).

The standard treatment is a custom knee-high orthosis with DAF (Fig. 18). A total contact cast (TCC) may be considered as an alternative. Ready-made orthoses can also be used for feet that are not severely deformed (Fig. 19). A diabetes-adapted foot orthosis should also be prescribed to provide good individual support for the arch of the foot. (Separate instructions on the use of ready-made devices can be found in the explanation of the supplementary declarations).

The basic treatment principle in this risk group is to eliminate ankle movement and tibial rotation. This requires a careful casting technique and very good modelling of the bony structures of the foot and the tibial crest, and possibly additional knee condyle guidance. Non-removable restorations are superior to removable ones.

Risk group VIIc

Patients with plantar lesions outside the heel region (Fig. 20) are in risk group VIIc. The standard treatment is a non-removable, knee-high, ready-made orthosis (Fig. 21). However, the fit and weight restrictions of each model must be observed. (Separate instructions on the use of ready-made orthoses can be found in the explanation of supplementary declarations). If this is not possible, a non-removable custom orthosis with DAF must be fabricated (Fig. 22). The non-removability criterion for standard treatment is based on the significantly better wound healing rate demonstrated in studies [4].

However, in cases of high-grade PAOD or infection, the devices should remain removable to monitor the wound, as well as in cases of moderate PAOD associated with moderate infection [4]. Severe exudation of the wound will require more frequent dressing changes and possibly a greater amount of exudate-absorbing dressing material. In these cases, the dressing should not be secured against removal and it may be necessary to omit the otherwise useful diabetes-adapted footbed for a short period. However, experience has shown that if the high shaft assisitive-device is worn consistently, the immobilisation and compression effect will reduce wound exudation significantly after a few days.

15 Dorsal lesion. Photo: Stumpf

16 Bandage shoe (Streifeneder). Photo: Stumpf

17 Foot with active CNO, 1st ray already amputated. Photo: Stumpf

18 Two-shell relief orthosis. Photo: Stumpf

19 Ready-made orthosis (Össur). Photo: Stumpf

If there are reasons, such as a particular domestic situation or very limited mobility of the patient, which make it impossible to wear a lower leg orthosis, ready-made bandage shoes or individual interim shoes (Fig. 23) with a corresponding pressure-relieving, diabetes-adapted footbed can also be used. Of course, the use of a TCC (Fig. 24) is also a me-

20 Plantar lesions in the forefoot area. Photo: Stumpf

21 eady-made orthosis with closure (Össur). Photo: Stumpf

22 Two-shell orthosis, sealed with adhesive tape. Photo: Stumpf

23 Customized interim shoe based on plaster cast.. Photo: Stumpf

24 Total Contact Cast (TCC). Photo: Stumpf

dical treatment option where the appropriate infrastructure and expertise are available.

Risk group VIId

Patients with plantar heel ulcers (Fig. 25) are at high risk for prolonged hospitalization and disability periods. These ulcers often lead to lower extremity amputation [5, 6]. For this reason, a separate risk group VIId has been created for this group of plantar wounds.

Customized, non-removable, knee-high heel relief orthoses should be used to provide good condylar guidance and eliminate axial forces. Functional fixation of the foot in maximum dorsiflexion at the upper ankle joint has proven to be a particularly effective method of heel ulcer relief. This reliably prevents the heel from moving up and down vertically during the various phases of gait. The optimal dorsiflexion position of the foot must be determined using the Silfverskjöld test (Figs. 26, 27). Ready-made heel relief orthoses do not meet these functional requirements. The same limitations of non-removability described for risk group VIIc also apply to risk group VIId. The medical treatment option with TCC is also subject to the same limitations as in risk group VIIc.

Explanation of additional information on risk group classification

In individual cases, it may be possible to deviate from the above scheme with simpler or more complex treatments, e.g. after failure of adequate previous treatments or in the case of additional orthopaedic/neurological complications, according to the doctor‘s prescription.

Even if an attempt has been made to systematically assign the various pedorthic assistive devices to the different forms of DFS, in clinical practice there will always be specific initial situations in this very complex clinical picture that are not represented in this scheme. Ideally, an individual treatment option will be found in an interdisciplinary foot consultation together with the patient‘s goals, which may well deviate from the standard treatment.

The prescribed assistive device must always be approved by a doctor together with the patient. Pedorthists will instruct the patient in the use of the assistive device.

Acceptance criteria

- Are the required components included?
- Is the fit guaranteed?
- Is stability, step and gait safety guaranteed?
- Is the assistive devide worn consistently in everyday life?
- Does it function properly in terms of protecting the foot and compensating for functional limitations?
- Have the criteria for treatment with shoes for DFS been met?

The approval of the prescribed assistive device by the physician is primarily a means of verifying that the desired treatment objective has been achieved, ideally in conjunction with the pedorthist involved in the manufacture of the assistive device. In this way, any necessary improvements can be made immediately.

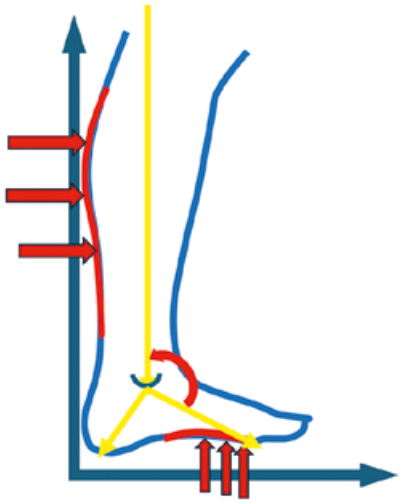
Minimum criteria for the treatment with shoes

For DFS, the minimum criteria for treatment with shoes are

- Sufficient space for the toes in length and height
- Sufficient width
- Avoidance of pressing seams
- Soft material over moving parts of the foot at risk of pressure points
- No toe cap that interferes with the foot
- Removable ready-made padded sole with a 30% reduction in pressure peaks in the bunion area
- Possibility of pedorthic adjustment.

These minimum criteria apply in particular to risk groups IIb - VI. In addition, the Foot Working Group of the ADE Rhineland-Palatinate provides a fitting protocol on its website that lists even more extensive criteria for successful treatments (see the homepage of the Foot

25 Plantar heel ulcer. Photo: Stumpf



26 Use of the dorsiflexion stop in the upper ankle joint to relieve the heel ulcer. Photo: Stumpf

27 Two-shell orthosis to relieve the heel ulcer, cast in the functional dorsiflexion stop in the upper ankle joint. Photo: Stumpf

Working Group (https://ag-fuss-ddg.de) under „Formulare", the document is called „Vorlage-OSM-Protokoll orthop. techn.Versorgung").

The need for pressure distribution measurement

Successful pressure reduction with a diabetes-adapted footbed must be performed and documented using pedobarographic measuring insoles according to the current standard.

As patients are unable to provide reliable feedback on the fit of the shoe due to their PNP and associated loss of sensitivity, measuring the pressure distribution in the shoe using sensor insoles is the only way to obtain an objective assessment of the pressure relief effect. Studies have shown that, with appropriate pressure reduction and patient compliance, the recurrence rate can be halved [8].

The German DGOOC Advisory Committee for Pedorthics and the Expert Group for foot pressure distribution measurement have published a recommendation for performing pressure distribution measurements in Germany [7].

Plaster cast recommended

To correct or functionally compensate for a high degree of foot deformity with orthopaedic custom-made footwear, it is necessary to make a custom last by hand using a plaster cast or similar technique. Although scanning technologies and CAD programs for processing foot data have developed in recent years, unfortunately it is still not possible to capture the corresponding bony structures and soft tissues with the same quality as a trained specialist using a plaster cast.

This is particularly true for high-risk feet in risk groups V and VI, but also for the fabrication of custom orthoses in risk group VII, where moderate positional corrections are often required to achieve correct alignment. Precise modelling of the knee condyle guideanc also requires manual skill when casting.

Ready-made or custom – fit is crucial

When using ready-made assisitive devices (e.g., prefabricated orthoses), the fit must be guaranteed, otherwise a custom assisitive device must be prescribed (e.g., single or double shell orthosis, frame orthosis, or transitional shoe).

The choice between a ready-made and a custom-made assistive device must be made very carefully and is the most controversial with health insurers because of the large differences in price. In principle, a ready-made assistive device should always be considered first, in accordance with the principle of cost-effectiveness.

However, in the sensitive PNP patient group, it is always important to remember that patients are unable to provide feedback on the fit, which can very quickly lead to wounds and, unfortunately, amputations and even death in these mostly multimorbid patients if the assisitive device does not fit properly. It is therefore very often up to the care team to make a responsible decision. In addition to the still very poor information provided by manufacturers on the exact fitting data of, for example, ready-made relief orthoses, weight restrictions (maximum permitted patient body weight) are also limiting factors.

Follow-up

From Group III, outpatient examinations are required at least every 3 months. This is a rough guideline. Ideally, an initial fitting in risk groups IIb - VI should be checked no more than 30 minutes after the initial fitting and then again within the first 14 days, at which time a decision should also be made on the appropriate basic kit with a change of one pair and one pair of slippers. Only if the patient wears the optimal pressure-relieving shoes throughout the day is there a chance of avoiding further foot complications [8]. In risk group VII, closer monitoring is generally required.

Notes on Charcot neuro-osteoarthropathy (CNO)

Definition of terms: The nomenclature of Charcot neuro-osteoarthropathy (CNO) has been adapted to the international nomenclature of IWGDF Guide-

line 2023. Previous names are DNOAP/ Charcot foot.

The distinction between active and inactive stages is based on the following criteria:

Activated Charcot foot

Signs are: Significant inflammatory swelling; redness; sometimes deformity; possibly local, rarely generalised temperature rise; thus overall general clinical signs of inflammation in one or more joint regions of the foot; often accompanied by an increase in CRP due to the destructions; medical imaging not always conclusive; MRI usually „exaggerates" the findings.

Inactive stage Charcot foot

Signs are: Absence of clinical signs of inflammation such as redness, swelling or hyperthermia; skeletal deformity is still present, possibly ulceration of protruding exostoses or bony prominences.

Background

The recommendations for pedorthic treatment in DFS are based on the guidelines of the International Working Group of the Diabetic Foot (IWGDF, version 2023).

An initial risk group classification for diabetic foot care was already developed in 1999, initiated by the DDG Foot Working Group in collaboration with the BIV Orthopaedic Shoe Technology Association.

Due to well-founded indications of weaknesses regarding the insufficient consideration of the orthopaedic aspects of this disease by orthopaedic specialists, the risk group classification was revised in 2005 together with the DDG Foot Working Group, the DGOOC Advisory Committee for Pedorthics and the Central Association for Orthopaedic Shoe Technology (ZVOS) and finally adopted in 2006 under the name „Treatment with shoes and risk classes for diabetic foot syndrome - and analogous neuro-angio-arthropathies".

New scientific findings and the requirement of the National Association of Health Insurance Funds to fund only scientifically proven pedorthic services have made it necessary to restructure the classification after 18 years. In recent years, the International Working Group On The Diabetic Foot (IWGDF) has been very useful in regularly and conscientiously publishing its international guidelines based on the evaluation of current studies. However, these recommendations have to be adapted to the conditions and resources available in Germany.

Discussion

The revised risk group classification for diabetic foot syndrome (DFS) and similar neuro-angio-arthropathies takes into account the latest scientific findings and aims to ensure evidence-based care. At the same time, the aim is to create transparency for all those involved in care; this applies to the prescribing doctors, pedorthists and prosthesists&orthotists, health insurance companies, patients and the entire interdisciplinary treatment team.

However, such a risk group classification cannot reflect all manifestations of this complex clinical condition. For this reason, the most effective type of care can only be achieved in an interdisciplinary team. The focus here is on the patient, their particular life situation and their needs. Only an assistive device that is accepted and supported by the patient will be effective. ■

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On the following pages you will find the risk classes in table form with additional explanations. These can also be found on the AG Fuß DDG website at https://ag-fuss-ddg.de

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New risk group classification for diabetic foot syndrome (DFS) and the the analogous neuro-angio-arthropathies

	Risk group	Explanation	Standard care
0	Diabetes mellitus without PNP/PAOD	Education and counseling	Foot-friendly ready-made shoes
I	As 0, with foot deformity	Higher risk of later occurrence of PNP/PAOD	pedorthic treatment due to orthopaedic indication
II a	Diabetes mellitus with loss of protective sensation due to PNP/relevant PAOD	High risk of unnoticed injuries to the feet, e.g. due to ill-fitting shoes Separate education necessary	for DFS suitable shoe with removable soft cushion sole
II b	D.m. with loss of protective sensation due to PNP and/or PAOD With the following additional criteria: 1. impending dorsal ulcers 2. preulcerative changes 3. Renal insufficiency requiring dialysis	for 1. insufficient toe clearance in insole-compatible ready-made/comfortable shoe, e.g. with pronounced claw or hammer toes. for 2. e.g. hemorrhaged hyperkeratosis	Special shoe for DFS with DAF (diabetes-adapted footbed)
III	Post-ulcer condition	Significantly increased risk of ulcer recurrence compared to group II	Special shoe for DFS with DAF, if necessary with pedorthic shoe adjustment
IV	As II + III with deformities or dysproportions	Not to be treated using a ready-made last (e.g. special shoe for DFS)	Custom orthopedic shoes with DAF
V	Inactive CNO, with recognizable radiological joint and/or bone destruction/pseudoexostosis/static disorder	Inner shoes/orthoses generally for inactive CNO in the hindfoot area or severe perpendicular deviation If necessary, special shoes for DFS with DAF are possible for less deformed feet with preserved weight-bearing capacity	Cross-ankle custom-made shoes with DAF, inner shoes, orthoses
VI	As II with partial foot amputation	at least transmetatarsal amputation, also as an inner amputation.	treatment as IV + V plus prostheses if necessary
VII a	Non-plantar lesions	If sufficient pedorthic treatment is available, which relieves the ulcer region in conjunction with the wound dressing, this shoe treatment can continue to be used	Dressing shoes
VII b	Active CNO without lesion	If there is a risk of sintering of the bony structures The principle of treatment is to eliminate ankle movements and tibial rotation Non-removable assistive-devices are superior to removable assistive-devices Ready-made orthoses can only be prescribed for non-deformed feet	Individual knee-high orthosis with DAF Total Contact Cast (TCC)
VII c	Plantar lesions, except heel	In the case of PNP or mild infection and mild PAOD Or moderate infection or moderate PAOD In the presence of infected ulcerations, AVC or severe exudation, non-removable knee-high orthoses should be used with particular caution; removable orthoses should be used as a 2nd choice or as 3rd choice bandage shoes with appropriate pressure relief should be used.	Non-removable knee-high orthosis (observe weight limit, fit must be guaranteed, otherwise individual orthosis) Interim shoe TCC

DDG ARBEITSGEMEINSCHAFT
Diabetischer Fuß

	Risk group	Explanation	Standard care
VII d	Plantar heel lesion	High risk of transtibial amputation Design with condylar guidance and reduction of axial forces, ready-made heel relief orthoses do not meet these functional requirements In the presence of infected ulcerations, AVC or severe exudation, non-removable knee-high relief devices should be used with particular caution	Non-removable knee-high individual heel relief orthosis TCC

- In the entire risk group VII, it may be necessary to clarify the need for surgical intervention before prescribing the assistive device.
- In individual cases, it may be possible to deviate from the above scheme in favour of a simpler or more complex treatment, e.g. after failure of adequate previous treatment or in the case of additional orthopaedic/neurological complications, on the doctor's prescription.
- The prescribed assistive device **must always** be approved by a doctor together with the patient. Instructions on how to use the device are given by pedorthists.

Acceptance criteria:

Are the prescribed components included?

Is the fit guaranteed?

Is there stance, step and gait stability?

Does it function in terms of protecting the foot and compensating for functional limitations?

Are the shoe fitting criteria for DFS met?

The minimum criteria for DFS footwear are

Sufficient space for the toes in length and height, sufficient width, avoidance of pinching seams, soft material over pressure-prone mobile areas of the foot, no toe cap acting on the foot, removable ready-made cushioning sole with 30% reduction in pressure peaks in the ball area. Possibility of pedorthic adjustment.

- Successful pressure relief with a diabetes-adapted footbed must be performed and documented using pedobarographic measurement insoles according to the current standard.
- Correction or functional compensation of a higher degree of foot deformity using orthopaedic custom footwear requires the manual fabrication of a custom last using a plaster cast or similar technique.
- When using ready-made assistive devices (e.g. prefabricated orthoses), the fit must be guaranteed, otherwise a customised device (e.g. single or double shell orthosis, frame orthosis or transitional shoe) must be prescribed.
- For follow-up, outpatient examinations are required at least every 3 months from Group III.
- Definition of terms: The term Charcot neuro-osteoarthropathy (CNO) has been adapted to the international naming of the IWGDF Guideline 2023. Former names are DNOAP/Charcot foot.
- The recommendations for pedorthic care in DFS are based on the guidelines of the International Working Group on the Diabetic Foot (IWGDF, version 2023).

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Understanding User Practices for a Better Design of Assistive Devices

FRED HOLTKAMP

Patients with orthopedic problems often use assistive devices, e.g., ankle-foot orthoses and therapeutic footwear, to support their mobility. However, many users are not satisfied with their devices or do not use them at all, resulting in a decrease of quality of life. A main cause for dissatisfaction and non-use lies in the process of drawing up requirements. Orthopedic experts* seem to have too little insight in the different areas of life of patients leading to deficient design requirements. In this article a general approach – the so-called Triple I model – is presented to understand the different areas of life of patients.

Introduction

The idea of 'quality of life' in health care can be traced back to the definition of health by the World Health Organization (WHO) in 1948 [1] as "a state of complete physical, mental and social well-being and not merely the absence of disease or other physical defects".

With 'Quality of Life' the standard of health, comfort, and happiness experienced by an individual or group is defined; in other words, it is about "the things that are needed for a good life".

Assistive devices, such as ankle-foot orthoses and therapeutic footwear, are prescribed and designed to improve mobility and to support physical activity, thus attributing in a positive way to quality of life of their users.

However, to be effective, assistive devices should be used daily by those for whom they were prescribed.

Unfortunately, studies in the past have repeatedly shown that assistive devices were not worn at all or only occasionally by a significant proportion of patients. ([2], De Boer et al. [3], Van Netten et al. [4], [5].)

Two main causes of dissatisfaction and non-use were identified [6–9]:

1. Orthopedic experts do not analyze systematically the different areas of life of their patients when drawing up requirements for the assistive device.

2. The different professionals in the orthopedic chain like doctors, orthopedic experts and manufacturing technicians, focus too much on their own profession, instead of jointly developing a good solution for the patient [9].

When patients complain that the assistive device does not support them adequately because specific movements are impossible or because it cannot be used in specific conditions, these complaints can be understood from the present practice in which the daily life of the users is not systematically explored [9].

A recent study in the Netherlands investigated how many of the needs and activities that patients wanted to perform with their assistive devices were actually asked about by orthopedic experts (10).

Participants were recruited from five orthopedic footwear companies in the Netherlands. They recorded their conversations with male and female users who received their first pair of orthopedic shoes.

The activities requested by the orthopedic expert were marked and counted, as were the activities spontaneously mentioned by the users. This showed that the orthopedic experts asked zero to a maximum of seven out of a total of 14 possible activities. On average, the users mentioned one activity during the interview, with answers ranging from zero to a maximum of three activities.

The "transportation" environment, i.e. getting around on foot outside the home, was most frequently asked by the orthopedic expert. This environment was also mentioned most frequently by the users spontaneously. The second most frequently mentioned environment – by both the orthopedic experts and the users – was "daily life at home". Questions about activities within the "work" and "leisure" environments received the least attention.

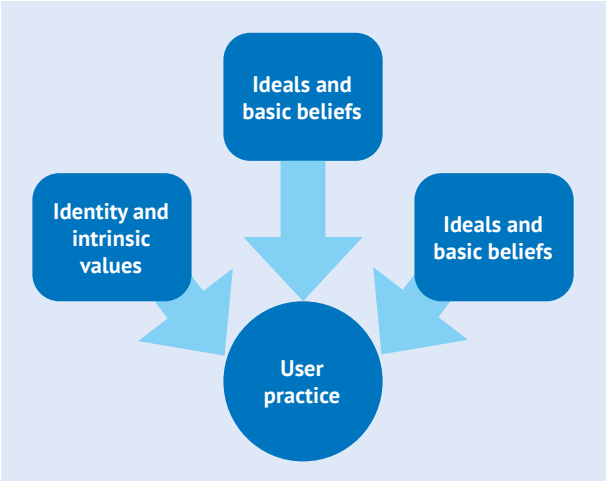
This study shows that both orthopedic experts and patients lack an awareness of the variety of ways in which assistive devices need to be used in patients' everyday lives. The more we know about these needs and can take them into account, the more likely it is that patients will use our assistive devices.

Understanding practices

In recent decades, general models such as the International Classification of Functioning Disability and Health (ICF) have been developed, to map health and environmental conditions of individuals [11].

The ICF is a framework for describing, classifying and organizing informati-

*It has to be noted that the name of the various professions involved in orthopedic services in healthcare is not universal. In this article, we use the term 'orthopedic expert' for professionals at bachelor and higher levels. Equivalent terms are 'certified orthotist', 'orthopedic shoe technological expert' (orthopedic shoes), or 'pedorthist' (manufacturer of orthopedic shoe wear).



1 Graphical representation of the Triple-I model for user practices

on on functioning and disability. ICF recognizes the role of environmental factors in the onset of a disease or disability, as well as the relevance of associated health conditions and their effects [11].

For the field of orthopedic experting, in which devices are designed to enhance functioning and participation related to mobility, the ICF cannot, as such, offer direct and practical alternatives towards possible solutions respecting the conditions in which an assistive device for mobility enhancement is used.

However, there are certainly models that offer more orientation for a user-oriented design. The Matching Person and Technology (MPT) model [12] focuses on three primary areas that differentiate technology users and non-users:

(a) personal and psychosocial characteristics, needs and preferences;

(b) environmental factors; and

(c) functions and features of the technology [13].

The Human Activity Assistive Technology (HAAT) model [12] relates the personal characteristics, the objectives of the user and the assistive device that has to overcome obstacles in a certain context.

The merit of both models is that they have identified general key parameters for designing assistive devices.

However, for daily practice, a specific manner to map specific activities and environments of patients in a complete manner, is not available. In our opinion, practice approaches are very suitable to explore the world of the orthopedic experts and the different areas of life of patients. [14].

The main reason is that these approaches focus on the activities that are carried out in a certain context. They concentrate on the activities done by orthopedic experts during the intake and on the activities that patients with mobility problems would like to do in different areas of their life.

One of the reasons for their usability is that they force us to rethink the role of all involved stakeholders (professionals, patients, users).

Another reason is that they invite us not only to describe what people do but also to understand their activities from the perspective of meaning-making.

The Triple "I" model

In this article, we would like to introduce one specific practice approach, the so-called Triple I model [11,12]. Triple I has been developed in close cooperation with healthcare professionals and experts and has a solid foundation in sociological, organizational and philosophical theories of practice. [16-20]. For that reason, it can be expected that it also fits to the world of the orthopedic expert.

The Triple I can be used to understand the nature of the professional practice of the orthopedic expert who creates the requirements. This perspective is necessary to understand the activities of orthopedic experts and why they behave the way they do.

It also can be used to understand the nature of the different areas of life in which a patient uses an assistive device. This perspective is necessary to understand the meaning of the different activities for the patients and why they behave the way they do in the different areas of life. In this article, we use the term "user practices" to refer to these life domains.

The Triple I approach [15] offers three perspectives for understanding a practice.

The first "I" refers to the identity and intrinsic values of an orthopedic experts practice. This practice can be described as "caring for patients with problems of mobility". In this practice, the technical solution plays a key role. However, this does not change the fact that all activities in this practice must be focused on the well-being of the patient. The intrinsic values of this practice are empathy, respect, care and trust.

The second "I" refers to the interests of those involved in a practice. Orthopedic experts have their own specific network of stakeholders, for example orthopedic surgeons, insurance companies, material suppliers, manufacturers of medical devices, associations of orthopedic experts, their professional association and so on. Each stakeholder has its own legitimate interests.

The third "I" refers to the influence of social views, cultural developments and the zeitgeist. These phenomena are summarized with the words "ideals and basic convictions". In recent decades, for example, ideals such as the promotion of patient autonomy and quality of life have become increasingly important.

These ideals shape the treatment of patients, the way orthopedic experts work and the protocols and guidelines of the practice.

The third "I" also has a temporal component: it is about the ideals and core beliefs that are embedded in professional practice (past), that influence professional practice (present) and that will change professional practice (future).

The interrelationships described above show that the professional practice of orthopedic experts is also a "battle scene" of "players". Orthopedic experts must always focus on the well-being of their patients, but they are naturally caught up in a system of different interests that make it difficult to achieve this goal. Ultimately, there is always an economic side to their work, which can come into conflict with their own demands, the demands of the patient and the demands of the health insurance companies. Health insurance companies are not always prepared to pay for the best assistive device from the point of view of the craftsman and patient.

The Triple I model can make the different interests of the various stakeholders clear and thus provide a point of reference for starting a dialog about these interests.

It also challenges experts to understand the ideals and core beliefs of the current culture. For example, ideals such as "autonomy" and "quality of life" challenge orthopedic experts to understand the patient's view of quality of life and to make decisions in dialog with the patient.

In summary, the three I's are "lenses" through which we analyze and interpret professional practice. These different lenses are not independent of each other, but influence each other.

Insights into user practices

Apart from understanding the professional practice of the orthopedic expert, the Triple I model can also be used to understand the world of the patient, see Figure 1.

Whereas an orthopedic expert works in one professional practice, the patient's life consists of several different practices, which we call 'user practices'.

Each practice has its own identity and intrinsic values, interests, and ideals and basic beliefs, comparable to professional practices, but with a different meaning.

To show the strength of the Triple I model and to illustrate the practicability of this approach, we present the

The case of Peter

Peter is 58 years old, married and has no children. He lives with his wife in a small apartment without an elevator on the second floor in the city center. They have a dog. He commutes every working day by bus between his home and his work as a maintenance technician in a large factory specializing in the manufacture of microchip-controlled machines. In his spare time he goes fishing, preferably at sea, and one evening a week he does yoga.

Peter has had back surgery for a hernia. During this operation, one of the nerves that control the foot was damaged. Since then, he has suffered from drop foot. He is no longer able to lift his foot. As a result, all walking movements are more difficult, especially when the ground is uneven and complex movements are involved. The risk of falling is also increased. To overcome these limitations, he receives an ankle orthosis. In the following, we will take a closer look at the requirements that this orthosis has to fulfill in Peter's life. The brief description of Peter's life shows that five areas of his life are important and affect his mobility:

In his daily life at home, he has to climb the stairs to his apartment every day. It is important for his wife that he still feels comfortable at home. To this end, it is important that he can move around in the sometimes small and narrow rooms without restriction. It is also important to his wife that he supports her in the household and can do all the tasks in the kitchen, such as cooking or loading and unloading the dishwasher.

In the practice of his work, the most important stakeholders or actors are his boss and his colleagues. The main interest of his boss is that Peter performs his tasks efficiently and that his foot problem does not increase his absenteeism. The main interest of his colleagues is that Peter is flexible at work if one or more of his colleagues are absent. The assistive device must support Peter in all movements required for maintenance, e.g. sitting on his knees, crawling under machines, standing on stairs and moving and turning in confined spaces. It also has to fit into his safety shoes.

The most important means of transportation for Peter are bus, train and bicycle. His most important values are comfort and safety. On the bus (which is overcrowded at peak times), he needs to be able to take small steps and walk sideways. The owner of the bus and train company is interested in Peter not taking longer to get on and off the bus than other passengers.

When cycling, he must push the pedals (circular movement) and move his leg sideways when he is standing. For the assistive device, this means that sufficient support must be provided when cycling and the device must therefore be designed with a certain degree of rigidity.

For Peter, the intrinsic values of yoga are a perfect combination of the search for peace and serenity. In addition, yoga includes exercises that help to stay in shape and gain more self-confidence. However, Peter is unable to perform some of the exercises due to the rigidity of the orthosis. The yoga teacher's main concern is that Peter can perform his exercises without hindering his fellow students. The identity of the practice of fishing with friends at sea is a typical social activity.

Peter wants to do all the activities with his friends himself as much as possible. He wants to participate in fishing like a "normal" person. The main purpose of the aid is to help him take small steps in the boat and maintain his balance in strong waves. The assistive device must also be able to withstand the conditions of sea fishing, e.g. salt, moisture and cold.

	user practice or areas of life	identity and intrinsic values	interests of stakeholders	ideals and basic beliefs	specific movements	conditions
1	**daily life at home**	social context: living – being together, supporting each other, enjoying life	spouse is main stakeholder: her main interest is that her husband is happy and can move freely in and around the house	freedom, autonomy, independency	maneuvering in small rooms (kitchen), walking stairs, walking in and outside the house	standard
2	**work**	technical and economic context: quality and safety	employer is main stakeholder: his interest is that Peter works in an efficient way	self-development		wearing safety shoes
3	**transport**	transport context: convenience and safety	bus and train company are main stakeholders: biking in public space, all users of public space are stakeholder: get on and of easily no hindrance for fellow passengers and public space users.	social and economic participation, independency		standard, moisture (rain)
4	**social activities and sprituality**	social and spritual – being together, being meaningfull, finding inner peace	Teacher and fellow participants are main stakeholder. Their Main interest is no hindering fellows and independent practicing the exercises.	independency, self-consciousness, indfependecy		wearing no shoes – barefoot
5	**sport and leisure**	social context: friendship, being a very close friends	friends are most important stakeholders: they want to get along easily with all activities	social participation		salt, moisture, coldness

Table 1. A summary of all details of the life of Peter that are relevant for prescribing a new assistive device.

case study of Peter (s. info-box p. 25 and table 1).

This information about Peter's life provides the orthopedic expert with the relevant know how to discuss the best possible solution with the user, to make together a decision, and to draw up detailed specifications.

In relation to the specification this means that the orthopedic expert needs to think over how these demands are to be realized, for example using a stiff material in a construction that allows a certain flexibility or a flexible material with some construction elements that stiffens the ankle foot orthosis in certain places.

An alternative solution can be a custom-made orthopedic safety shoe to use during his work, in combination with an ankle foot orthosis and ready-made shoes to use in his home and leisure time.

In conclusion, the case of Peter clearly shows the fruitfulness of the Triple I model. It offers a practical approach to consider the different areas of life systematically. It gives the opportunity to discuss the variety of possible solutions and to choose the preferred solution together with the user in a process of shared decision making.

We would like to highlight that the case of Peter shows that the Triple I model addresses the personal and environmental factors of the ICF model in-depth. [21,22].

Developing A Methodology to Draw up Specifications

The case of Peter shows that patients use their device in different areas of life, and that every area has its own requirements, needs and conditions.

The first step is to identify the different practices in which a patient will use the assistive device.

The second step is to execute a Triple I analysis for every user practice. During the patient examination time is available to explore these practices.

The third step is to perform an activities-movements analysis for every practice. That means: for every practice the activities of the patient have to be mapped and the associated movements have to be made explicit.

The fourth step is to specify the conditions for every practice. The most important parameters are the condition of the surface, and physical conditions like temperature and humidity.

The last step is to draw up the specification. However, it cannot be guaranteed that all needs and wishes can be realized in one device.

For example, in certain cases descending the stairs asks for a relatively flexible way of moving the foot. For walking, a more immobilized foot to generate sufficient support is needed. In this case, these two conflicting demands, flexibility and rigidity, can be realized in the device by a partly ridged and flexible construction around the foot.

It has to be noted that extensive mapping of the different life areas may reveal that it is not possible to meet all the requirements within one device. For exam-

ple, a particular person would like to ride the bike but has insufficient control of the foot. In this case a standard assistive device, for example an ankle foot orthosis, cannot accomplish all wishes and demands.

At the same time, the model helps to clarify such impossibilities, and helps to discuss and address expectations with the user. Further research needs to be undertaken to examine the consequences of mapping the user practices for the design requirement specification set up.

The Triple I approach will induce a change in the professional practice. Presently, orthopedic experts do not investigate the areas of life of patients in-depth [9].

The Triple I model and its methodology, however, urges the orthopedic expert to analyze all areas of life in which the patient has to use the assistive device and has to understand the meaning-making of all these areas from the personal characteristics of the patient.

We believe that this change will lead to a transformation in the way the professional is acting: only in this way the patient with his or her preferences, motivations, needs and wishes, will become the focus of what is called 'patient centered' design and care.

To find its way in research and clinical practice, the Triple I model and its methodology have to be translated in, e.g., a flowchart model and an (automated) structured questionnaire (internet application). In this way the user concerned can provide information on their practices in a systematic way to the orthopedic expert. This could be already performed at home before the consultation. During the intake or patient examination process these answers are to be discussed.

On first sight, the process of asking and answering questions might seem time consuming. However, the advantage is that much more information becomes available in a systematic way to be used in the design process, leading to better products, better alignment to expectations and shared decision making, less adjustments afterwards, and less second opinions. And that, on its turn, saves a lot of time.

The application of the Triple I model and its associated methodology will increase the quality of the specification, which is a precondition to improve the quality of orthopedic care and to increase the quality of life of patients with mobility problems. ■

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