

ANNUAL REPORT

2018



60 YEARS | **AO Foundation**
Transforming surgery,
changing lives

AO

Founded 60 years ago, the AO is a medically-guided, not-for-profit organization, a global network of surgeons, and the world's leading educational and research organization for the surgical treatment of trauma and musculoskeletal disorders.

Today the AO has a global network of over 215,000 health care professionals. Each year it offers over 830 educational events around the world, supported by nearly 9,000 faculty and attended by over 58,000 participants. It has 20,000 surgeon members working in the fields of trauma, spine, craniomaxillofacial, veterinary, and reconstructive surgery.

In this video, AO Foundation CEO 2011-2018 Rolf Jeker and AO Foundation President Robert McGuire talk about their achievements over the past year, and the AO's plans for the future.

Patient outcomes



The AO began with a problem: how to improve patient outcomes. This is the priority for everyone at and involved with the AO. The AO covers different specialist areas, brought together into one global network, one powerhouse of excellence focused on improving patient outcomes.

In 2018 the AO celebrated the first 60 years of its history. This milestone offered the AO time to take stock and contemplate on the challenges the AO founders faced as they worked to gain acceptance for their new approaches—which are now the gold standard in the surgical treatment of fractures and musculoskeletal disorders.

A living legacy

In the AO's 60th anniversary year, the decision was made to create a CHF 15 million Jubilee Fund, provided over five years, to safeguard the AO's legacy and ensure ever more people around the world have access to appropriate, timely care.

This Jubilee Fund channels a grant of CHF 10 million to supporting the launch of a World Health Organization (WHO) global initiative to improve emergency and trauma services in multiple countries around the world. The Global Emergency & Trauma Care Initiative will make simple, affordable, life-saving interventions available to ensure timely care for all people in need.

“No one should die for the lack of access to emergency care, an essential part of universal health coverage,” said WHO Director-General Dr Tedros Adhanom Ghebreyesus in a statement. “We have simple, affordable and proven interventions that save lives. This initiative will ensure that millions of people around the world have access to the timely, life-saving care they deserve.”



Image courtesy of the WHO.

A contract signing ceremony marking this significant agreement was held on-stage in the Congress Center Davos as part of an event to mark the AO Foundation's 60th anniversary. AO Foundation President Robert McGuire and the WHO's Etienne Krug participated. Speaking on-stage at the event, McGuire said “We are proud to launch this collaboration with WHO, addressing a neglected public health issue which is fully in line with our mission and expertise.”

The other CHF 5 million of the Jubilee Fund is to be spent on AO initiatives in low- and middle-income countries over the same five-year term.

Navigating complexities

The health care environment today is more complex than ever before. Clinicians have many more treatment options than in the past, and patients have higher expectations regarding outcomes and the relationship they will have with those who treat them. However, how to measure outcomes in orthopedics is still poorly understood, and the existing literature is confusing and is not comparable.

AOTrauma's Research Clinical Priority Program (CPP), Clinical Outcome Measurements of Fracture Treatment, aims to address this issue. This program, launched in 2018, recognizes the critical need today for an approach to assessing patient outcomes that can be applied internationally. With a global network of over 215,000 health care professionals, the AO is the ideal place to carry out this research.

Working with 16 external partners that are leaders in the field as well as AO Research Institute Davos (ARI), AO Clinical Investigation and Documentation (AOCID), and the AO Technical Commission (AOTK) System, AOTrauma is following in the spirit of the AO's founders in this program that will produce guidelines to allow orthopedic surgeons to best direct fracture treatment, aftercare, and rehabilitation. In 2018, a consortium was established to work on patient outcomes and a CPP was defined and officially launched, with an initial term of five years.

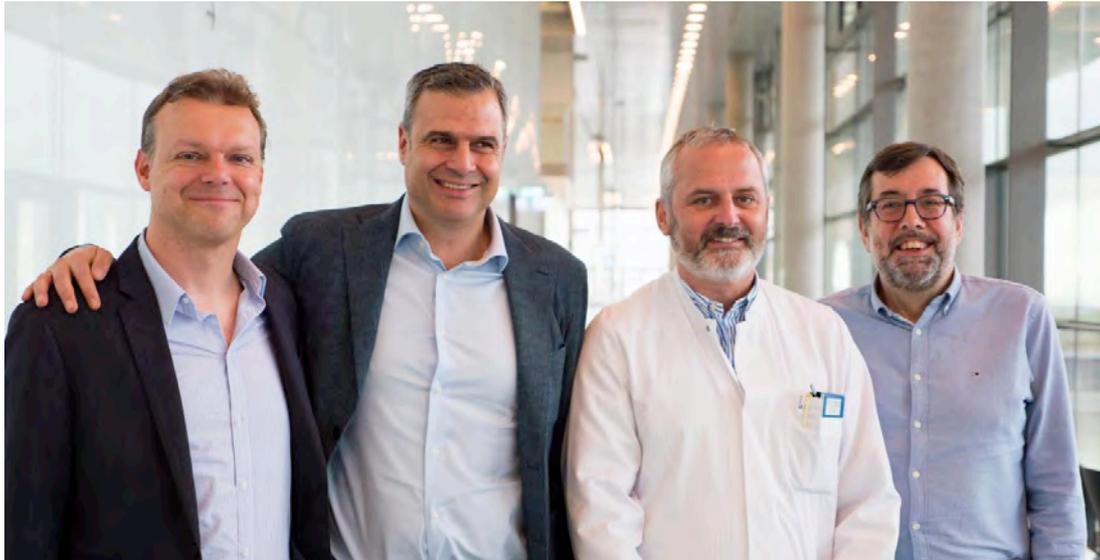


Dr Marilyn Heng

This is in step with the continuing advance of patient centered care in all disciplines of medicine—including orthopedics. Technological solutions are part of the answer—as can be seen in soles inserted into shoes to monitor weight and activity, but for optimum personalization this goes in hand with standardized and localized approach to patient reported outcomes. Headed by Dr Marilyn Heng at Massachusetts General Hospital, United States, this consortium is broader and involves more international partners than similar projects that the AO has previously led.

Building partnerships—to improve patient care

The AO understands that engagement with partners within and beyond its global network of over 215,000 health care professionals is central to its continued ability to respond to significant clinical problems.



AOTK System Director Claas Albers, Business Unit Lead SPI (Surgical Process Institute, Digital Surgery) Felix Wandel, AO Foundation President-Elect Florian Gebhard, and AO Education Institute Director Urs Rüetschi.

In 2018, the AO signed a memorandum of understanding with the Surgical Process Institute (SPI). Based in Leipzig, Germany, SPI's goal is to improve treatment quality and patient safety by reducing variation in surgical standards and approaches, meaning that wherever patients are treated they will be able to expect the same high level of quality. This is in line with the AO's mission of promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

Together, the AO and SPI will work to transform the surgical experience by bringing together AO's surgical content and principles and SPI's technology. This starts with an initial assessment of the scope of work involved in digitizing AO standards and aligning workflows with SPI.

The real-world goal of this will be to digitize AO standardized procedures using SPI technology so that they are available to surgeons in the operating theater when they are most needed. As part of this work, the AO will also explore surgical performance comparability, and will develop metrics to measure performance and to detect difficult steps.

Expanding our horizons

In an increasingly complex medical device field, it can be difficult for small businesses or individual innovators to bring their innovations to the market. The AO Development Incubator (AODI) helps clear a path through this complex environment for innovators, wherever they are.

Working with the Queensland University of Technology, Australia, on biphasic plating and with the AO Research Institute Davos (ARI) on the AO Fracture Monitor, the AODI helps bring inventions into clinics, in cooperation with institutions around the world. For the AO's global network, AODI offers innovators a clear route to develop their innovative ideas to the highest standards so they can have a positive impact on patient outcomes. Today, the AODI evaluates over 100 innovation ideas from more than 50 countries each year.

Back to our roots

Patient case documentation was an essential part of the AO founders' work to standardize treatment and improve patient outcomes. Today, AO Clinical Investigation and Documentation (AOCID) leads the AO's work in clinical studies and clinical evidence. In 2018, AOCID ran 66 studies in 37 countries, and enrolled about 1,100 new patients, resulting in a total of 4,500 patients in the monitoring phase.

Sixty years ago, the founders pioneered documentation involving physical patient files, medical cards, and X-rays. They worked to collect information relating to patient outcomes in a standardized way. Built on these solid foundations, the AO now collects magnitudes more data via digital technology.

In today's highly regulated environment, the AO plays a unique role that is distinct from, and complementary to, industry. It provides an environment open to academic research that offers the scientific freedom to explore without fearing failure.

The AO Registry established in collaboration with OBERD in 2018 was set up to meet the need in our surgeon community for the standardized, comprehensive collection of patient outcomes—both those defined externally and those reported by the patients themselves.

The analysis of real-world data is essential in the AO's continued advances in improving treatments for trauma and musculoskeletal disorders.

Responding to changing needs

With its strong focus on educating surgeons to help them make better informed decisions as regards patient treatments, AORecon continued to respond to a growing need of ageing populations requiring more and better treatments of degenerative joint diseases.



AOREcon Skills Lab station at AOREcon Course—Principles of Total Hip and Knee Arthroplasty in Dubai, UAE

Since its foundation in 2014, AOREcon has organized over 70 events reaching close to 11,000 surgeons across the world with leading arthroplasty experts as faculty. More than a third of all educational events it held in 2018 took place in Asia Pacific, a region where the call for high-class education makes it a high priority for AOREcon.



Practical exercises at AOREcon Course—Complex Total Hip and Knee Arthroplasty, Singapore

When it comes to creating and shaping the educational content, patient problems and best patient outcomes are the starting point of the AO curriculum development process.

The desired results determine the preceding steps; necessary competences are derived, from which specific learning objectives are defined. Thus, an AOREcon curriculum course follows a systematic and holistic approach and is consistently patient-centered.

With the support of the AO Education Institute, AOREcon has developed three such curricula: two hip and knee courses, one on primary arthroplasty and one on complex and revision cases, and—in cooperation with AOTrauma—a course on periprosthetic fracture management. A fourth one, addressing shoulder-specific issues, is on its way.

Patient reported outcomes to deliver better care

In 2018, AOSpine continued its work through the AOSpine Knowledge Forums to improve patient outcomes. One key advancement was the development and validation of a patient reported outcome tool in the treatment of spine cancer, namely the Spine Oncology Study Group Outcomes Questionnaire (SOSGOQ2.0). This health-related quality of life tool will have meaningful impact for the well-being of spine cancer patients because it aims not only to evaluate their quality of life but to improve it.



2nd AOSpine Advanced Level Live Tissue Training, Acibadem University, Istanbul

AOSpine encourages clinicians to use and build the SOSGOQ2.0 into their practices as a way of evaluating which patients improve and which do not. It will enable greater clarity over key questions in treatment and recovery such as the definition of “meaningful change” from the patient perspective and enhance the ability to predict patient outcomes.

New clinical tools and resources available for spine surgeons in 2018

- AOSpine Injury Classification system (Upper Cervical, Subaxial, Thoracolumbar, and Sacral)

The SOSGOQ2.0 is available in English and is currently being validated in Dutch and Hungarian. It has been translated into German, and there is interest in translating it into Russian, Thai, and Turkish. It has also been integrated in OBERD, a company with which the AO has partnered and which is supporting patient-reported outcomes data collection system in orthopedics.

AOSpine's goal is to see this become the standard patient-reported outcome measure for spine cancer patients to ultimately improve their quality of life. AOSpine knows that all of its efforts to innovate in education and deliver outstanding research, treatment guidelines, and new measurement tools work together to benefit patient outcomes.

- AOSpine Masters Series—the complete 10 volume book series



AOSpine Simulation Course, Minimally Invasive Cockpit Surgery, Dubai

Published in 2017, the AOSpine-developed clinical practice guidelines for acute spinal cord injury and degenerative cervical myelopathy were presented and launched at the 2018 Global Spine Congress. These guidelines ensure appropriate management and define treatment strategies to help clinicians improve patient outcomes by making evidence-informed decisions. The year 2018 also saw this initiative backed by SCIRE, and further interest expressed by the World Federation of Neurological Societies (WFNS) and the Rick Hansen Institute (RHI).

The AOSpine Patient and Clinician Reported Spine Trauma Outcome Measures (AOPROST and AOCROST) currently under development aim to create and validate a multidisciplinary, universally applicable, outcome tool for spinal trauma patients that brings together the patient perspective and that of the health care professionals.

Top 3 papers published in 2018

- Versteeg AL et al. [Psychometric evaluation and adaptation of the Spine](#)

This is much-needed recognition of the increasingly central decision-making role patients play in treatment, as the relationship patients expect with their health care providers today is very different from that seen five, ten, or 60 years ago.

From the past to the future—strategies for success

The AO Strategy Fund was created to expand the AO's opportunities to improve patient outcomes in the fields of trauma and musculoskeletal disorders. There are several brilliant ideas about how to advance patient care being developed outside the AO. The AO Strategy Fund exists to help create a pathway to bring these new ideas into the organization. There are echoes in this of the disruptive thinking that drove the AO's founders 60 years ago.

In 2018, AOVET collaborated with the AO Strategy Fund on a project that is set to benefit the entire AO and the broader scientific community: the creation of a comprehensive database that will allow scientists to more effectively choose models for fracture research. This will help the development of new treatments and make it possible to improve patient outcomes. Importantly, it also minimizes the need for the use of animals in this process.

[Oncology Study Group Outcomes Questionnaire to evaluate health-related quality of life in patients with spinal metastases.](#) Cancer 124(8): 1828-1838, 2018.

- Lenke LG et al. [Lower Extremity Motor Function Following Complex Adult Spinal Deformity Surgery: Two-Year Follow-up in the Scolio-R](#). J Bone Joint Surg Am 100(8): 656-665, 2018.
- Fehlings MG et al. [and risk factors of postoperative neurologic decline after complex adult spinal deformity surgery: results of the Scolio-R study.](#) Spine J 18(10): 1733-1740, 2018.



Dr Carl Kirker-Head, Chair, AOVET International Board

This database brings together over 4,000 journal articles—published from the 1970s to today—describing animal use in fracture research. Each year there are around 250 papers published in this field, and the database is built to grow. This offers researchers a single entry point to the comprehensive archive of research in this field.

This AOVET and AO Strategy Fund initiative is part of the AO's commitment to digital transformation and expanding the value it offers its members, its network, and the scientific community. It also further safeguards animal welfare, a long-term priority for AOVET within the AO, as its positioning of the AO as a core member of AAALAC International shows.

Going where the need is greatest

In March 2018, AOCMF held a seminar in Bhutan in association with the 3rd International Craniofacial and Dental Summit 2018. This was the first time that AOCMF had held an event in this country, where although health care is free, resources are limited.



AOCMF faculty and participants at the AOCMF Introductory Seminar in Bhutan

The seminar focused on giving local surgeons the latest information on treatment approaches in their field and helping enhance their skills to improve patient care. Surgeons from across the country came to attend the event, where they learned both the theoretical basis of the operative treatment of CMF fractures, and their complications, and were able to take part in practical exercises.

New AO Mobility Toolkit could become the standard in large, multicenter research trials

Originally conceived as a “mobility toolkit” enabling physicians and researchers to collect and use objective outcome data on patient performance-based measures (PBMs), the AO Mobility Toolkit project was launched in 2015 and is today an ever-evolving and ever-expanding software suite.

It encompasses three motion sensor applications and two website functions for use by rehabilitation physicians, physical therapists, orthopedic surgeons, neurologists, geriatricians and prosthetists, and could be very useful to total joint replacement surgeons tracking patient mobility before and after surgery.

“There are many electronic systems available to monitor patients' mobility, but the AO Mobility Toolkit is the first one being utilized in large, multicenter research trials, and it could potentially become the standard for use in multicenter clinical research,” said Project Leader Dr Stephen Sims, past chair of AOTrauma North America, AO Foundation Trustees Alumnus, past AOTrauma International Board member, and editor for the AOTrauma Pelvis and Acetabulum Education Taskforce.

“There are many electronic systems available to monitor patients' mobility, but the AO Mobility Toolkit is the first one being utilized in large, multicenter research trials, and it could potentially become the standard for use in multicenter clinical research,” said Project Leader Dr Stephen Sims.

Sims' collaborators on the project were recently retired Dr Richard Peindl, chair of Bioengineering at Atrium Health (formerly Carolinas Medical Center); AO Foundation Past President Dr James Kellam; and Dr Rachel Seymour, director of research of the Musculoskeletal Institute at Atrium Health.

The project has its roots in Peindl's interest in assessing fall risks of head injury patients and elderly patients. A funding shortfall had stalled development of a mobility cloud for storing information related to that work, and that's where Sims, the AO Mobility Toolkit project team—and the AO Strategy Fund—stepped in.

Today, the AO Mobility Toolkit is being used in two research centers and soon will be used at an additional seven sites, Sims said, including centers that are part of the US Department of Defense-funded Major Extremity Trauma Research Consortium (METRC). It's also listed in other research projects that could expand it to another five or 10 sites.

“This project would not have taken place without support from the AO Strategy Fund. There has also been significant financial support from Atrium Health, as well as Atrium Health Clinical Research,” Sims said. “The AO Mobility Toolkit project has shown that you can—in a very simple, non-intrusive way—get a much more refined objective measurement of patient PBMs and that this can be a very valuable research tool.” said Project Leader Dr Stephen Sims.

More on patient outcomes at AO in 2018



Healing signals
from the
bone: towards
the world's
first
continuous
healing sensor

Read online



Soft-Tissue
Management
initiative
update

Read online



AOTK Experts
Symposia
respond to
clinical needs

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Innovation



Today the AO is the leading innovator in the surgical treatment of bone fractures and disorders. Innovation at the AO goes from bench to bedside, including basic research and innovation, product development, and clinical validation.

At the core of the AO's innovations and approvals process is the AO Technical Commission (AOTK) System. A key part of developing and bringing innovations to market, the AOTK System is central to the AO landscape. It plays a crucial role in quality control and product development, forming an essential link between AO Clinical Divisions, the other institutes, and the AO's global network.

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Innovation at the AO has remained the same, finding solutions to clinical problems—meeting patient treatment needs. What has changed is implementation and the way that innovation is moving forward.

Robert McGuire, President, AO Foundation

To be an innovation leader in the treatment of trauma and musculoskeletal disorders, the AO itself must be willing to change, develop, and innovate. It is this willingness that will ensure it retains not only its leadership position on the market, but also its long-term relevance to the broader community.

AOTK System approvals in 2018

In 2018, the AOTK System approved a suite of products that will benefit patient outcomes across all areas in which the AO is active.

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You must know everything in your field, and then you must have a brilliant idea.

AO Foundation President-Elect Florian Gebhard

Within the AOTK Trauma, the most recent innovation from the Intramedullary Nailing Expert Group (INEG) is the Femoral Recon Nail (FRN), which enables surgeons to treat a broader range of complex femur fractures in adults and adolescents. It is an advance from previous models; thanks to its enhanced anatomical fit, it allows different surgical entry points and offers a reduced risk of distal cortical impingement.

The FRN comes with streamlined insertion instruments that help ensure that it is correctly placed and that reduce the length and complexity of the surgery involved. This nailing system is the result of six years of intense development in direct response to identified clinical needs and offers real benefits to patient care worldwide.

In 2018, the AOTK System continued its focus on continuous compression implants used in musculoskeletal fixation made from nickel titanium alloy, Nitinol. Nitinol displays super-elastic qualities and shape memory effect; this rubberlike elasticity means Nitinol products offer unique benefits in their medical application to treat fractures. Limited AOTK approval has been given to the first Nitinol Staples products: Speed, Speed Shift, Speed Arc, Speed Titan, Speed Triad, and Elite.

The Veterinary Expert Group has developed a new plate solution, the Equine T-Plate, for the treatment of physeal fractures of the proximal tibia in foals. The AOTK-approved locking compression plate (LCP), Equine T-Plate, is an optimum approach to treating active foals and is available in a range of sizes. Among its advantages are versatility: It can be used to treat other injuries of the long bones.

Two new products for CMF treatments were also approved in 2018. The first was a support system to help surgeons plan treatment using patient specific implants (PSI), with patient outcomes at the forefront of this work to improve clinical reliability and workflow efficiency. This includes technique guides and an integrated 3-D virtual approach to the online designing process of TruMatch PSI products.



AOCMF Course—Advances in Medical 3D Planning and 3D Printing

The second is the RAPIDSORB Injectable Polymer System (IPS) which has been developed to offer a faster alternative to the fixation of resorbable plates with resorbable screws. This second-generation IPS has been successfully updated to offer greater usability, simplifying fixation to just two steps: drill and fill. It is intended for non-loadbearing applications of the craniofacial skeleton in the pediatric and adult population.

Increasing demand for solutions to improve minimally invasive surgery (MIS) on the spine has led to AOTK Spine's launch of two new products that help clinicians improve patient outcomes in the treatment of low back pain through fusion surgery. The first is VIPER PRIME, an innovative all-in-one instrument system that eliminates the need for guidewires, Jamshidi needles, and additional pedicle preparation instruments in minimally invasive spinal fusion surgery.

Its unique feature, the self-starting screw tip design and a stylet fully controlled by the screw driver, allows safer procedures and reduces the time needed for these procedures by 33%. Over 1 million cases of lower back pain are treated with fusion surgery around the world each year.

The second is the CONCORDE Clear MIS Discectomy Device. This tool specially designed to enhance MIS discectomy procedures will provide for more efficient disc clearing and endplate preparation in less time than using standard discectomy tools. Surgeons will be able to quantify and estimate the volume removed during the procedure. In 2018, an estimated 140,000 discectomies were performed alongside interbody fusion procedures across Europe, Middle East, and Africa; an increasing proportion of discectomies are minimally invasive.

Individualized treatment pathways

In 2018, the AO Research Institute Davos (ARI), with AOTK System and AO Development Incubator support, continued its development of the AO Fracture Monitor, an implantable biofeedback sensor device for the continuous monitoring of fracture healing status, patient compliance, and the early detection of delayed healing or non-union.

Innovation from the anti-infection task force

Since its inaugural meeting in August 2016, the Anti-Infection Task Force has focused its efforts on pioneering work to improve the diagnosis, prevention and treatment of infection. Chaired by Prof. Michiel Verhofstad (Rotterdam, the Netherlands), the AITF comprises global key opinion leaders in the field of infection, including orthopedic and trauma surgeons, microbiologists, infectious disease specialists, and basic scientists.

Fracture Related Infection (FRI) is a significant global problem, compounded by heterogeneity in diagnosis and treatment due to the lack of evidence-based guidelines. Members of the AITF saw a clear opportunity to address these clinical problems by leveraging the AO's reputation and global reach to bring together key opinion leaders to reach a consensus on the requisite clinical approaches. A broad consensus on diagnosis and treatment principles for FRI was achieved at a meeting held in Zurich, Switzerland in February 2018. Supporting the meeting were 35 experts and key opinion leaders in the field of FRI including trauma surgeons, infectious disease specialists, a plastic surgeon, clinical researchers, and research scientists. Representative organizations included the EBJIS, the Orthopedic Trauma Association (OTA) and the Pro-Implant Foundation.

Recommendations for the diagnosis and treatment of FRI will be published in 2019. Members of the AITF agree that trauma surgeons worldwide need access to a single, reputable site to access these FRI recommendations, and they are looking to develop an app to achieve this aim. The availability of such guiding principles should enable improvements in clinical studies on infection incidence, treatment cost, treatment strategy effectiveness, and patient outcomes.



Members of the international consensus group, Zurich, Switzerland

Identifying and recognizing development potential

AOTrauma's research focus is currently firmly on innovation in education, and in 2018 it established a mechanism by which the application of new technologies in education can be evaluated. New technology and innovative approaches have been incorporated into AOTrauma's Competency Training and Assessment Program which kicked off in 2018.

The AO is constantly looking to identify areas where it can engage with its members, its network, and the broader community to identify and support the development of innovative ideas. In 2018, the first AOTrauma Innovation in Education Award was presented at the AO Davos Courses. It recognized Klaus Dresing and Matthias Süncksen for their work on a virtual reality X-ray simulator. There is no other award in this sector, and this will be awarded annually. This year also saw the launch of the AOSpine Discovery and Innovation Awards.



From left: AOTK Executive Board US Chair Daniel Buchbinder and AOTK Innovation Prize winner Karl Stoffel, Basel, Switzerland 2018

The AOTK Executive Board recognizes individuals or groups for their involvement and innovative contribution to a project. The winner of the 2018 AOTK Innovation Prize was Karl Stoffel in acknowledgement of his contributions to the Femoral Neck System (FNS) and the Modular Plating System for periprosthetic femur fractures.

The importance of cross-pollination in innovation

The AO's founders understood that the AO is stronger, more innovative, and more likely to succeed when it works collaboratively. The AO's greatest asset remains the breadth of talent and diversity of specialties that it encompasses. Being able to pool resources in this way remains one of the AO's key advantages.

Since the first AOVET courses were offered 50 years ago, AOVET has been integral to these ongoing processes of cross-pollination through the interplay between veterinary and human surgical innovations in the development of solutions for specific patient needs.

Unlike their human health care counterparts, AOVET clinicians and researchers see much greater patient variability even within one species. This is what pushes AOVET to be at the forefront of innovation within the AO.

New frontiers, new formats

In 2018, AORecon introduced a state-of-the-art Skills Lab to its principles hip and knee arthroplasty courses. As the new practical component of the AORecon principles course curriculum, it greatly enhances the educational impact by offering the participants a hands-on experience to improve their daily performance in hip and knee arthroplasty surgeries.



AORecon Skills Lab station at AORecon Course—Principles of Total Hip and Knee Arthroplasty in Dubai, UAE

Tasked with developing 3-D surgical videos, AOTK Executive Board Chair Daniel Buchbinder knew exactly where to go: the Ninth People's Hospital in Shanghai, China. With 16,000 CMF surgical procedures, 100 surgeons, 480 beds, and an even more impressive teaching and training mission, the Ninth People's Hospital was an ideal choice. Filming in 3-D delivers a result that is more realistic and better suited to the demonstration of important procedural steps. Five surgical videos were completed within one week. The videos will be available online in 2019 and will contribute to different education formats (such as the Management of Facial Trauma).

Strength in diversity

Looking to the future, the AO is eager to recognize and respond to the needs of younger generations of health care professionals. A diversity initiative, in which AOVET and AOCMF play a key role, was kickstarted in 2018. Recognizing the large number of women graduating from veterinary and medical schools today, the AO is determined to ensure that there are no barriers to entry or promotion of women up through the organization.

More on innovation at AO in 2018



Innovational Skills Lab upgrades global arthroplasty education

Read online



Surgeon's innovation comes to life thanks to AO Development Incubator expertise

Read online



Inspired by our past looking to the future

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Education



The AO is the world's leading education provider to health care professionals working in the fields of trauma and musculoskeletal disorders. Each year it offers over 830 educational events around the world, supported by nearly 9,000 faculty, and attended by over 58,000 participants.

With hands-on exercises, discussions, and a diverse range of courses covering key fields in trauma, spine, CMF, veterinary, and reconstructive surgery, the AO's flagship educational event, the AO Davos Courses, is a gateway to excellence

Back to our roots

The AO's founders understood the importance of education as they developed a comprehensive new approach to fracture care and treatment.



Nurses during a lecture at the first Operating Room Personnel (ORP) Davos Course 1961

Education remains at the core of the AO's global work to improve patient outcomes. To date more than 600,000 health care professionals in over 124 countries have participated in AO courses.

In 2018, most events were held in Europe and Southern Africa, closely followed by Asia Pacific, Latin America, North America, and then the Middle East and Northern Africa.

The AO Davos Courses are its flagship educational event. It is there that participants from all fields have the opportunity to find out about the newest approaches to education, training, and treatment, meet leaders in their fields, and also to share experiences and learn from each other. People who have participated in AO courses around the world, come to Davos, Switzerland for an unforgettable experience that acts as a gateway to excellence in their field.

AO education 2018

58,118 participants

832 educational events

22,311 faculty days

8,798 faculty—worldwide



AO Foundation, AOTK Meet the Experts (MtE), Guidance in Planning, Design and Use of Patient Specific Implants with Alexander Schramm and Pit Voss, AO Davos Courses, 2018

New generations, new challenges

Inspired by the rigor of the approach taken by the AO's founders 60 years ago, in 2018, AOSpine launched a major re-appraisal of its global activities and research, led by its new Chairperson Shanmuganathan Rajasekaran. It involves an assessment of what works and what can be improved or modified in order to deliver better results. By questioning underlying assumptions, AOSpine will ensure it is better able to meet health care professionals' needs.

Ongoing generational shifts give rise to several challenges as the AO works to remain relevant to today's generation, and future generations. One change is a decrease in institutional loyalty as people working in this area are more likely to take up training and education opportunities that respond to their interests and needs—wherever those opportunities lie—rather than being motivated by allegiance to a particular organization, society, or institution.

Curriculum development—by experts, for experts

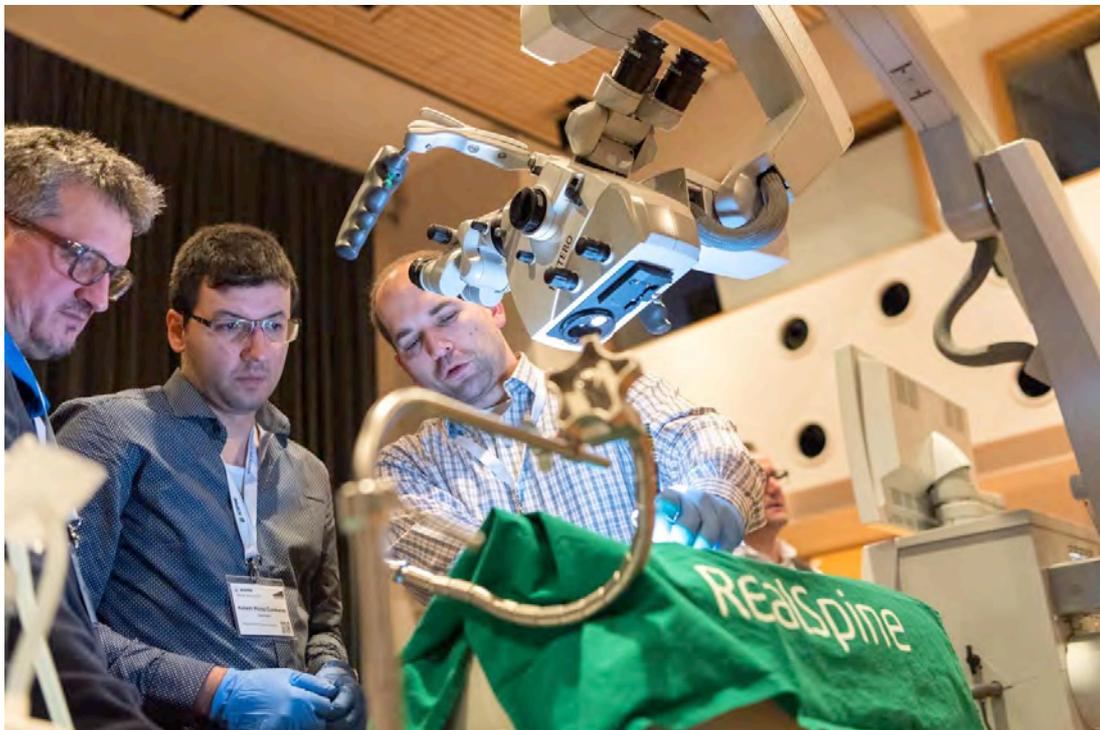
Almost 250 expert surgeons from 22 clinical areas are now involved in various stages of curriculum development and implementation. Supported by four experts in the principles and methods of teaching from the AO Education Institute, these groups base all educational activities on addressing patient problems. They are responsible for defining the quality criteria for awarding the AO Competency-based Curriculum stamp to programs and for continuous improvement based on evaluation data.

Curricula under development in 2018:

- > AOTrauma (Residents, Orthogeriatrics, Pediatrics, Pelvis and Acetabulum, Foot and Ankle, Hand and Wrist, Upper Extremity, and Lower Extremity Educational Taskforces)
- > AOTrauma Intramedullary Nailing, External Fixation, and Infection Education Working Groups
- > AOTrauma and AOREcon Periprosthetic Fractures
- > AOREcon Hip and Knee Principles and Complex
- > AOREcon Shoulder Principles
- > AOREcon Joint Preservation
- > AOSpine and AOSpine Minimally Invasive Spine Surgery (MISS)
- > AOCMF (Management of Facial Trauma)
- > AO VET (Principles in Small Animal Fracture Management, Advanced Techniques in Small Animal Fracture Management)
- > AO Foundation Soft Tissue Initiative
- > AO Strategy Fund: Limb Surgery in Disasters and Conflicts
- > AO Foundation Imaging
- > AO Program for Education and Excellence in Research (AOPEER)
- > AO Alliance (Focused Courses)

Retaining a leadership position

For AOSpine to retain its leading position as an innovative educator in its field, it is imperative to provide the community with courses tailored to their changing needs. The recently launched diploma project, which involves creating curricula for lifelong learning, aims to meet these needs.



AOSpine Advanced Simulation Course, Minimally Invasive Cockpit Surgery, Degenerative Spine and Spondylolisthesis, Regional Course, Dubai, United Arab Emirates, 2018

To retain and enhance its position as a knowledge leader in its field, AOTrauma continued its move from certifying attendance to certifying proficiency in 2018, which means certifying that course participants demonstrate the required level of knowledge, skills, and attitudes.

In 2018 AOTrauma held

392 educational events involving
35,225 participants,
14,716 faculty days and
4,939 faculty.

The AO Strategy Fund supported the Pro-C: AO Trauma's Proficiency Curriculum project, which takes an evidence-based approach to teaching surgical skills and allows the AO to extend its leadership in orthopedic education to become the standard reference for skills teaching.

Everything AOTrauma does in education is based on the backward planning process of curriculum development to positively impact patient outcomes by addressing particular clinical needs: from applied to clinical research, quality control and education—as can be seen in the ongoing Clinical Priority Program.

Crucially, AOTrauma offers course participants the same high standard all over the world. In 2018, it improved these templates, introduced new exercises, changed modules and updated the formats offered. The curricula for both basic and advanced courses was updated, and a blended learning component was added to the basic principles course. As a measure to help maximize impact, AOTrauma increased the minimum duration of its fellowship programs from 4–12 to 6–12 weeks.

In 2018, AOTrauma continued the backward planning process for curriculum development, established education key performance indicators (KPIs), and assessed the technological landscape in search of new educational formats. This digital transformation will continue to be a major part of the AO's future in the coming years.

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Many channels, one message

In the spirit of the AO's founders, the AO is constantly looking for new ways to reach its audience, improve patient outcomes, and enhance value for its community. This process of continual assessment and reassessment led in 2018 to several new approaches to traditional educational offerings.

In 2018, AOSpine expanded its use of webinars and e-learning to provide knowledge and adapted its face-to-face courses to more clearly focus on skills. This combination allows for an optimum learning experience for participants, ensuring everyone who attends the face-to-face courses has first had the opportunity to develop their theoretical knowledge, before they expand their skills. Feedback shows that this has been a success.

With the AO's dedication to digital transformation, the integration of virtual reality and simulation further into education will provide more opportunities to deliver and reinforce knowledge remotely, in conjunction with face-to-face course provision.

In 2018, AOCMF prepared to relaunch the updated Management of Facial Trauma (MFT) educational concept. First launched in 2017, the MFT course has been a global success, with more than 2,000 participants receiving training in 60 courses across 32 countries. In 2018 the AOCMF Global Education Task Force comprehensively reviewed all MFT content in line with course feedback. The result is an updated and enriched MFT 2.0 that more closely responds to participant needs that will be made available to participants in 2019.

In 2018 AOSpine held

213 educational events involving
11,053 participants
2,516 faculty days and
1,644 faculties.

Faculty Education Program leading the way

The AO's Faculty Education Program (FEP) is a comprehensive and widely applicable professional education program designed to improve teaching skills. It is based on adult learning principles with an emphasis on practical implementation.

FEPs consist of a five-week online learning part, a one-and-a-half-day, face-to-face event, and an online follow-up. This promotes excellence in teaching and learning in a lecture setting, small group discussions, and practical exercises. In 2018, 30 programs were conducted in Chinese, English, German, Italian, Russian, and Spanish, by the Regional Education Teams (RETs) comprising two surgeon faculty and one AO-certified professional educator.

In addition, 128 experienced faculty members, who had an upcoming chairperson assignment and already completed the FEP, joined the Chairperson Education Program which introduces the principles of instructional design and faculty management, as well as assessment and evaluation.

New formats 2018-2019

At the AO Davos Courses 2018, AOCMF held the first-ever live "On Air" event: Condylar fractures—to treat or not to treat. This involves a disarmingly simple concept: CMF surgeons from around the world are invited to join a live-stream discussion involving the world's leading experts in their field, and a select studio audience—broadcast from the heart of the AO Davos Courses 2018.

Developed in response to an identified need in the AOCMF community for new approaches to involving people in the AO Davos Courses and greater flexibility in terms of means of access, this winning formula will be made available to the rest of the AO at the AO Davos Courses 2019. AOCMF is working to ensure it reaches ever more people in its community around the world in coming years.



AOCMF On Air at the AO Davos Courses 2018

Last year also saw over 2,000 surgeons complete the AOCMF Global Needs Analysis for Education, designed to ensure AOCMF educational events are relevant, the highest quality, and respond to the needs of today's aspiring surgeons.

In 2018 AOCMF held

121 educational events involving
6,947 participants
2,120 faculty days and
1,119 faculty.

As a result, AOCMF identified a consistent need for education in reconstruction, across all regions; significant interest in new technologies; and continued demand for fellowships; as well as significant interest in online and in-person courses with practical elements, surgical simulation, and case-based courses.

In 2018 AOTrauma and AORecon developed the periprosthetic curriculum which is designed to address changing clinical needs and improve patient outcomes. Education is a primary focus for AORecon, and since it was founded in 2014, it has gained global recognition as a leader in the field.

AORecon 2018 Educational Events

24 educational events
16 countries, (5 new countries)
3,500 participants, involving
391 faculty days, and
231 faculty;

Entering into partnerships with orthopedic societies helps AORecon amplify its reach and grow as a network of surgeons led by world leaders in their field. AORecon's educational events consistently attract a high proportion of self-payers, which speaks to real need for what AORecon offers.

Over 1,600 surgeons registered for the AORecon webinars and webcasts in 2018, enabling participants from all over the world to further educate themselves online and ask questions to the experts in real time.

In 2018, the AOVET Education Commission developed new guidelines that apply to both course chairs and faculty. This initiative responds to a very real need. As AOVET continues to expand internationally, it is most important that the processes and procedures governing course chairs and faculty are both aligned with best practice and fully consistent. These changes are underpinned by an essential principle of global transparency and succession planning.

Reaching out into the community

In-hospital education is another element of AOSpine's updated approach. Going out into the community, providing outstanding and innovative education in the workplace, enables increased attendance rates and offers the AO greater, more nuanced insights into environmental factors that impact decisions around the approach to treatment. This is something that AOSpine is proud to have rolled out to all regions in 2018—a process in which the AOSpine centers globally are integral.

In 2018 AOTrauma introduced an online organizational tool that makes it easier to meet expanding demand for clinical training modules (CTMs), which are in-hospital training programs for operating room personnel (ORP) to help make AOTrauma more accessible to this key audience. The program includes different CTMs, and ORP can sign up for the courses online in a new streamlined procedure. These changes have led to a significant increase in uptake.

In 2018, AOTrauma continued to explore its pioneering in-hospital educational consultancy on orthogeriatrics. This entails a team of orthogeriatric experts going to a hospital to evaluate treatment and giving recommendations about how to establish comprehensive orthogeriatric treatment systems. These events have taken place in Colombia, Norway, and Singapore.

ORP in 2018

53 ORP courses were provided
2,407 participants,
1,835 faculty days, and
723 faculty.

Interactive learning opportunities

Every year, the AO Technical Commission (AOTK) System hosts Meet the Experts sessions at the AO's flagship educational event, the AO Davos Courses. These engaging live sessions offer participants the opportunity to experience firsthand presentations and hands-on demonstrations of new surgical techniques based on solutions that have recently received AOTK approval. At the AO Davos Courses 2018, the AOTK Meet the Experts roster included six sessions; four were focused on latest AOTK product approvals, one on the Evolution of Craniofacial Distraction, and one on Patient Specific Implants.

Partnerships for growth

AOVET has been working to expand its relationships with other educational providers, as this is an essential element in ensuring that access to its outstanding educational offerings is maximized. The growing partnerships with the American College of Veterinary Surgeons and with the European College of Veterinary Surgeons are significant gains in this area achieved in 2018.

By partnering with these colleges and veterinary societies, AOVET is building an ever-greater reputation as the go-to provider of education in veterinary orthopedics

In 2018 AOVET held

53 educational events involving 2,486 participants, 1,125 faculty days, and 373 faculty.



AOVET, Masters Course, Feline Orthopedics and Traumatology, AO Davos Courses 2018

In 2018 AOCMF took part in two major congresses: the International Federation of Head and Neck Oncological Societies (IFHNOS) in Buenos Aires, Argentina, where AOCMF organized two well-attended intra-congress panels; and the European Association for Cranio Maxillofacial Surgery (EACMFS) conference in Munich, Germany, where AOCMF held symposia on drug-induced osteonecrosis of the mandible and on Pediatric CMF Surgery.

Taking part in these events provided AOCMF with valuable opportunities to further establish relationships with members, and to raise awareness among congress participants. In addition to the traditional booth opportunities, in Buenos Aires, AOCMF initiated meet-and-greet sessions to expand community engagement through formal and informal networking opportunities.

In 2018, inspired by the AO's achievements over the first 60 years, AO Invest invested in Precision OS Technology, a company that combines orthopedic surgeons and high-end game developers, to deliver solutions that help orthopedic surgeons improve their performance.

The aim is to develop tailor-made AO content that meets the fast-changing needs of the AO's global network of surgeons and health care professionals. This collaboration is part of the AO's broader efforts to ensure it retains its leading position as the international provider of surgeon-led educational solutions in the fields of trauma and musculoskeletal disorders.

"The difference between AO Invest and other investors is that the AO is uniquely positioned given its global stance on education, specifically for orthopedic surgeons. There is no other organization in the world that does as much for orthopedic surgeons as AO," said Danny P Goel, MD, CEO, Precision OS Technology.

This was one of two agreements AO Invest signed in 2018, the second was with Finnish medical device firm Synoste that creates smart solutions for bone-lengthening and bone-deformation correction. Inspired by the AO's tradition as an innovation leader, AO Invest's goal is to invest in cutting-edge technologies around the world. It hopes these will bring benefits to the health care professionals in the AO's network—and ultimately to patients—and will help it gain recognition as a respected player in the start-up landscape.

"Our collaboration with AO is relatively new. We provide an innovative approach to education, and we are there to enhance the current model of education that the AO provides," said Danny P Goel, MD, CEO, Precision OS Technology.

These two new agreements bring AO Invest's portfolio up to four, with Synoste and Precision OS now sitting alongside Augmedics, which develops an augmented-reality surgical navigation system for spine surgery, and Digital Surgery, which is building an ecosystem of software tools for surgery and surgical teams.

AO showcases latest research findings at AMEE 2018

The Association for Medical Education in Europe's annual conference (AMEE) was attended by 3,800 participants from around the world. The AO was significantly involved in the Surgery Track and is proud to be a member of the Swiss Organizing Committee. Surgeon faculty and staff from the AO's clinical divisions and the AO Education Institute presented their work in the new Surgery Track, shared best practices and the latest research findings in surgical education and skills training, and the development of teachers and trainers.

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There is no other organization in the world that does as much for orthopedic surgeons as AO.

Danny P Goel MD, CEO, Precision OS Technology



Miriam Uhlmann and Wa'el Taha running a workshop on building a global faculty development program.

The AO ran three workshops on backward planning of curricula, the development of proficiency metrics, and the development of the education program covering limb surgery in disaster situations. AO surgeons and staff also gave presentations in six peer-reviewed poster sessions. The key symposium, titled Acquisition, Maintenance, and Verification of Surgical Skills, featured Wa'el Taha, Chair of the AOTrauma Education Commission (AOTEC) along with Ajit K Sachdeva (American College of Surgeons), Stephen Tobin (Royal Australasian College of Surgeons), and Craig McIlhenny (Royal College of Surgeons of Edinburgh, Scotland).

To mark the AO's 60th anniversary and in recognition of its Swiss heritage, the AO presented four awards at AMEE 2018 for the best posters and short communications in surgeon education and simulation in surgical education.

Looking to the future

AOCMF is building momentum toward its first-ever global summit: FACE AHEAD. This innovative, unique experience is focused on next-generation CMF, plastic, and ear, nose and throat (ENT) surgeons, and will be held March 26–28, 2020 in Barcelona, Spain. Planning and preparations are well underway.

The first pilot of AOTrauma's new event, the AOTrauma World Meeting, took place in Madrid, Spain in 2018. About 250 people attended the five courses offered during the three-day event, and the second pilot event will be held in 2019.

Surgery Reference

In 2018, the AO Surgery Reference published new content on the pediatric forearm shaft, dog mandible, and dog or cat distal femur, and also revised existing older content on the adult proximal forearm, femoral shaft, distal tibia, and humeral shaft. On average, the AO Surgery Reference has 12,828 visits each day, 60% of which are in order to prepare for surgery. This means that AO Surgery Reference touches 7,700 patients per day.

Comprehensive online reference in daily clinical life CMF

Please select an anatomical area

Clavicle	Proximal humerus
Scapula	Humeral shaft
Spine	Distal humerus
Pelvic ring	Proximal forearm
Acetabulum	Forearm shaft
Proximal femur	Distal forearm
Femoral shaft	Hand
Distal femur	
Patella	
Proximal tibia	
Tibial shaft	
Distal tibia	
Malleoli	
Foot	

Pediatric

More on education at AO in 2018



AO Davos
Courses 2018
highlights

Read online



AO research
excellence
aims to
improve care
worldwide

Read online



Excellence on
display at the
AOTK Meet
the Experts
sessions

Read online



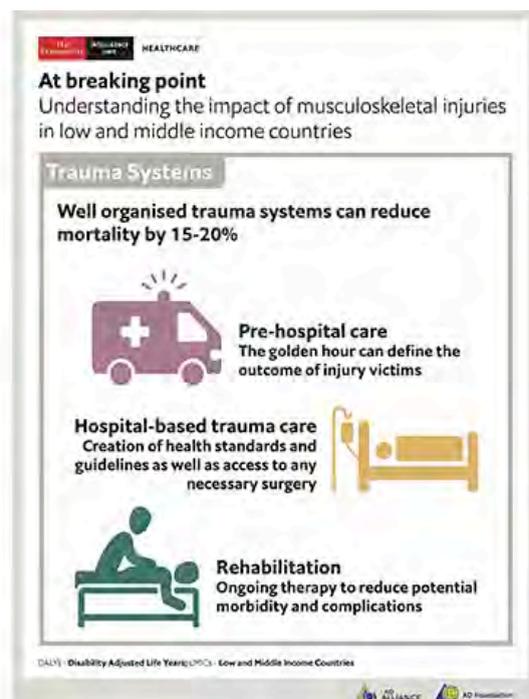
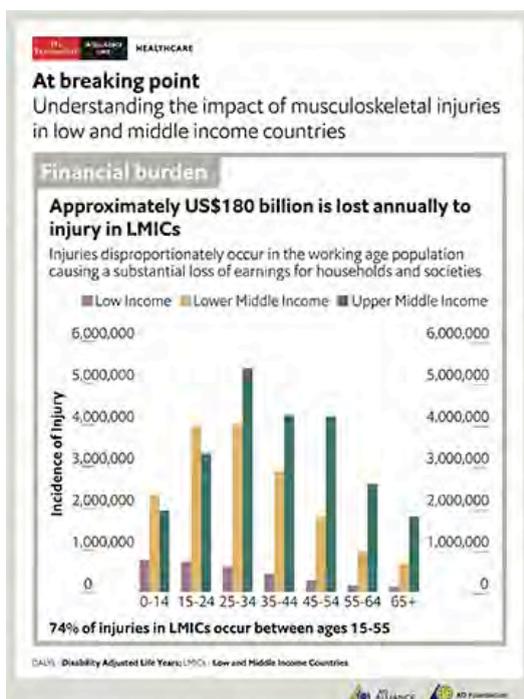
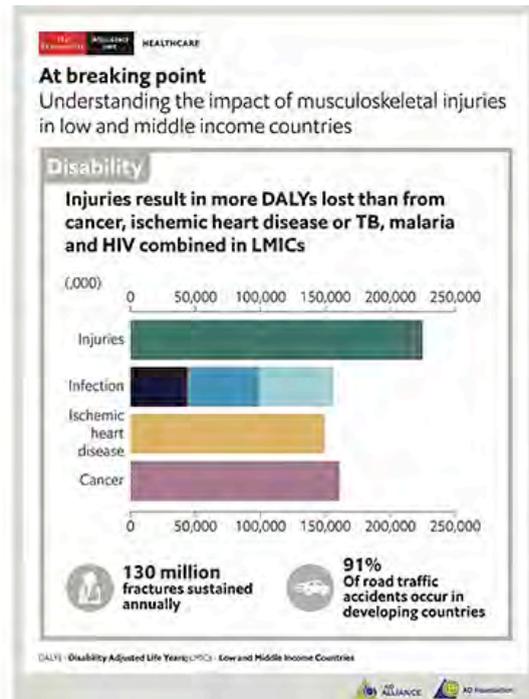
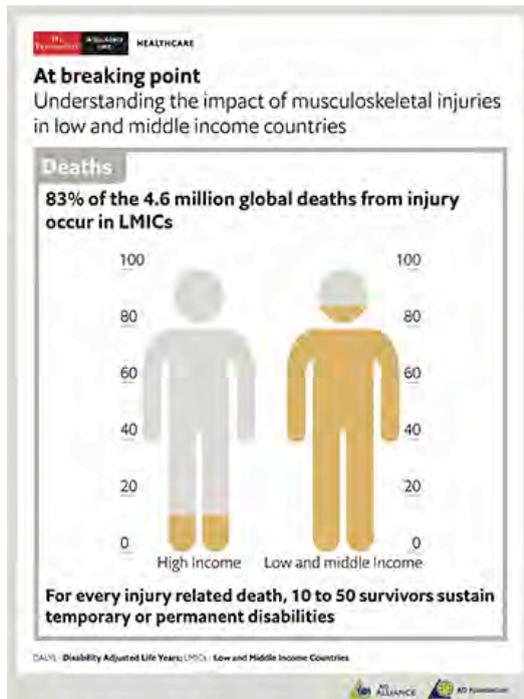
Corporate Social Responsibility



The AO is proud to be a good corporate citizen in all geographies where it has a presence. Locally, and globally, the AO has a positive impact on patients, the health care sector, and communities.

From energy-saving initiatives at its headquarters in Davos (Switzerland), to projects in Malawi, and targeted initiatives in key locations across the world, the AO remains driven by its founders' passion for improving lives.

The AO Alliance Foundation was established in December 2014 to strengthen the AO's engagement in low- and middle-income countries (LMIC). Health care professionals in these countries face particular challenges, including lack of equipment (C-arms, surgical instruments, and implants), patients who reach hospitals after the golden hour for optimum treatment, insufficient time in the operating room, and lack of continuing education opportunities. AO Alliance works to address these needs.



AO Alliance is the AO's largest CSR project, and is its most significant financial contribution to the care of the injured in LMIC. Trauma victims in high-income countries (HIC) usually get medical help within minutes of an accident. Trauma victims in low-income countries can wait hours, or days, for adequate treatment—due to local infrastructure and the availability of qualified health care.

AO Alliance

has since its establishment:
organised 304 courses
trained 13,452 surgeons and
operating room personnel (ORP)
sponsored 170 fellowships in sub-Saharan Africa and Asia.

Each country has different needs, but these needs usually amount to the 4Ss: staff, stuff, systems, and structure. The AO has the reputational and financial strength to act as an advocate and raise awareness for the current silent epidemic of injuries in low-income countries.

Going where the need is greatest

In 2018, AO Alliance:

- > secured an additional 1.5 million USD for projects in the next financial year (2019)
- > completed the first phase of its flagship program, Fracture Solutions for Africa and Asia, delivering 100 courses and training 4,120 health care professionals in 24 sub-Saharan African countries and in seven low-income countries in Asia
- > successfully partnered with Coalition for Dialogue in Africa (CoDA) to raise awareness about the silent epidemic of injuries in sub-Saharan Africa, developing a resolution that will be considered by the African Union Commission (AUC) in 2019
- > developed additional activities to be implemented with AO Clinical Divisions in select LMICs in 2019
- > delivered a white paper, At Breaking Point: Understanding the impact of musculoskeletal injuries in low- and middle-income countries, with the Economist Intelligence Unit, looking at the care of musculoskeletal injuries in LMICs, released in 2018
- > began construction on the Lilongwe Institute of Orthopedics and Neurosurgery (LION), due to open in 2021
- > received an honorary award for its contribution and support for development in orthopedics in Myanmar. Dr Claude Martin jr. was presented with the award by Permanent Secretary of the Ministry of Health and Sports Dr Thar Htun Kyaw in November 2018. This recognizes the role AO Alliance has played over the past five years in developing the National Roadmap for Trauma Care in the country.



Foundation stone laying ceremony at the Lilongwe Institute of Orthopedics and Neurosurgery (LION)

This focus is shared by the AO's Clinical Divisions. In 2018 the AOTrauma Europe and Southern Africa Board decided that LMIC need additional focus and set themselves the goal of building an AO community among surgeons in selected countries which can carry out AO activities that are locally sustainable and managed centrally.

Safeguarding health worldwide

The AO offsets a portion of the carbon footprint created by the travel of its surgeons and staff by supporting work in Malawi to renovate old boreholes. This means that people (mainly women and children) who had to walk for hours to get dirty and unsafe water now benefit from clean water supplies closer to where they live. It also delivers carbon saving, as they no longer need to boil the water before they use it, thus reducing deforestation and the production of carbon dioxide (CO₂).

In looking to maximize the local impact of this AO CSR project in a way that corresponds to the AO's broader goals and identity, the decision was taken to renovate health centers in Malawi, together with local partners, in a three phased approach—covering three clinics in three years from 2017-2019.

Per diem donations in 2018

31,500 CHF in donations
50% to AO Alliance
25% to ARGO
25% to additional projects in Malawi

In 2018, the AO supported First Climate and its Malawi-based partner United Purpose on the second project in the Dowa district, completing much-needed reconstruction and renovation work on Dowa District Hospital, which serves 850,000 people. This included providing a new solar-based reticulated water system, backup solar-powered lighting for some of the hospital wards and operating theaters, and backup solar energy for ventilators on-site.

These measures have a direct impact on patients. Eliza Mabulasa, Bimphi Village, Traditional Authority Msakambewa, Dowa, Malawi said: "I was referred to this hospital from Mponela. My colleagues were sorry for me because of the water problem. To my surprise we have a tap stand from a solar-powered borehole that has running water throughout. The hospital is now clean. The guardians don't have to go to the rivers to wash and clean anymore. I will go back with a different, wonderful, story."

“

The hospital is now clean. The guardians don't have to go to the rivers to wash and clean any more.

Eliza Mabulasa, Bimphi Village, Traditional Authority Msakambewa, Dowa, Malawi

The installation of solar-powered lighting means that pregnant women no longer need to bring candles with them to provide light for the medical teams on duty when they are giving birth.

Thanks to the additional money donated by AO faculty through their per diems, the AO expanded planned renovations at the Dzoole Health Center, which serves 50,000 and was part of the first phase of this project in 2017. Senior Village Head at Dzoole said: "I am speechless, the joy in my life is beyond words. Our Health Center is now a haven. We have running water and electricity even at the hospital, as well as at the staff houses. Other centers lack this. Our pregnant women and guardians have dignity now because of the guardian shelter."

“

Our pregnant women and guardians have dignity now because of the guardian shelter.

Senior Village Head, Dzoole

The AO built new shelters, provided a new antenatal bed, mattress, and solar power. "The new shelter has a big sleeping quarter, a kitchen, and a laundry. What an honor that has been put to all the women of TA Dzoole," said Esnart Harold, Samuel Village, Traditional Authority, Dzoole, Dowa, Malawi. The impact is felt by patients and doctors: lighting, electricity, and ventilation machines all help improve patient outcomes day and night. The community benefits as these improved conditions mean these locations are more appealing places to work, helping retain talented professionals and thus raising the standards of care available to people in these areas.

Rehabilitation in disasters and conflicts

The AO is actively engaged in bringing excellence in orthopedic treatment and education to areas affected by natural or man-made disasters, and conflict zones.



©William Daniels, Handicap International

The AO Strategy Fund's 12-month Early Rehabilitation During Disasters and Conflicts project was launched in 2018 and is due to yield a clinical guide and suite of resources for health care professionals working in these difficult situations.

This project will offer both resources that can be used in an emergency and in preparation for emergency situations in disaster-prone areas. By focusing on the needs of clinicians in these areas the AO Strategy Fund aims to help reduce the inequality of care that affects their patients.

More on CSR at AO in 2018



Play Safe with
Sisimpur

Read online



AO Center:
leading the
way in energy
efficiency

Read online



Fracture
Solutions for
Africa and
Asia

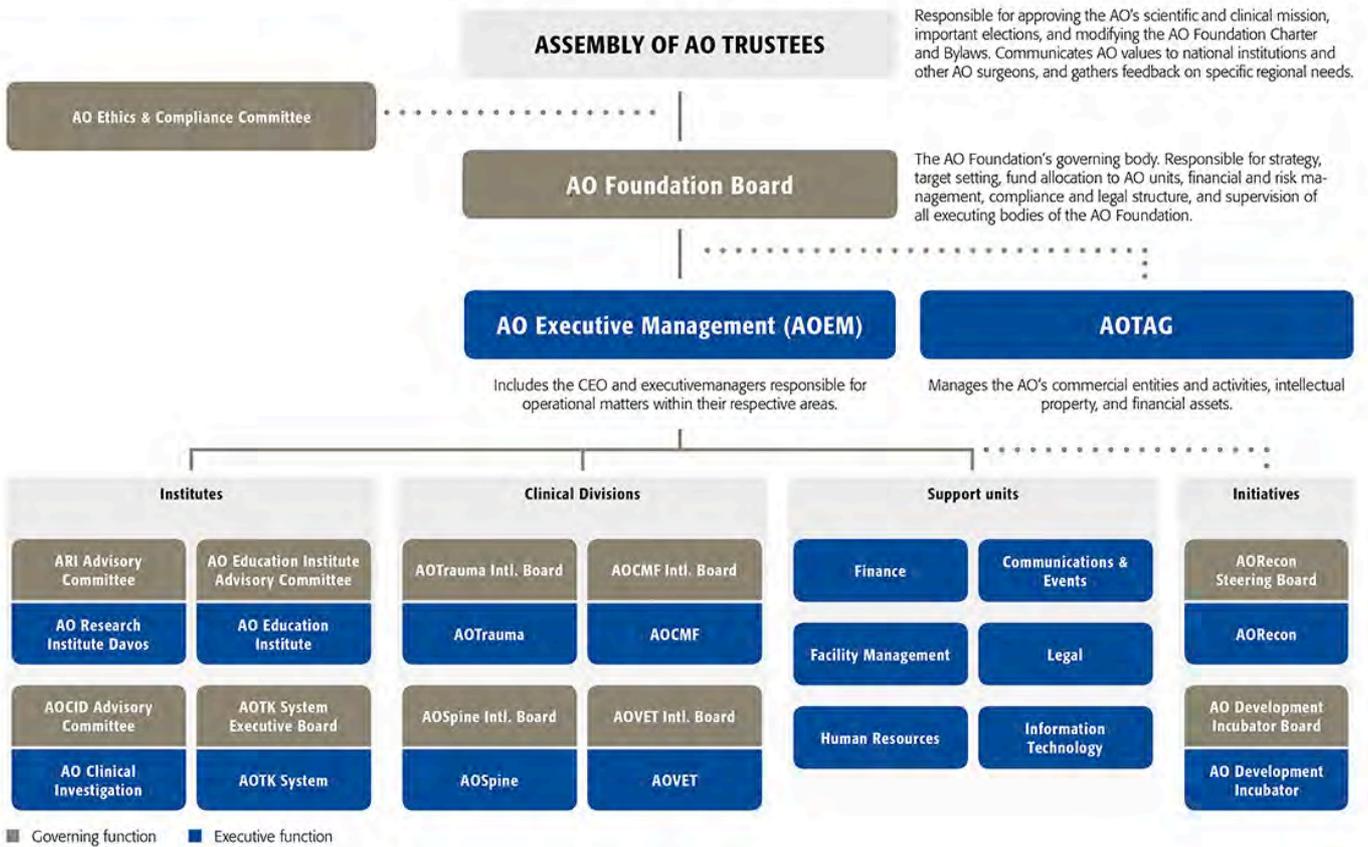
Read online



Governance

A clear separation between governing and executing bodies guarantees optimum organization governance.

AO Foundation Governance Structure



Finance

OPERATING INCOME

**98
million**

CHF

OPERATING INCOME GROWTH

**11%
increase**

from 2017

FOUNDATION EQUITY

**1,245
million**

CHF

Financial overview

Despite leaner operations and greater efficiency, the Net Result was negatively impacted by the financial performance of our portfolio due to market decline in the latter months of 2018.

Helped by the full implementation of the AO educational events management process (AO Global Education Process - GEP), third party income increased by 61% compared to the previous year. Higher expenses in the current year negatively impacted the Operating Result, which was CHF 6 million lower compared to the previous year, amounting to CHF -29 million.

A Financial Result of CHF -98 million was due to the performance of the global financial market in late 2018. Impacted by this, the Net Result reached a level of CHF -127 million, which in turn led to a decline of the Foundation's Equity to CHF 1,245 million by the end of 2018.

AO financial overview

The 2018 financial results

AO Financial Overview	2017	2018	Variance A18/A17	
in million CHF	abs	abs	abs	%
Operating Income	89	98	9	11%
Operating Expenses	111	127	16	14%
Operating Results	-23	-29	-6	27%
Financial Result	166	-98	-264	-159%
Net Result	143	-127	-270	-189%
Equity per 31.12.	1,372	1,245	-127	-9%

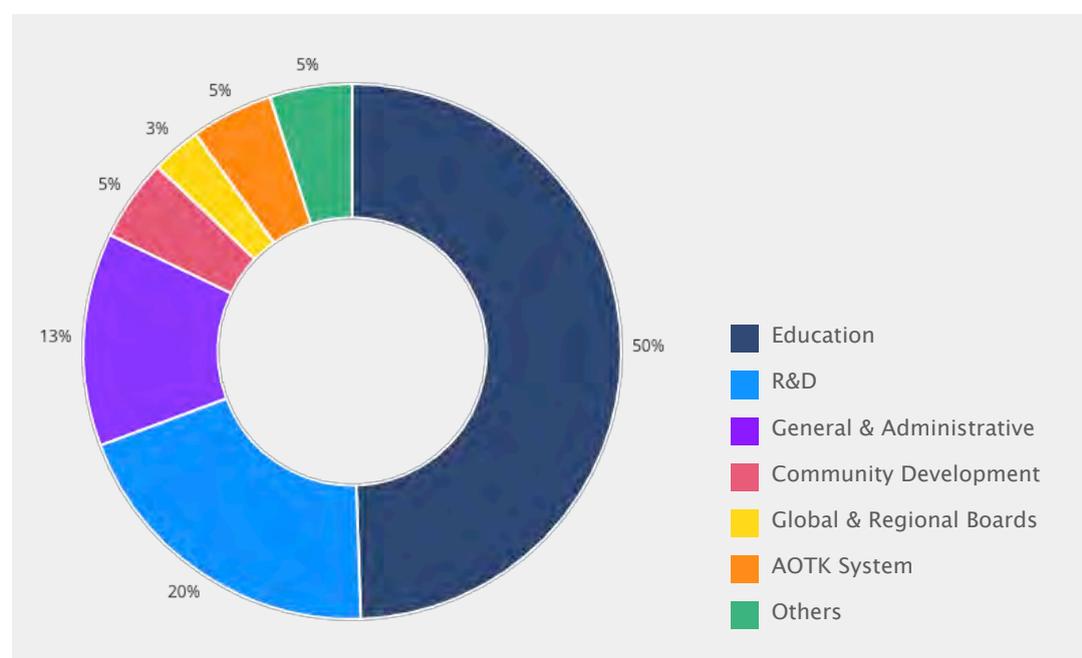
Operating income

Operating income includes the income from the Cooperation Agreements with DePuy Synthes of CHF 64.7 million and third-party income amounting to CHF 33.6 million. The increase of +61% versus the previous year is mainly a result of the full implementation of new finance flows, a sub-process of the AO Global Education Process.

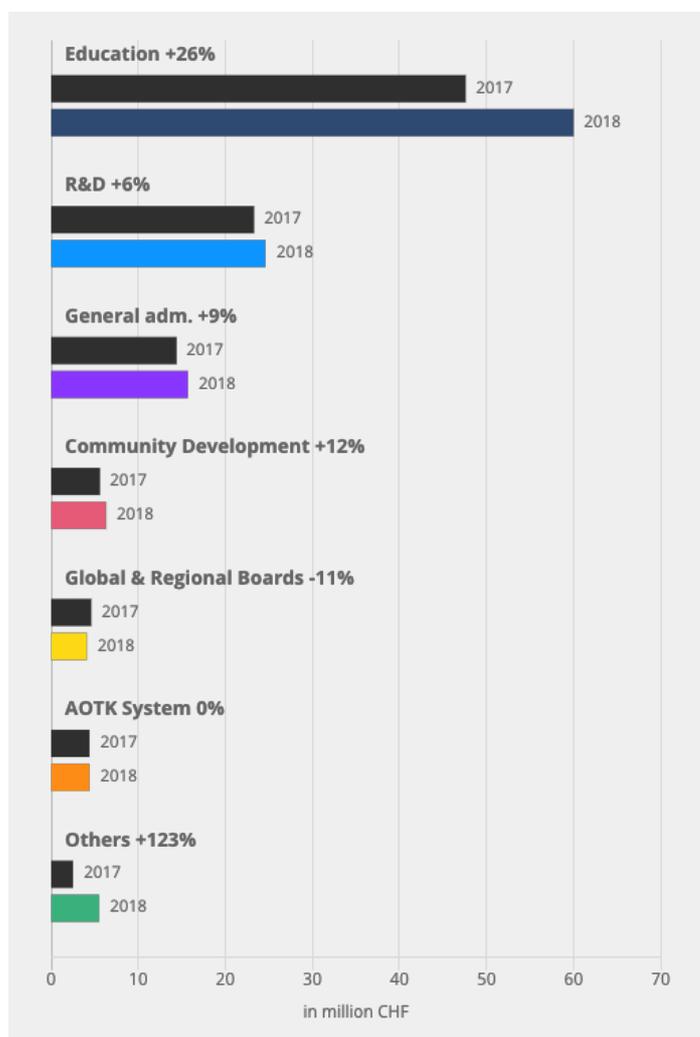
Operating expenses

Operating expenses, excluding 'Unforeseen', 'Strategy Fund', 'AO Alliance' contribution, and 'AOIT Projects', amounted to CHF 120.6 million (+18% versus the previous year). The largest operating expenditures (70%) were related to 'Education' (CHF 59.9 million) and 'R&D' (CHF 24.6 million). 'Education' spending increased by 26% on the previous year, showing the impact of the full implementation of the new processes for management of AO educational events. This was partly compensated by additional income in 'Education' and further optimization and cost reduction measures in 'Global & Regional Boards' (-14%).

Breakdown 2018 actual, CHF 120.6m



Growth versus 2017 actual



Income statement

The 2018 income statement is as follows in comparison to the previous year and budget:

Prot & Loss Statement Consolidated	2017 Actual		2018 Actual		2018 Budget		Variance A18/B18		Variance A18/A17	
	abs	%	abs	%	abs	%	abs	%	abs	%
in million CHF										
Cooperation Agreements	67.7	76%	64.7	66%	64.7	66%	0.0	0%	-3.0	-4%
3rd Party Income	20.9	24%	33.6	34%	33.4	34%	0.2	1%	12.8	61%
Total Operating	88.5	100%	98.3	100%	98.1	100%	0.2	0%	9.8	11%

R&D	23.2	21%	24.6	19%	29.3	22%	-4.6	-16%	1.4	6%
AOTK System	4.4	4%	4.5	4%	4.6	3%	-0.1	-2%	0.1	2%
Community Development	5.6	5%	6.3	5%	6.2	5%	0.1	2%	0.7	12%
Education	47.6	43%	59.9	47%	63.0	46%	-3.1	-5%	12.2	26%
General & Administrative	14.4	13%	15.7	12%	14.7	11%	0.9	6%	1.3	9%
Global & Regional Boards	4.7	4%	4.1	3%	4.4	3%	-0.3	-8%	-0.6	-14%
Others	11.4	10%	12.3	10%	13.4	10%	-1.0	-8%	1.0	8%
Total Operating Expenses	111.3	100%	127.3	100%	135.5	100%	-8.1	-6%	16.0	14%
Operating Results	-22.8		-29.0		-37.4		8.4	-22%	-6.2	27%
Financial Results	166.3		-98.4		35.0		-133.4	-381%	-264.7	-159%
Net Result	143.5		-127.5		-2.4		-125.1	n/a	-270.9	-189%

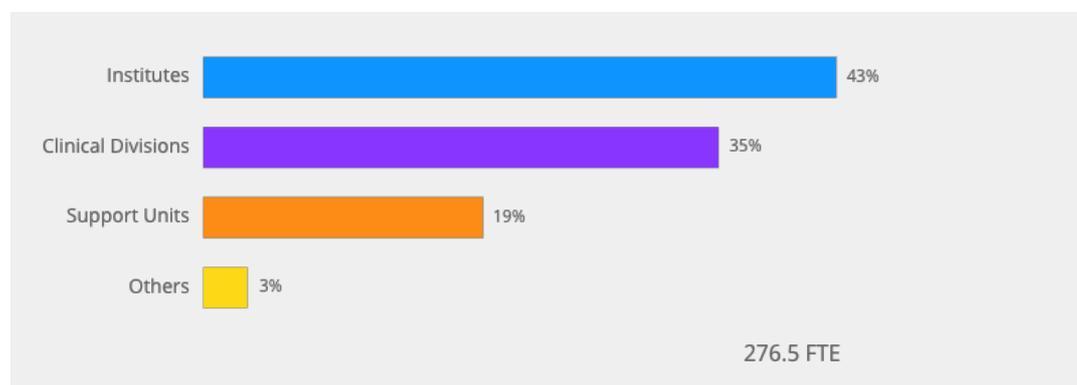
The Cooperation Agreements were CHF 64.7 million as budgeted (+0%) and slightly below the previous year (-4%). In contrast to last year, when we achieved a strong financial performance, in the current year there was a negative Financial Result of CHF 98.4 million. Operating Expenses at CHF 127.3 million, reflect a budget underspent by 6%, but is above the previous year's amount. The variance to budget is mainly due to lower expenses in 'Education' and 'R&D', and lower expenses in various operational areas.

Employees

The number of permanent staff increased to 276.5 full-time equivalents (FTEs), an increase of 12.5 FTEs or 5% versus 2017.

FTE weighted permanent	2017 Actual		2018 Actual		Var.
	abs	in %	abs	in %	
Total located in Switzerland	230.9	87%	239.6	87%	8.7
Asia Paci	14.3	5%	15.7	6%	1.4
Latin America	11.0	4%	13.2	5%	2.2
North America	7.8	3%	8.0	3%	0.2
Total worldwide	264.0	100%	276.5	100%	12.5

2018 FTE overview by area (weighted permanent)



Course activities by region

The total number of courses offered increased to 832, essentially on the same level as in 2017. Overall, the number of participants increased by 7%, as did the number of participant days, which increased by 2%.

	Number of Courses			Number of Participants			Number of Participant Days		
	2018	Share	vs.2017	2018	Share	vs.2017	2018	Share	vs.2017
Asia Pacific	186	22%	-3%	15,457	27%	1%	31,259	27%	2%
Europe	285	34%	0%	15,469	27%	17%	33,789	29%	5%
Latin America	180	22%	9%	13,729	24%	15%	22,519	20%	9%
Middle East and Africa	69	8%	-10%	3,074	5%	-10%	6,584	6%	-13%
North America	73	9%	-4%	4,697	8%	-13%	10,644	9%	-11%
International	39	5%	11%	5,692	10%	16%	9,890	9%	2%
Total	832	100%	0%	58,118	100%	7%	115,684	100%	2%

Asset management

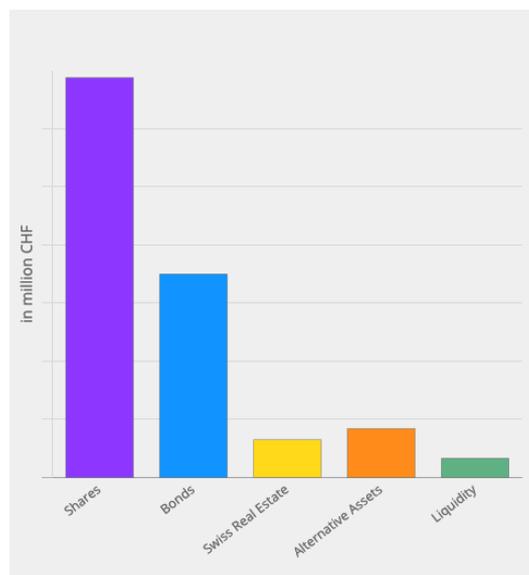
The asset management result of CHF -93.5 million reflects an actual return of -7.1% on the underlying financial assets, amounting to CHF 1,220 million by the end of 2018.

All asset classes had negative performance in the reporting period. Shares saw the greatest decline (-10.2%), with Emerging Markets the worst performers, at -13.7%. The segments "Switzerland" and "Developed" declined -11.1% and -8.5% respectively. At the end of 2018, investments in equities comprised 56.4% of the portfolio. The underperformance relative to the benchmark was mainly due to the exposure to Small & Mid Cap Equities. The exposure to commodities as part of "Alternative" investments also had a negative impact. The cumulative performance of the portfolio since January 2008 was 53.9%.

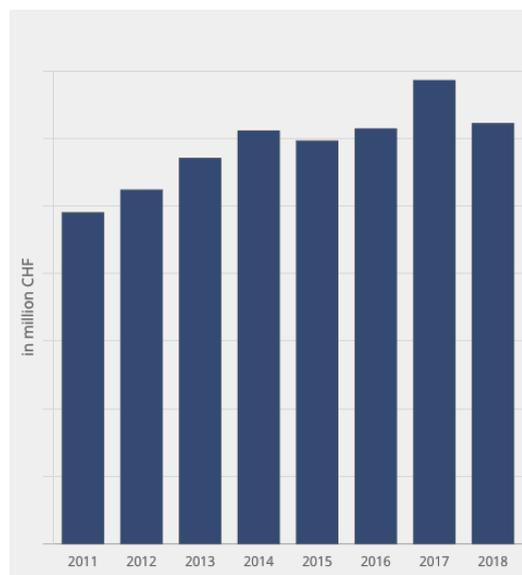
Equity evolution 2010-2018

Due to unfavorable financial market developments in 2018, the AO Foundation's equity decreased to a value of CHF 1,245 million by December 2018.

Equity category



Equity evolution 2010-2018



Transparency section

According to its Transparency Policy, the AO Foundation publishes annually the total remuneration of the AO Foundation Board (AOFB), international boards of the clinical divisions, and the AO Executive Management, in addition to disclosing all scientific grants to third parties.

Remunerations per board

The total remunerations summarized for all governance activities of the International Funding Boards in 2018 were CHF 1,344,500 (2017: CHF 1,406,124) which is 1.1% (2017: 1.3%) of the total Operating Expenses of the AO Foundation and its institutions. The table below shows the total remuneration of each individual International Board in absolute amounts CHF and as a percent of the total amount of individual Operational Expenses, as well as the absolute amount of the highest individual remuneration amount within each board in 2018:

	2017	2018
AO Foundation Board	10 members	10 members
Total AOFB	317,500	355,000
% of total Operating Expenses AOF	0.3%	0.3%
Highest remuneration AOFB	75,000	75,000
AOTrauma	10 members	9 members
Total AOTIB	375,000	337,500
% of total Operating Expenses AOT	1.3%	0.9%

Highest remuneration AOTIB	75,000	75,000
AOSpine	11 members	11 members
Total AOSIB	393,750	337,500
% of total Operating Expenses AOS	2.0%	1.6%
Highest remuneration AOSIB	100,000	75,000
AOCMF	9 members	8 members
Total AOCMFIB	275,000	262,500
% of total Operating Expenses AOCMF	3.6%	3.0%
Highest remuneration AOCMFIB	100,000	75,000
AOVET	9 members	9 members
Total AOVETIB	44,874	52,000
% of total Operating Expenses AOVET	1.5%	1.4%
Highest remuneration AOVETIB	30,000	30,000
Grand Total	1,406,124	1,344,500

Remuneration of the Executive Management

The total annual compensation of ten members of the AO Executive Management in 2018 was CHF 2,773,288 (2017: CHF 2,686,715). The highest individual compensation was CHF 331,575 resulting in a 1/5.1 relative ratio between the highest and the lowest paid individual compensation (permanent employees).

Assignment of scientific and other grants to third party organizations

In 2018, AO Foundation funded research projects with scientific and other grants in a total of CHF 1,741,819 in 51 different third-party organizations (2017: CHF 1,607,707).