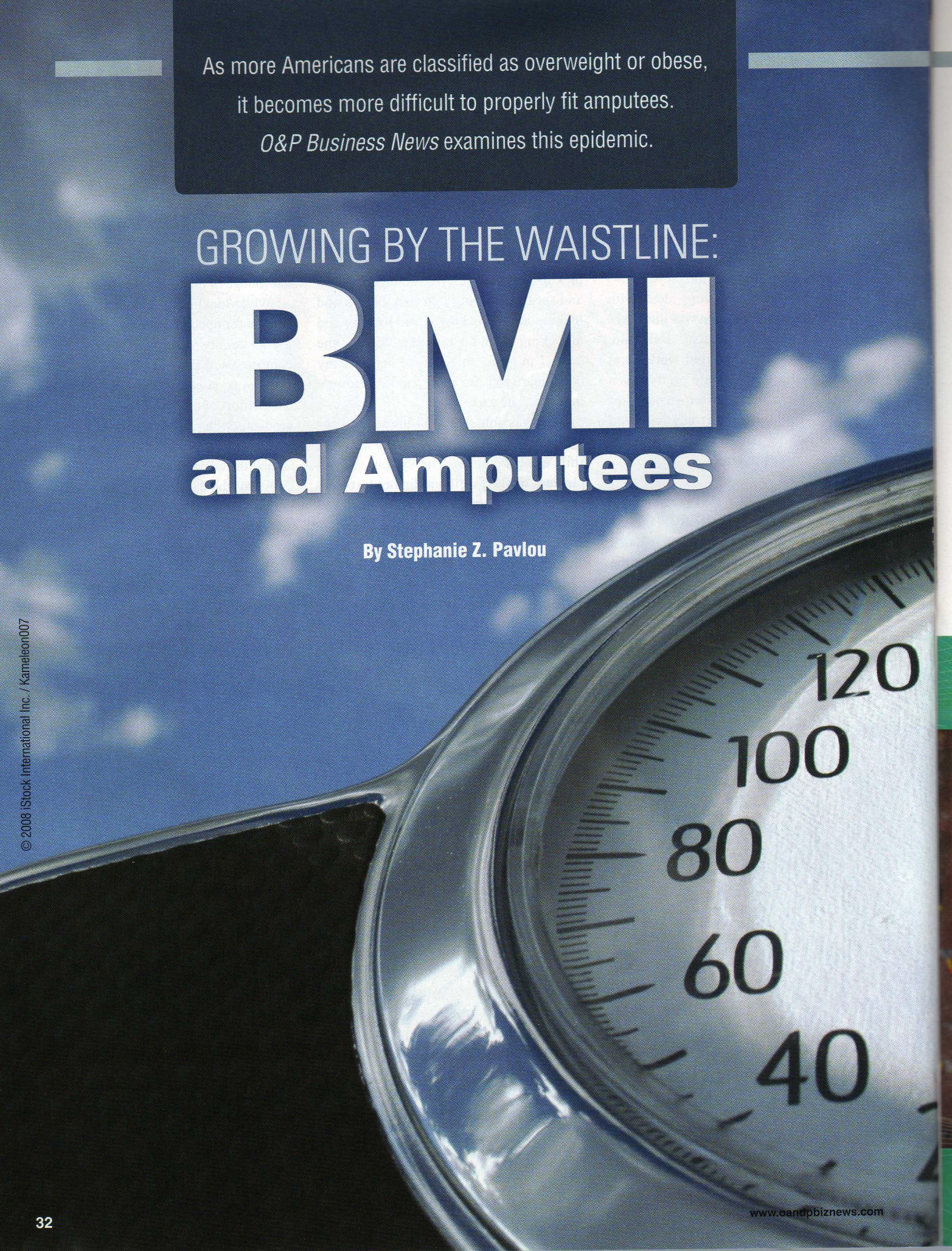
As more Americans are classified as overweight or obese, it becomes more difficult to properly fit amputees. *O&P Business News* examines this epidemic.

GROWING BY THE WAISTLINE: BMI and Amputees

By Stephanie Z. Pavlou



It is no secret that an ever-increasing number of Americans are overweight or obese. An Internet search for body mass index (BMI) will find millions of Web sites about BMI: what it is, how to calculate it and how to reduce it. For amputees, however, this epidemic causes additional problems that may affect their daily lives and their ability to continue activities they may enjoy.

But the situation is not hopeless. O&P practitioners often need to lead the way to a healthier life for their patients.

Breaking it down

M. Jason Highsmith, PT, DPT, CP, FAAOP, assistant professor in the School of Physical Therapy and Rehabilitation Sciences at the University of South Florida in Tampa, started studying this condition in a clinical rehabilitation setting, and he now focuses more on the research aspect. Highsmith said BMI is a math formula that gives an objective quantification of the body type. By dividing a person's body weight by the square of his height, Highsmith determines the person's body composition.

"The real question is, what does the number mean?" Highsmith told *O&P Business News*.

The BMI score places people into one of five categories relative to their lean body mass. According to this scale, "normal" ranges from a BMI of 18 to 25, with anything less qualifying as "underweight." Overweight people have a BMI of 25 to 30. Having a BMI of greater than 30 qualifies people as "obese," and greater than 40 as "morbidly obese."

Other similar methods — such as skinfold caliper, underwater weighing or waist-hip ratio — also determine this information. The important thing to remember, however, is that each of these methods has its limitations. Tall people, for example, may receive an artificially high BMI number despite having a lean physique. It may be difficult to complete underwater weighing, on the other hand, because of the significant cost and equipment required.

BMI and amputees

Amputees with high BMI face an additional set of issues that do not affect amputees in the normal weight range.

First, it is more difficult to fit a prosthesis on a limb with an excess of soft tissue. Typically, the interface locks onto the bones in the residual limb, but extra soft tissue makes that difficult, or impossible, said **Jason T. Kahle, CPO, LPO,** staff prosthetist for Westcoast Brace and Limb in Tampa, Fla.

High BMI in amputees also affects issues like edema and volume changes, making them more prevalent. Exercising — the main component to reversing excess weight — becomes even harder and less likely when an amputee is overweight or obese.

Highsmith explained that the effort expended when walking is exponentially greater for overweight or obese amputees. The heavier the person, the more effort it takes to walk because the body was not designed to carry the extra weight. Added to this effort is the fact that the amount of energy required for an amputee is greater than that for a per-

Body Mass Index Ratings

Underweight:	<18.5
Normal:	18.5-24.9
Overweight:	25-29.9
Obesity:	30-39.9
Morbid Obesity:	40+

Source: www.obesityinamerica.org/PDF/obesitytrends.pdf

son with two natural legs. This often results in decreased motivation, increased sedentary lifestyle and additional weight gain.

Biomechanical issues

Kahle offers a simple physics lesson.

"When you walk, it is actually two- to three-times body weight force that is put on your body … because body in motion increases the force exponentially," he said.

This force on the residual limb increases with activities more intense than walking, reaching three-times body weight, and even four- to five-times body weight with strenuous athletic activity.

"We are talking about more than 400 pounds of pressure on an area that isn't meant to be walked on," Kahle said.

Additionally, most prosthetic components are rated only to a certain weight. For amputees weighing more than 220 pounds, the number of options decrease significantly. For weights much greater than 250 pounds, prosthetists are forced to consider the few custom feet, knees and shins that can accommodate bearing the amount of weight. Similarly, certain suspension systems, as well as gel and silicone liners, might not fit appropriately over excess tissue.

Another factor to consider is that those custom parts bring additional cost and third-party payer issues.

Kahle said that manufacturers seem to be developing new prosthetic components to accommodate a country that is "growing by the waistline," but for now, choices still are limited.

"You have to kind of be creative in your selection process, but by creative, I basically mean limited," Kahle told *O&P Business News*. "There is a certain way we want to fit people who are now limited because of the choices we are forced to make."

Overweight issues affect lower extremity amputees more than upper extremity amputees because of the obvious weight bearing issues that arise when fitting lower extremity prostheses. Although prosthetists may be challenged with finding myoelectric sites, determining the best socket design and resolving harnessing issues for upper extremity amputees, the majority of restrictions for amputees would begin in the lower extremities. In addition, both men and women tend to hold excess fatty tissue in their lower bodies, like their abdomens, buttocks and thighs, which makes transfemoral prosthetic fittings for overweight or obese patients most difficult.

Comorbidities

Amputees also need to worry about various comorbidities that may develop. In addition to diabetes, which often necessitates the amputation in the first place, many amputees also may develop cardiovascular issues or hypertension due to continued poor dietary choices, the accumulation of fatty tissue and lack of exercise, such as being confined in a wheelchair. Practitioners and other health care professionals should think about these issues when recommending that amputees increase their activity levels. Neglecting to consider additional complications could result in inflicting more harm than good.

Beginning with patients' amputations, health care practitioners are forced to modify their process to accommodate overweight or obese amputees. Orthopedic surgeons must first operate on extra tissue, then find the best way to suture and create a residual limb that lends itself to fitting prostheses. Prosthetists will find it more difficult to fit a residual limb that is "certainly not ideal," according to Kahle. The patients, too, struggle with donning their prostheses and walking for the prescribed distances, he said.

"The basic physiology behind this is if you gain weight, you are going to have more living body tissue to support," Highsmith said. "Fat is inert in that it doesn't work for you, but it is metabolic tissue so it still requires nutrients."

For one thing, this puts surplus strain on the heart to pump blood through excess body mass, and the small organ needs to increase blood pressure to accomplish this.

"Then the problem snowballs," he said. "It is more effort to walk as an amputee already, and now add this extra mass and it is even harder to walk. Motivation probably will go down again … decreased body image, [etc.]."

Treatment methods

It may not be in O&P practitioners' job description to prescribe exercise, but Kahle stresses the importance of referring back overweight or obese patients to their primary care physicians. Physicians should create a nutrition and exercise plan for their patients, and monitor them — and their glucose levels, blood pressure and medications — over a certain period of time. If part of the plan involves weight loss medication, the physician should ensure that it does not conflict with other medications.

Another possibility for obese amputees is bariatric surgery. Many health care practitioners disagree on the merits and drawbacks of this surgery, but it may provide an answer for some patients who have run out of other options.

Highsmith has seen both sides of the argument.

"You have to look at the motivation of the people, their willingness and their ability to stick to a regimen," he said. "It is definitely life-changing."

One thing to think about, he said, is that the ability to start working with a prosthesis as soon as possible after amputation is a major factor in prosthetic success. With bariatric surgery, patients may need additional recovery time, effectively slowing down the process.

This option, like all others, should be carefully considered among amputees' health care teams.

Fitting issues

As amputees lose weight, they will notice that their prostheses do not fit the way they did previously. In the midst of large amounts of weight loss, practitioners will need to adjust the fitting of the current prostheses. When amputees move into a lower weight category, practitioners will need to fit new prostheses.

"This is not something to fixate on," Highsmith said. "This is a sign that you are losing

Caring for Overweight Amputees

Recognize the problem: Determine that the patient falls into the overweight or obese category through body mass index or other measures.
Use the prosthesis: Do not fixate on the prosthesis. See it as a tool rather than a hindrance.
Enlist help: Work together with other members of the amputee's health care team to find a solution.
Boost motivation: Anticipate that the amputee will experience any number of feelings that might prevent him or her from physical activity. Counteract that with motivation in the form of an exercise partner and rewards for simple goals.
Change diet: Make realistic changes to the patient's diet.
Exercise: Physical activity is the most important factor in weight loss. Work with the patient's health care team to determine the best workout for his or her activity level.

weight. Everybody has skinny pants. This is a sign that you are going to start moving toward the smaller [prosthesis] that you want to be in."

He sees this discomfort as a minor inconvenience compared to the long-term health benefits that amputees will get from losing the weight.

Kahle has not found any issues with reimbursement from Medicare or third-party payers. Proper documentation should reveal medical necessity, and the amputees' physicians also should be able to provide documentation stating the same.

Team approach

A multidisciplinary approach to treatment is the best path to success. Each member of the health care team is integral in aiding patients' weight loss.

"It is your duty as an orthotist or prosthetist [to] bring up this subject with your patients," Kahle said. "O&P practitioners are viable members of the medical community and it is their job to get involved."

When approaching the issue with his patients, Kahle suggests speaking with the physicians first and citing the biomechanical reasons for weight loss. He adapted this tactic because he finds that many patients are noncompliant.

He emphasizes that practitioners should realize that overweight and obese amputees risk disqualifying for prosthetic fitting. The old standard of standing for 5 minutes on the contralateral side is impossible for some overweight or obese amputees. Sometimes the only answer is to lose weight.

"It should be understood that it is a partnership and the prosthetist is there to help the person meet his goals," Highsmith said.

Most important, he said, prosthetists should let their patients know that there is help available, "you just have to go get it."

FOR MORE INFORMATION:
http://www.cdc.gov/nccdphp/dnpa/bmi/adult_BMI/about_adult_BMI.htm

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