BRIDGING THE GAP FROM REHAB TO PERFORMANCE

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FOREWORD
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EXCERPT FROM CHAPTER ONE

THE SEGMENTS OF THE ORGANIZATIONAL SYSTEM

Now that we have covered some of the basic principles that form the foundation of the organizational system, let us take a closer look at its segments, each of which has its own chapter for further exploration.

This is not a dogmatic classification system. Many interventions or schools of thought might fall into more than one category. Each intervention has many parts to it, and in your thought process, one might fit into an entirely different category than listed in this book. This is fine. As you work through the chapters and begin to understand the system, think about where each of the phases, disciplines, and concepts fit into your personal practice.

All models fit, all disciplines fit, and all "gurus" fit when we work to bridge the gap between rehabilitation and performance. Whatever your specialty, decide where that school of thought lies in this system as you create a process to return athletes to sports performance.

We will look at an overview of each category next, and expand upon them in individual chapters.

Briefly, think about when a client comes to you in pain. Say, for example, the person is a soccer player with a painful groin. First, we need to decide what tissue is the issue. We need to identify the *pain generator*.

Is the pain coming from a torn muscle or tendon in the adductors or in the abdomen? Is the pain coming from the hip-joint capsule impinged between two bones? Is the pain coming from a degenerated joint surface?

Are all structures of the hip normal and the pain is coming from the low back or the central nervous system?

Once this is determined, we need to ensure the joint is moving properly in relation to those around it. Does the hip have full range of motion? Is flexibility normal? Are all aspects of the joint working well so it can fit within the system as part of a whole? Can the lumbar spine stabilize in order for the hip to move? Are there limitations at the ankle that could be affecting the hip? This section will take into account the entire *motion segment*.

We then need to make sure the right muscles are firing at the right time. We need to ensure there is proper *psychomotor control*. Is the glute acting as a prime mover for hip extension, or are the hamstrings or lumbarparaspinals dominating the movement pattern?

From here, we move into *somatosensory control*. We consider all aspects of the

neurological system—including reflexes, visual, vestibular—and all the neuromotor programming elements affecting how the motion segment moves or why pain is being generated. This is the largest and most complicated category and certainly influences and is influenced by every other aspect.

Next, we have *fundamental performance*. Not only does the hip itself have foundational strength—which could also fall under the motion-segment category—but we look to see that the entire system has proper fundamental strength to be expressed as power in our next category, *fundamental advancement*.

It is within fundamental advancement that we begin to move at various loads and speeds, introducing fundamental athletic movements such as acceleration, crossover, drop step, and more.

Finally, in *advanced performance*, we begin to meet the client-specific goals of returning to an activity. Whether the client is a hockey player, lacrosse player, or laborer, we introduce the specific movement requirements that must be mastered prior to returning to the activity.

Of course, underlying this whole strategy are the *biopsychosocial* factors that influence how we each have a different response to pain and to the planned and executed interventions.

The biochemical, nutritional, and genetic factors of each person's biology will affect the mindset, mood, and attitude of the person.

The societal, familial, and cultural influences on a person will impact how that person responds to any stimulus.

The biopsychosocial influencers are the individual factors we must consider every time; they will never be the same for any two people.

No single part of the continuum is necessarily a prerequisite to another. Many of these areas can and should be addressed simultaneously as an athlete progresses from table to field. However, these all need to be considered prior to an athlete successfully returning to play.

Pain Generator

In Chapter Two, the section on determining the pain generator, we identify the problem tissue. It matters whether we are dealing with a bursa or a tendon.

If the client is struggling to manage a bursitis and we attempt tool-assisted soft-tissue work on the inflamed bursa, we might make things worse. However, if we are dealing with a tendinopathy, soft-tissue treatment might significantly help the healing process.

In another case, if the athlete has disc-originating pain, trunk flexion might exacerbate the symptoms. If we are instead looking at a stenosis, trunk flexion might improve the symptoms. Accurately identifying the problem tissue is important for us to appropriately direct our initial treatment efforts.

If you do not have examinations and assessments in your toolbox, befriend a

diagnostician and share patients and clients with that person. You do not need to learn how to assess, but you do need to understand assessment and have a referral policy in place.

If no pain generator is present—such as in a patient with phantom-limb pain, chronic pain, or non-specific lower-back pain (NSLBP)—we need to use other identifiers, such as restricted range of motion, compromised movement patterns, a lack of stability, neurological influences, or biopsychosocial considerations to guide us to the area that needs our first attention.

Someone who is in pain without the presence of a pain generator presents a challenging situation. There is no nociceptive stimulation to alter; therefore, our typical pain-eliminating techniques will not work.

In the initial pain discovery, we are defining which "tissue is the issue." As an example, in my case, I might draw from my manual therapy and differential diagnosis background to determine the problem at hand.

To determine a working diagnosis for the patient in front of me, this might involve applying the skills learned in physical therapy or athletic training schools or things I mastered when studying for my certification in orthopedic manual therapy.

We might be concerned about pain and want to decrease it by using a method such as kinesiology tape.[11] Perhaps other standard modalities will assist in pain reduction. There are many clinical interventions to choose from; your list of skills will be different, and that will guide your choices.

Motion Segment

We need to reestablish the proper use of the entire motion segment, and not just a localized injury site or the source of pain. For example, if we are dealing with an elbow issue, we need to make sure the cervical spine, shoulder complex, elbow, wrist, and hand are all working as a unit—this is the focus of Chapter Four.

We should also ensure that there has not been loss of compensatory range of motion elsewhere in the body.

The nervous system prioritizes protection of painful tissue, and adjusts movement accordingly.[12] Through proper neuromusculoskeletal evaluation, the diagnostician will be able to determine if and where the body has compensated to protect the injured tissue.

I once had an athlete who had dislocated his elbow in a traumatic manner. Despite our good efforts, he ended up with a shoulder issue, including loss of motion and pain because he was guarded and afraid to move his arm away from his body. As a result, dysfunction developed in the segment next to the injury site, which in this case was the shoulder.

We may not be able to prevent everything, but we know that the motion segments that make up and surround an injured limb or the spinal segments above and below an injury can become

compromised due to fear, avoidance, and pain.[13,14]

There could also be a restriction along a fascial line feeding tension upstream, downstream, or both.[15] You can define a motion segment in many ways. You could simply consider an upper extremity, spine, or lower extremity as the motion segment, or you could think of it even broader than that, following fascial lines or kinetic chains.

However you define the motion segment for a given patient, you must address and consider it throughout the rehabilitative process, rather than just looking at a joint or tissue in isolation.

Bring the concepts of biotensegrity to mind when thinking of motion segments. Biotensegrity applies the mathematical concept of tensegrity to the human body.[16] Tensegrity, developed by R. Buckminster Fuller between the 1920s and 1940s, is the concept that a three-dimensional structure is under constant tension with intermittent periods of compression to maintain the structure's stability.

Biotensegrity states that in the human body, all levels—including molecular, cellular, tissue, organ, and organ systems—are operating in the same manner.

Humans will maintain their general form despite gravity because of the constant state of tension with intermittent compression that occurs throughout the body. Our bodily systems, down to the molecular level, are built upon this constant tension.

Our movement choices and postures will introduce the necessary compressive forces to allow the body to change and adapt, all while maintaining the general human form.

When we think of the body as a tensegrity system, we realize we never do movement in isolation. In order for movement in one area to occur, a resultant compression or tension must occur elsewhere to allow that to happen. This concept demonstrates a system in which nothing occurs in isolation.

While we consider these concepts and interventions, we are concerned with how the client is or is not using the entire affected limb.

We might pull from manual therapy, mobilization with movement, or tool-assisted soft-tissue work to reestablish the motion-segment function. Dry needling or cupping might be a suitable intervention choice. Alternatively, we might perhaps use fascial or visceral manipulation to deal with the affected area.

Corrective exercises learned during the Functional Movement Screen (FMS®), the Selective Functional Movement Assessment (SFMA®), or Functional Range Conditioning® (FRC) training could come in handy. Muscle activation techniques (MAT™) might also be applicable in this stage as we try to get the entire limb and motion segment functioning normally.

The options in this phase are almost limitless, based on your training and area of focus.

Psychomotor Control

In reviewing psychomotor control, which we will do in Chapter Five, we are concerned with the appropriate tissue firing at the right time as muscles and other tissues do their jobs. Prime movers must remain prime movers. Synergists must be synergists, and stabilizers must be stabilizers.

When a stabilizer such as lumbar musculature becomes a synergist to hip extension, or a synergist like the hamstrings becomes a prime mover, or a prime mover like a glute decreases its activity because another muscle is doing its job, the body gets angry and it will produce pain.

Just as in a factory, the body has individual parts responsible for a job. When people in a factory start doing jobs they were not intended to do, the entire line gets thrown off. One job has too many workers, while another has no one focusing on it. Chaos ensues, and in our example, pain is created in the body.

Neuromuscular control of the body is the fine-tuning we use to ensure proper movement. Of course, the body will figure things out if needed and will compensate its way through a less-than-ideal motor pattern.[17] That newly created motor pattern certainly has the potential to be efficient; however, biomechanical stresses caused during these compensations can cause damage if left unattended.

Over time, this compensation can lead to pain or asymmetries in flexibility and strength, and will further exacerbate the issue. The compensatory pattern will become the default pattern once the brain myelinates this new workaround.

There are many schools of thought in psychomotor control to pull from, including Dynamic Neuromuscular Stabilization® (DNS), Postural Restoration Institute® (PRI), MAT, dry needling, FMS, SFMA, Shirley Saharmann's work in Movement System Impairments, and Pilates, to name a few. We use whatever aligns best with our specific training and practice.

Biopsychosocial Considerations

The biopsychosocial model was introduced in 1977 by psychiatrist George Engel.[18] In this model, he suggests that the person's biology, psychology, and social aspects of life have an influence on each other and the human as a whole being. These three things in combination will dictate pain, suffering, and response to treatment interventions, and this is what we discuss in Chapter Six.

The psychological stress of an injury can increase stress hormones and inflammatory markers, making a somatic injury difficult to heal. Social activities such as drinking and smoking all impact a person's overall health and wellbeing.

Lack of support from family and friends can increase depression, impacting a person's biology. It can also lead to unhealthy lifestyle behaviors such as substance abuse, interrupted sleep, or poor eating habits, thereby impacting the biological ability to heal.

In fact, biopsychosocial factors could be argued as the number-one element that

will impact your patients' ability to heal and return to play.

We have all had experiences when we had two people who play the same sport walk in the door with the same diagnosis, and later have two very different outcomes. Biopsychosocial factors that are individual to each person are most likely at play when that happens.

When dealing with any athlete, we must recognize that the injury impacts the psychological wellbeing of that person. How someone deals with the trauma will be dictated by social support and techniques used to cope with the stresses of injury. These stresses will impact biology and the person's ability to heal.

We cannot ignore these factors in this work as we are bridging the gap from rehab to performance.

Somatosensory Control

The somatosensory system, covered in Chapter Seven, is a system of nerve receptors and cells that sense and react to alterations in a body's internal state. We could not have a motor system without a sensory system. Our input gives us our output. Bad input equals bad output.

If we continually type the wrong command into a computer keyboard, we keep getting the wrong output. We have to give the computer the correct commands for it to work properly.

The same goes for our bodies. If we send faulty information, our motor responses will be wrong and potentially inefficient. When we are dealing with somatosensory control,[19] we are addressing vestibular balance, postural sway, reflexes, visual system, and proprioceptive awareness.[20]

This phase of moving from rehabilitation to performance centers on reestablishing balance and postural reflexes and creating better sensory input for improved motor output.[21] Here, concepts of motor learning and motor control are of use, and we might apply techniques from DNS, PRI, yoga or Pilates to assist the client with balance, proprioception, and reflexive responses.

Fundamental Performance

As we start to look toward performance, which we will do in Chapter Nine, we begin to address fundamental strength. Does each muscle have the basic foundational strength to carry out the task we are asking it to do? Does each muscle have the ability to fire, against gravity, with resistance?

During standardized manual muscle testing, does each muscle possess the ability to perform at a foundational "five out of five" strength—the normal muscle strength per manual muscle testing principles?[22,23]

If not, we have some basic strength training work to do. We cannot build power—the forceful application of strength—without first building baseline strength. In this stage, we need to reestablish fundamental strength and ultimately power.

Deploying foundational corrective exercises for strength will work well during this phase. Correctives derived from

FMS, SFMA, PRI, MAT, and strength and conditioning training are used to produce the strength needed to prepare for more powerful movements.

When introducing power, it does not matter whether this is from a kettlebell, Olympic lifting, or another approach. Use whatever you think will work best for a client, given the medical history, sports background, training age, and performance needs.

Fundamental Advancement

During the fundamental-advancement phase, Chapter Ten, we study how to display foundational strength—fundamental performance—as an expression of power, and apply this power to general athletic movement. This is the phase where we introduce power production and focus on linear movement, multi-directional movement, jumping, and landing.

For example, an athlete must be able to achieve the fundamental positions needed for acceleration before we program sprints. Athletes need to be able to manage the forces created during the acceleration and then be able to safely decelerate to avoid injury.

During this progression of bridging the gap, a recovering athlete must relearn proper backpedaling, shuffling, jumping, landing, and basic footwork techniques before returning to full practices and games.[24] These fundamental athletic skills are required in every athlete, in different combinations, and at various loads and speeds. This is the time to rebuild the foundation of athletic movement.

The primary goal at this point is to retrain universal athletic movements and power creation and management. This is when we use the skills from the strength and conditioning models. It is up to you whether you follow principles employed by EXOS, Michael Boyle, Dan John, standard CSCS formulas, or any other approach.

Attention to your individual client's needs based on the medical history, the sport, and your experience will serve your client well.

Advanced Performance

Once we get to performance, which we will do in Chapter Eleven, the unique requirements of each sport and the different positions start to come into play. For example, whether a football player is a wide receiver or an offensive lineman, both athletes need to run, but an offensive lineman most likely needs acceleration mechanics more than absolute speed mechanics.

Consider a baseball and a soccer player: The former needs to run around the bases and to various fielding positions while paying attention to where a ball is as it flies through the air, while the latter must run down and across the pitch with a ball at foot, avoiding opponents along the way. Although these athletes share fundamental athletic movements, each sport and each position within a sport have different needs from a movement perspective, and we address those needs

in a slightly different way.

This brings us to a fundamental concept when organizing an intervention: *Are we offering something to the athlete that is diagnosis-specific, diagnosis-inclusive, or client-specific?*

Our treatments in the pain generator and motion segments are typically based on the diagnosis—these are *diagnosis-specific*. In the early rehab phase, it is important to know whether we are dealing with a bursitis or tendonitis, and it matters how that pain generator is affecting the entire limb or motion segment.

As we move forward through rehabilitation, the interventions become *diagnosis-inclusive*. This means that most likely we will prescribe some form of "core stability" work to everyone in the facility—however we choose to define that core stability.

The 60-year-old golfer gets a set of core stability exercises, as does the 14-year-old high school football player and the 24-year-old professional athlete.[25] These are different age populations with different performance goals and, probably, different diagnoses, but they all need some type of "core stability" to improve the conditions.

Finally, as we work our way toward the more performance-centric end of the bridging-the-gap model, we must be more *client-specific*.

The firefighter and the professional athlete will both need to function at a very high level, but they will do it in different ways. The quarterback and the pitcher may both be professional athletes, but their jobs require different skills. We need to consider the individual needs of the athletes in order to restore full function and return them to their sports.[26]

This performance phase aims to return the client to the sport, with position-specific functions needed for that sport and position. As with the rehabilitation interventions, it does not matter which performance model you choose. These are your personal preferences and prerogative as a practitioner or coach.

Be sure to include skills coaches in this segment, as it is essential to enable the client to meet the unique technical demands of the sport and position.

You can also apply the kind of movement analysis used at EXOS, described beginning on page 238, to ensure the client has regained full capacity in each of the main movement patterns needed to retake the field.

SHIFTING BETWEEN A MEDICAL AND A PERFORMANCE MODEL

This is one of the most difficult concepts to capture in a book. There is no single defining point where an athlete is doing rehab and then making the transition to performance training. Our athletes may rehabbing an upper-extremity injury, and at the same time be performing lower-body performance training to minimize atrophy and maintain the ability to produce power in the legs while still protecting the injury.

Although the bridging-the-gap model seems like a continuum, it is actually more of a checklist. Your athletes do not need to pass one stage before moving to the next. These elements do not have to happen in a certain order, with the exception of addressing the pain generator, if there is one.

Pain will affect all aspects of the biopsychosocial model, which is covered in Chapter Six, and needs to be dealt with immediately. With that exception, everything else may be worked on at any point in the process of returning to play, but these all need to be addressed at some point prior to returning an injured athlete to the field.

However, there are plenty of athletes playing while in pain. While the bridging-the-gap model acknowledges that pain should be dealt with immediately, this idealistic suggestion may not be a realistic expression of what occurs every day in sport.

People participate while they are in pain—they do it all the time. Hence, this model is not a true continuum, but more of an ideal, theoretical progression that recognizes the need for flexibility toward a given athlete at a given time.

The first four categories of *Pain Generator, Motion Segment, Psychomotor Control,* and *Somatosensory Control* live under the medical model. We typically address these areas under the supervision of a health care provider with a focus on improving pain, normalizing a system, and preparing for the higher-level activities of the performance model. These four areas deal with the fundamental building blocks of performance.

Somatosensory Control, Fundamental Performance, Fundamental Advancement, and *Advanced Performance* are part of the performance model. These typically build and fine-tune an athletic body after laying the foundation.

The overlap of the two models comes from the nervous systems. Somatosensory control—the afferent nervous system—is the underlying key to everything. It will be difficult to build total-body strength and power, athletic movement, and athletic skill in a person who is in pain, lacks proper mobility and stability, and has poor body control.

Athletes always want to be in the performance model. Athletes will come to you with goals such as "I want to improve my first-step quickness," yet have horrible hip mobility and cannot get into the fundamental athletic positions needed to improve first-step quickness.

Restoring the motion segment might be necessary in the immediate stages of intervention. Once the motion segment is improved, first-step quickness improves because you have addressed the weakest link in the system.

Philosophies and techniques that are more on the medical model side of the continuum should improve the performance model without doing anything related to performance.

Think of the medical model as the foundation for a new house, and the performance model as the actual house to be

built upon that foundation. Can you build a house on a bad foundation? Of course you can.

However, you will be limited as to how many stories the house can have, how big the house can be, and how long the house will be able to withstand the elements. You can build a house on a bad foundation, but it is not advisable.

Likewise, building performance on an injured, broken system is possible, but it is not advisable.

CREATING A RETURN-TO-PLAY TIMELINE

People in our fields often work without a plan. Could you imagine getting on a flight and having the pilot not follow the preflight checklist and executing the flight plan? Alternatively, imagine trying to build a house without a blueprint. Plans direct us where to go. They force us to go through the systematic processes to ensure we do not skip a fundamental step that may be impossible to fix later.

Creating long-term goals with short-term milestones to be met along the way will ensure that you give your client ample time to adapt, and these allow everyone to see the roadmap they will be traveling along. If anything veers off course, the end result will change.

Let us use a soccer player returning to the field after a knee injury, whom we would like to have back on the field in a game in three months.

We need to look at the schedule and see if there is time to set up a simulated or friendly game that may not have much at stake. We aim for some type of lower-intensity, full game activity one week prior to the athlete's real return to see how well the action of a simulated game is tolerated.

Once we determine the day, we know to plan short games first, playing with a full team of 11 on each side, but with a shortened field so there is less running for our returning player. We might want that to happen one or two weeks prior to a full pitch simulated game.

Prior to that, we could schedule a game with shorter distances on the pitch, with fewer players on the field to focus more on offensive or defensive plays. We want that to happen a week prior to playing with a full team on each side.

Earlier, we would plan offensive or defensive drills with some light contact, and before that, drills without the possibility of contact. Before that, we would have used drills that do not require critical thinking—just movement execution—and before that, we would use multi-directional movement skills specific to soccer, while using a ball.

Before that, the athlete needs multi-directional movement skills specific to soccer, but without a ball. Prior to that, we would plan linear movement, with and without a ball.

Before performing linear movement, we need to see full strength and the ability to develop power.

In order to do this, an athlete needs full mobility and stability throughout the motion segment, with good psychomotor control and somatosensory control.

Prior to this, our athlete needs to be free of pain. By the time you work backward through that entire scenario, giving the athlete plenty of time to adapt to the new stresses, you may find that three months is not enough time to return the person to play.

If you were to attempt it, the progressions would have to be extremely aggressive and there would be no room for issues in the process.

If there is an increase in pain or swelling at any point, you would need to take a step backward, and the long-term goal of returning to the field would be delayed.

Reaching your short-term goals will culminate in achieving your long-term goal. You cannot achieve long-term aims without covering the short-term ones along the way.

From a clinical standpoint, we have to make our findings and explanation of dysfunctions meaningful. When we are evaluating a patient and decide we see a weak glute medius…truly, who cares? Why should anyone care that the glute med is weak?

Well, a weak glute med will lead to poor hip mechanics, possibly resulting in synergistic dominance of the TFL and decreased power production at the hip, overloading the lumbar spine or knee. Once we relate the objective dysfunction to a functional limitation, we can create a goal: improve glute med strength. Once we have a goal, we can create a plan. The plan should include glute med strengthening exercises.

Every objective dysfunction should have a functional limitation along with a short-term or long-term goal, with a plan to achieve the goal.

To be sure, I always tie an objective dysfunction with meaningful information, which you will see in the chart found in Appendix Two. This keeps me honest in making sure every objective finding has a plan for improvement, as well as making sure every dysfunction is attached to a meaningful functional impairment.

Don't identify dysfunction for the sake of identifying dysfunction. What does the dysfunction mean? How does it affect the patient's life, and how are you going to fix it?

CLINICAL PEARL

- Identify an objective dysfunction
- Attach it to a functional limitation
- Determine a short- or long-term goal for improvement
- Create a plan to fix it

Create realistic timelines for your athletes to adapt to the new stresses you are introducing, and build in some recovery days to allow for rest. Work backward

from the long-term goal to give you, the athlete and the coach a realistic timeline for return to play.

SUMMARY

Bridging the gap from rehab to performance does not follow a linear continuum. If we wait for all football players to have perfect fundamental performance and somatosensory control, we would all be staring at a blank television on Sundays. Nor are the sports medicine and sports-performance elements of athletic rehab going to represent a perfect sequence.

We might be working in several of these phases at the same time and might have to regress certain exercises to ensure quality movement patterns.[27] The organization of the bridging-the-gap model should help you and your team understand where each intervention fits, and this will not necessarily be a linear progression.

In a clinical and performance world where there are so many experts to follow, the development of a philosophical training model can be difficult to create and implement, especially for the less-experienced practitioner.

Rather than trying to be exclusive or exclusionary, remember that many schools of thought, when broken down to their core principles, all focus on the same thing. All techniques, exercise types, schools of thought, and training principles are valuable when bridging the gap from rehab to performance.

It is your job to figure out the best way to combine your education in the most effective and efficient ways possible to get your athletes back onto the field. I hope the material presented in this book will help you do exactly that. That is the beauty of this system.

You do not have to choose one person to follow nor do you need to adhere to a specific system. If it had been proven that a single system worked, we would all be doing it. Everything fits and has its place. Your choices are dependent upon the individual athlete in your care.

This was an introductory excerpt from
Chapter One of Sue Falsone's
Bridging the Gap from Rehab to Performance

The book is 296 pages and includes:
18 original illustrations and graphics
127 photographs
277 references
9 valuable appendices…
and is carefully indexed.

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