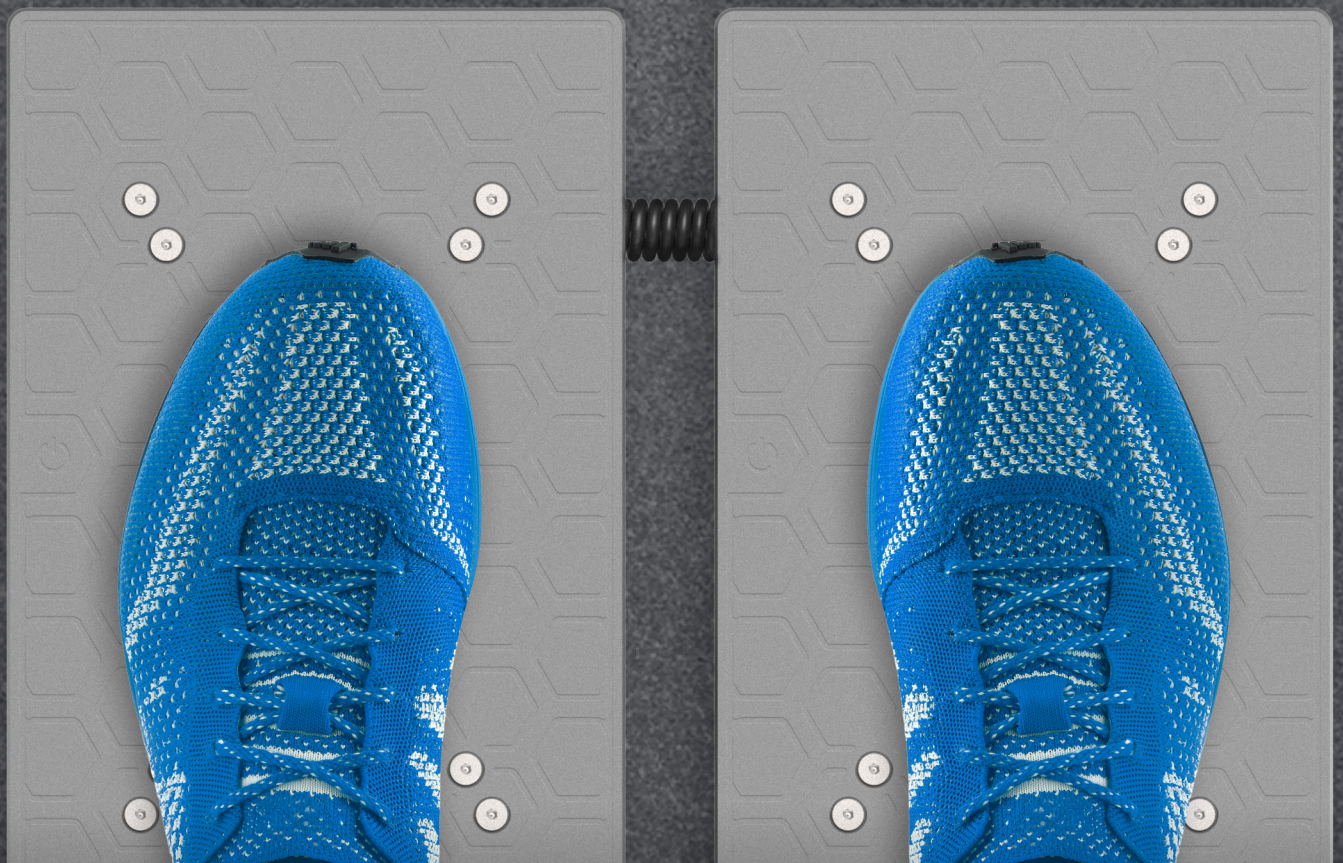


VALD

Practitioner's Guide to **Force Plates**

The definitive guide for practitioners
implementing force plates into
clinical practice.

VOLUME 1



A word from the inventors of **ForceDecks**



Dr. Daniel Cohen



Dr. Phil Graham-Smith



“ We created **ForceDecks** at a time when quick, easy force plate analysis was a pipe dream. We worked with traditional force plates for years, collecting data on Premier League football players only to find that the analysis would often take too long to make it actionable.

ForceDecks changed that, not just making instantaneous analysis possible but also making force plates accessible to whole new industries. All of a sudden, you didn't need a biomechanics degree and hours of free time to get value from force plate data – practitioners with no force plate experience whatsoever could use it day in and day out to help their decision-making processes.

We have spent decades working with force plates, but you don't need to in order to get value from them. If you are a practitioner and just getting started, don't worry – it's easier than you may think! ”

... and some words of encouragement for practitioners beginning their force plate journey, from **industry leaders who have been on the very same journey themselves.**



Mick Hughes

Director, **Learn.Physio**



@mickwhughes



@mickhughes.physio



Andrew Sokolowski

Founder, **LiveWell Health**

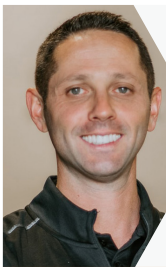


“ The biggest value for me from using force plates is being able to educate my patients on the “why” of rehabilitation. “Why” we are doing this exercise now, and “why” we can't do this one just yet based on the data we have today.

What made learning force plates easier was using it on a variety of patients – not just ACL-R patients. If I had a patient with any type of lower limb complaint, I would get them on ForceDecks to look at limb symmetry scores and force outputs on an array of jumping and hopping tasks ”

“ Force plates will make your decision-making easier, however in the early stages they can certainly seem overwhelming. As a practitioner, develop test strategies based on the patient.

For an 85-year old female, find what is important to her when it comes to exercise and daily activity. Begin with basics and build from there. As time goes on your test strategy will expand and the various metrics will become second nature. ”



Mike Reinold

Founder, **Champion Physical Therapy and Performance**

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“ There’s an old saying: **“if you aren’t assessing, you’re guessing.”** As a physical therapist, knowing and seeing the data not only helps me build more customized and specific programs for my patients, it also allows them to be engaged with the process and visualize their progress.

We use ForceDecks throughout the entire rehabilitation process, from early weightbearing exercises to advanced force training. The data along the way helps ensure we are progressing as planned and returning to sport as quickly and safely as possible. ”



Jo Clubb

Founder and Sports Science Consultant
Global Performance Insights

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“ When starting out with force plates, it’s essential to keep it simple. The abundance of data they offer can indeed be both enticing and overwhelming! But do not feel like you need to use all the features immediately.

By leveraging this objective data, clinicians can make more informed decisions, tailor interventions and rehabilitation to address specific deficits, and track patient progress over time. Furthermore, real-time feedback provided can enhance patient comprehension and engagement. ”



Peter Brem

Senior Clinical Specialist
Physiotherapy – MSK,
**Kantonsspital Winterthur
KSW Hospital**

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“ Embracing force plates in my practice has been transformative. They have revolutionized my understanding of patient movement dynamics, unveiling previously hidden deficiencies and asymmetries.

With this newfound clarity, I can finely calibrate interventions, leading to accelerated progress and enhanced patient outcomes. By leveraging objective feedback, you will optimize interventions, personalize care, and empower patients in their rehabilitation journey.

Embrace the challenge, as it is vital to elevating care standards and achieving superior outcomes. ”



Alex Natera

Performance Science Manager,
NSW Institute of Sport and
creator of **Run-Specific Isometric
Strength Testing (RSIST)**

[X](#) @alex_natera [ig](#) @alex.natera

“ The perception of force plates being “super high tech”, complicated, and best-suited for labs could not be further from reality these days. Many think that more complex data must be better, but the basics are where the truth lies and the bar for understanding these metrics is much lower than people think.

Start with no more than 3 metrics, make sure each of the metrics is reliable and you cannot go wrong. ”

I'm busy.

Why should I read this guide?

It is no secret that many practitioners treating patients with musculoskeletal (MSK) injuries or impairments have limited exposure to force plate technology.

We hope it will provide you with the **fundamental knowledge to feel confident** incorporating force plates into your practice.

If you are one of these practitioners, you are not alone, and – in fact – you are the reason we created this document. We hope it will provide you with the fundamental knowledge to feel confident incorporating force plates into your practice.

We believe in the value of technology to enhance rehabilitation for both practitioners and their patients. Technology can provide better experiences (for practitioners and patients), enhance patient-centered communication which builds [therapeutic alliance](#),

enhances insights, and ultimately plays an important role in targeted rehabilitation and injury prevention programs.

We are unashamedly passionate about this topic, but there is also an undeniable trend in our industry and an emerging body of evidence supporting it. We want to share this with you, so you and your patients can experience the benefits of objective measurement technology.

An Industry Shift

Injury rehabilitation professionals have long valued objective measurement in both research and clinical settings. Our industry has shifted away from solely “time-based” rehabilitation decision-making to using research-based objective measurement for “criteria-based” progressions.

Historically, these have been analog or “subjective objective” measurements, often relying on practitioners’ eyes and hands due to the inaccessibility of technology.

However, over the past decade, there has been a significant shift in the accessibility of objective measurement technology in clinical practice.

Digital handheld dynamometers (HHDs) such as the [DynaMo Handheld Strength & ROM](#) (range of motion) system represent perhaps the most notable example of this, having been widely accepted as superior to traditional manual muscle testing in accuracy and repeatability.

Not only is technology becoming more accessible, but researchers are using **the same tools to publish clinical insights** as practitioners are using in-clinic.



The shift hasn't stopped at HHDs, though, with other technologies such as fixed-frame dynamometry (e.g. [NordBord Hamstring Testing System](#), [ForceFrame Strength Testing System](#)), 3D motion analysis (e.g. [HumanTrak Movement Analysis System](#)) and force plates (e.g. [ForceDecks Dual Force Plate System](#)) all becoming accessible to clinical practice.



Not only is technology becoming more accessible, but researchers are using the same tools to publish clinical insights that practitioners are using in-clinic. For example:

- Kotsifaki et al. showed that **60% of ACLR patients possess abnormal landing kinematics** in their injured leg, despite having >90% Limb Symmetry Index for hop tests.
- Reactive Strength Index (RSI) and jump height are **more sensitive than hop distance in identifying interlimb asymmetries** at the time of return to sport.
- Assessing **rate of force development (RFD)** in addition to maximal isometric strength may be **helpful in guiding strength and power progressions in ACLR** rehabilitation process.
- Elevated concentric, eccentric, and landing impulse, peak landing forces, and jump height **deficits have been demonstrated at the return-to-play stage after surgery (9+ months)**, even when passing traditional discharge criteria.

Whilst a lot of these examples are for ACL, the principles apply to many other injuries as well as non-athletic populations.

- The power and speed scores measured during sit-to-stand motion can **accurately determine frailty in older adults with cardiometabolic diseases** at baseline. Clinicians can use these scores to screen high-risk patients for frailty, as the evaluation of ground reaction force (GRF) parameters during sit-to-stand motion is convenient and does not require much space.
- Area of ellipse is useful **post-concussion to monitor return to full function.**
- Several COP parameters emerged as good indices to distinguish **fallers from non-fallers.**

For these reasons, force plates have become a mainstay in professional sport organizations where they are used to measure, train, and monitor performance, as well as in rehabilitation. For the very same reasons, they are trending to become a mainstay in clinical rehabilitation.

“I’ve never heard of those metrics. **Where do I start?**”

We’ve all been there. The simple answer is: it is likely that you can implement force plates without demonstrably altering your current clinical processes.

Start by doing what you have always done, and incorporate force plates into it.

Instead, start by doing what you’ve always done, and incorporate force plates. For practitioners who work with patients with injuries, this alone will likely provide more than enough new insights to add demonstrable value to your clinical service.

Then, for those who wish to go further, there is a whole new world of educational content available to help you do so, that was previously inaccessible to practitioners.

This document will help to answer many of the common questions practitioners ask when starting their force plate journey, and dispel some common myths, including:

MYTH

Force plates are just for elite athletes.

REALITY

This may have been true in the past but is no longer the case.

VALD clients use ForceDecks with all kinds of populations – from [pediatrics to geriatrics, neurological to orthopedic, and everything in between](#).

Force plates have a role wherever there is a need to measure physical qualities such as force, weight tolerance, asymmetries, power, balance, and more. We discuss this further in our section on pathologies.

MYTH

Force plates are complex to learn and difficult to use.

REALITY

In the past, users needed extensive training to be able to use

force plates, but this has changed. For example, ForceDecks are **powered by sophisticated software that does the heavy lifting for you**, automatically delivering results that you can action – no biomechanics degree required.

At VALD, that has been our mission since we were founded: to make research-grade technology accessible to every practitioner.

MYTH

I don't have time to add force plates into my consultation – they will slow me down.

REALITY

This is one of the most common fears practitioners have, but also one that has been mitigated by tens of thousands of ForceDecks users around the globe who have come before you.

Now, many users report that the value of deeper insights from force plates significantly outweighs this potential drawback. Furthermore, these users have found that **force plates have created efficiencies in other areas such as note-taking and reporting**, and even in communicating and educating their patients.

MYTH

The cost of force plates is difficult to justify and I won't get a return on my investment (ROI).

REALITY

We have dedicated a [whole section](#) to this, but to cut to the chase – ROI

from force plates comes in many forms. Typically, the value of increasing patients' engagement in their therapy beyond when symptoms have resolved is **more than enough to cover the cost of the technology**.

Beyond buy-in, whether it is the ability to provide evidence to third-party insurers on the value of your rehabilitation services, the addition of new services to your offering, or an outreach and marketing tool for generating new business – achieving ROI on your force plates is possible for the vast majority of practitioners.

Now that you understand why we have created this resource, let's dive in. We know this is a long document, but that is testament to you. Today's practitioners work in many and varied settings, helping many different patients who have had their physical health impacted and wish to achieve their functional goals. With the democratization of technology in recent years, almost all of these practitioners and patients can derive value at some level from force plates.

We take pride in being able to provide you not just with technology, but with the education and support you need to succeed in implementing it, just as we know you take pride in providing high-quality clinical care to your patients.

In this guide, **we will cover...**

Tip: Click any heading to jump to section

How do force plates **work?**

Force plates in **injury rehabilitation**

Force plate **test types**

Jumps

Isometrics

Functional

Balance

Force plates in **specific pathologies**

ACL-R

Aging

Ankle Sprain

Neurological Conditions

Shoulder Injury

Total Knee Replacement (TKR)

Total Hip Replacement (THR)

How do I **choose a test** to perform?

Implementation ideas for your business

Purchasing considerations

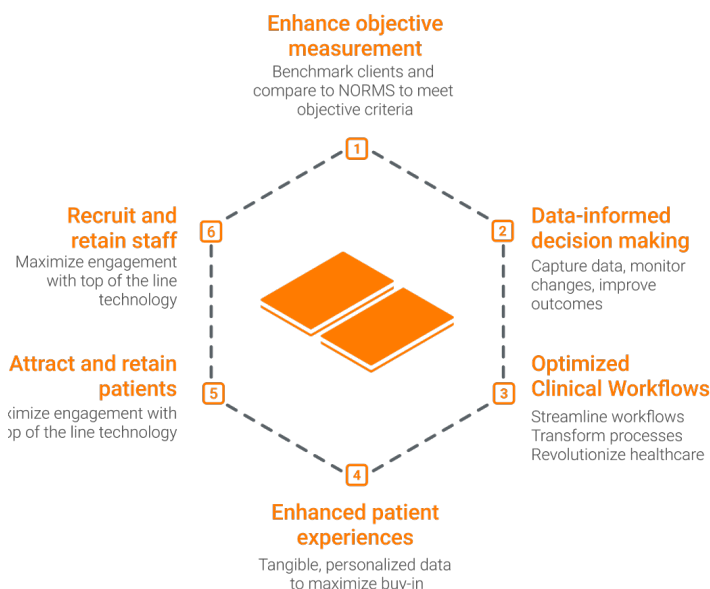
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Force Plate Fundamentals

Before we dive into clinical applications for force plates data, we will cover the basics of force plates: how they work, what data they produce and how they are used to derive the insights we will cover later in the document.

You do not need a deep understanding of how force plates work to get value from using them, so feel free to skip this section if you wish. Alternatively, if you would like to learn more, you will find links to other helpful resources along the way, such as this [Force Plates 101 article](#) from Jo Clubb.



Reasons for Implementing Force Plates

We have been working with performance and health professionals around the globe for nearly a decade. From sole practitioners to executives at large health organizations – we have spoken to many of you and sought to understand the role of force plate technology in your practices.

From these conversations with you and your peers, we have heard six common themes (see [left](#)). We know that this list is perhaps an oversimplification of many of the nuanced scenarios of clinical settings around the world. However, we have found these to be the six most common reasons for practitioners to implement technology such as force plates.

The Past and Future of Force Plates

Force plates have been around for over 50 years, so the technology that underpins them is far from new. However, only recently have they become accessible to practitioners in the field and the clinic.

Historically, force plates were designed for research

laboratories, not for clinics. They were priced accordingly – typically tens of thousands of dollars for a single plate. Their hardware and software were cumbersome to set up, difficult to use and their data required a great deal of time and skill to analyze.

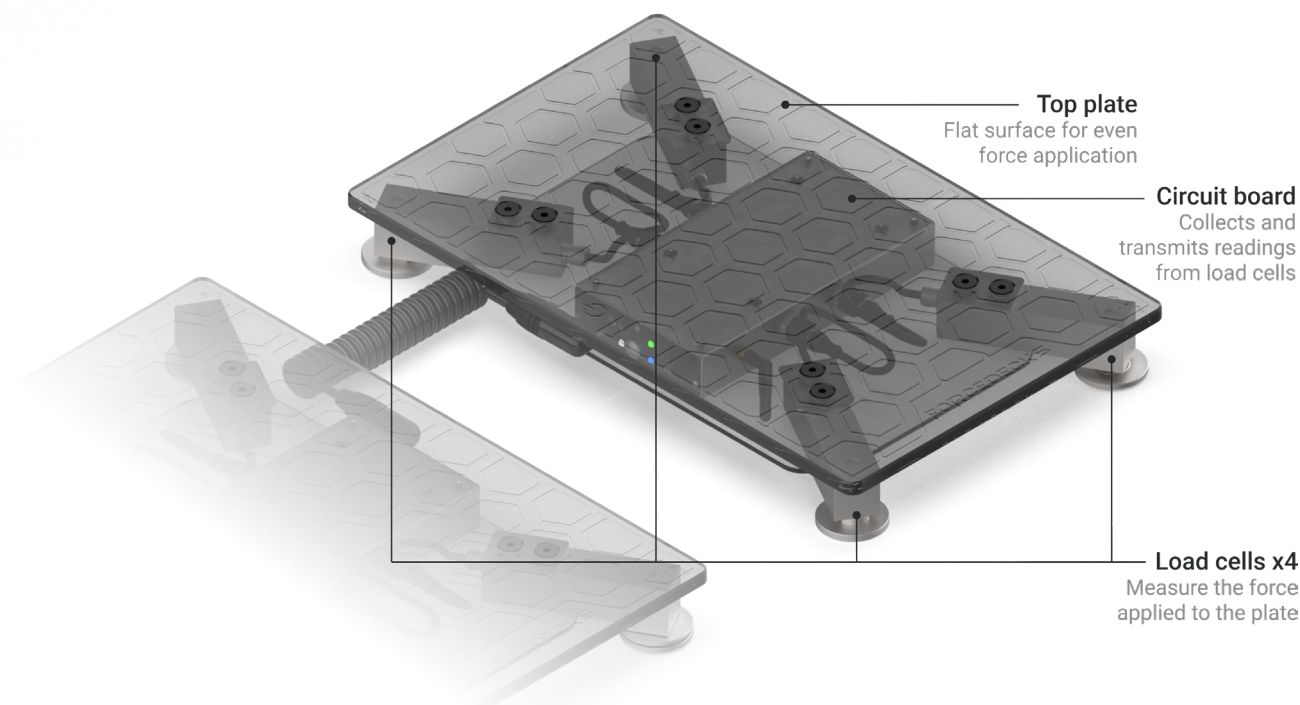
modern force plates ... are lightweight, portable, more affordable and come with **software that does the heavy lifting for you**

However, today's modern force plates – such as ForceDecks – are designed for the clinic. They are lightweight, portable, much more affordable, and come with software that does the heavy lifting for you by using algorithms to perform calculations automatically. Plus, they feature modern interfaces and intuitive visualizations to help you (and the patient) understand the data.

Force plates are likely to become even more prominent in clinics in the future, as they become more capable, normative force plate data expands and clinicians become more comfortable with incorporating them into their practices.

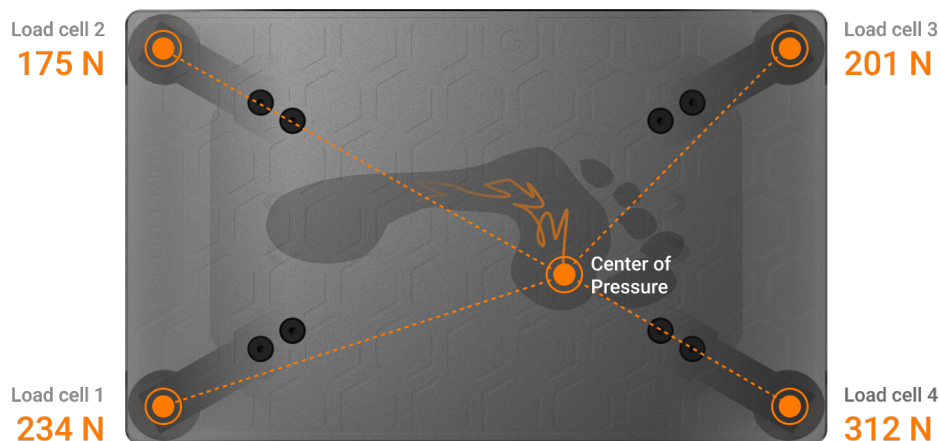
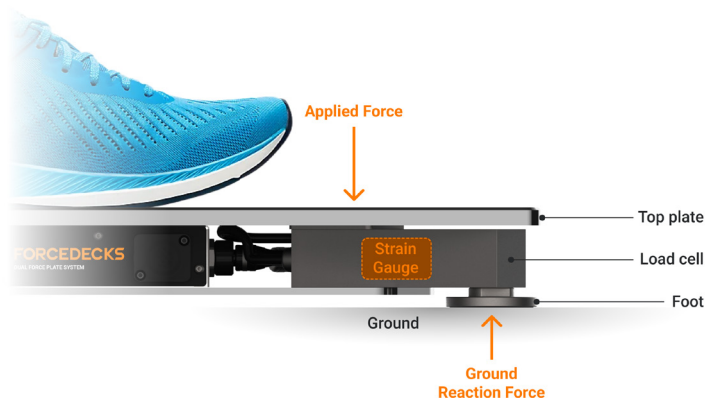
How do Force Plates Work?

Force plates share many commonalities with weighing scales – the same ones you would find in your bathroom or kitchen, albeit more advanced and of much higher capacity. Each force plate typically contains four force sensors (called “load cells”) – one in each corner – and a solid, flat top surface that force can be applied to.



The load cells measure vertical GRF, which – based on Newton’s third law – is the equal and opposite force generated by the ground when a force is applied to it.

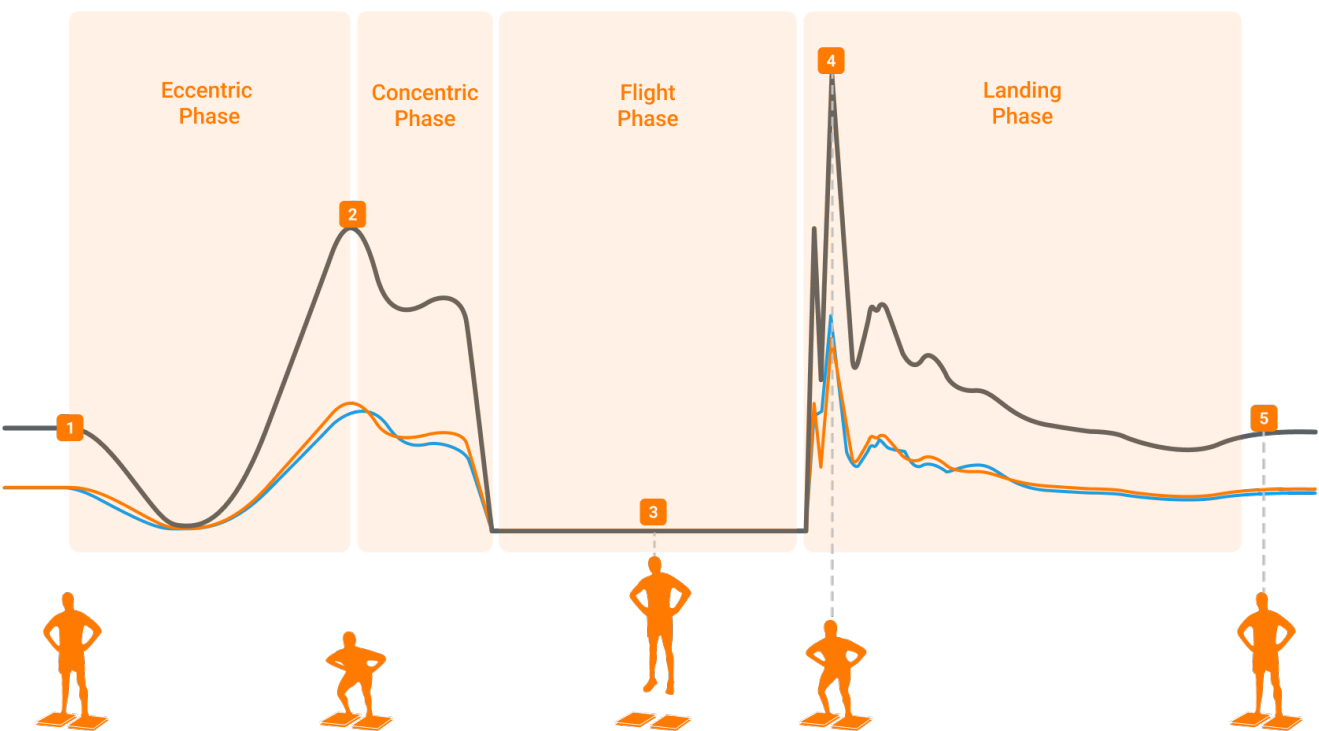
So, when a patient is standing still on force plates, GRF will be equal to their bodyweight. As the patient moves, GRF will decrease or increase, and the force plates measure the changes in this force over time.



Some force plates such as ForceDecks can also calculate **center of pressure (CoP)**, which is used to assess balance or instability.

What do Force Plates Measure?

Force plates measure GRF (and in some cases, CoP) to generate the “force-time curve” along with several other force derivative curves. However, this raw data on its own can be challenging and time-consuming to interpret.



... modern force plates such as ForceDecks take this raw data and use algorithms to calculate dozens of metrics that are **much more interpretable for practitioners.**

Therefore, modern force plates such as ForceDecks take this raw data and use algorithms to calculate dozens of metrics that are much more interpretable for clinicians. This can reveal more than just the outcome of a movement (for example jump height

can be achieved in many different ways). Some common metrics calculated by force plates and their corresponding physical functions include:

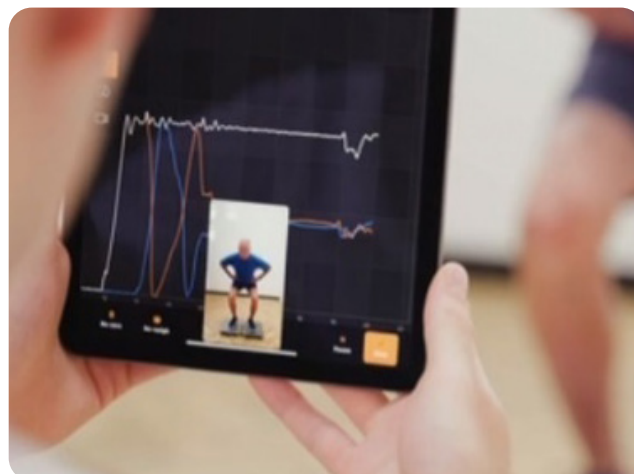
Force Plate Metric	Physical Function
Peak force	Strength
Asymmetry	Difference between limbs
Peak power	Power or explosiveness
Rate of force development (RFD)	Ability to generate force quickly

ForceDecks Vision directly links traditionally complex force data with visuals of their patient's movement.

In addition to the force data generated by force plates, [ForceDecks Vision](#) (a proprietary feature of ForceDecks) allows users to record video with their smartphone or tablet during a test, which is synchronized with force data and automatically annotated with key landmarks.

This has been another significant step in the direction of making force plate data more accessible to practitioners, as ForceDecks Vision directly links traditionally complex force data with visuals of their patient's movement.

The ability to show this to patients further enhances communication and their understanding the results of the assessment.



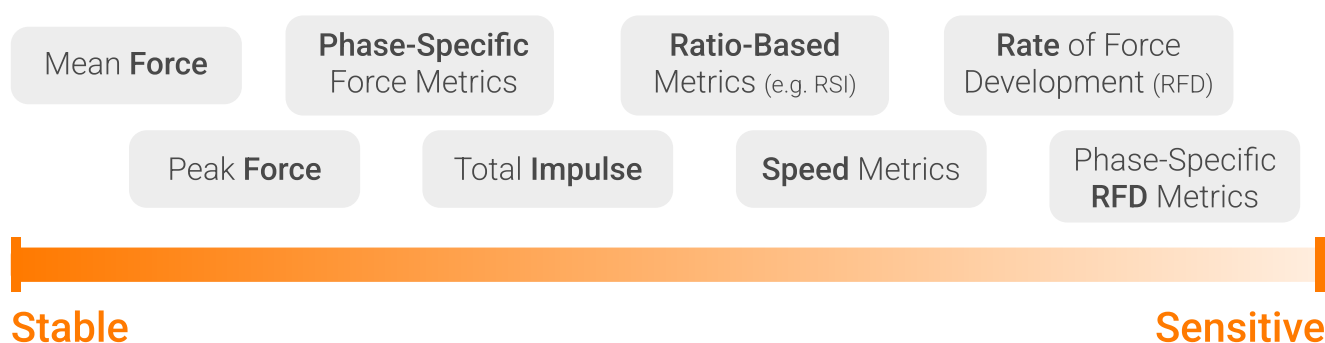
Not all Metrics are Created Equal

Clinicians starting out with force plate testing should opt for metrics that can more reliably reflect change in the individual. While helpful to understand and appreciate during end stage rehabilitation and advanced force plate analysis, advanced metrics such as Eccentric Deceleration Rate of Force Development (EDRFD) and Concentric Peak Velocity can be volatile and may vary substantially from test to test without clinically meaningful change for many patients.

However, metrics such as mean and peak forces, or phase-specific kinetic measures (e.g. Concentric Mean Force) tend to be more consistent in their presentations day-to-day.

Clinicians may find it helpful to rely on these measures early in their force plate journey to ensure that the changes they observe in their force plate assessments are reflective of meaningful change.

Metric Continuum

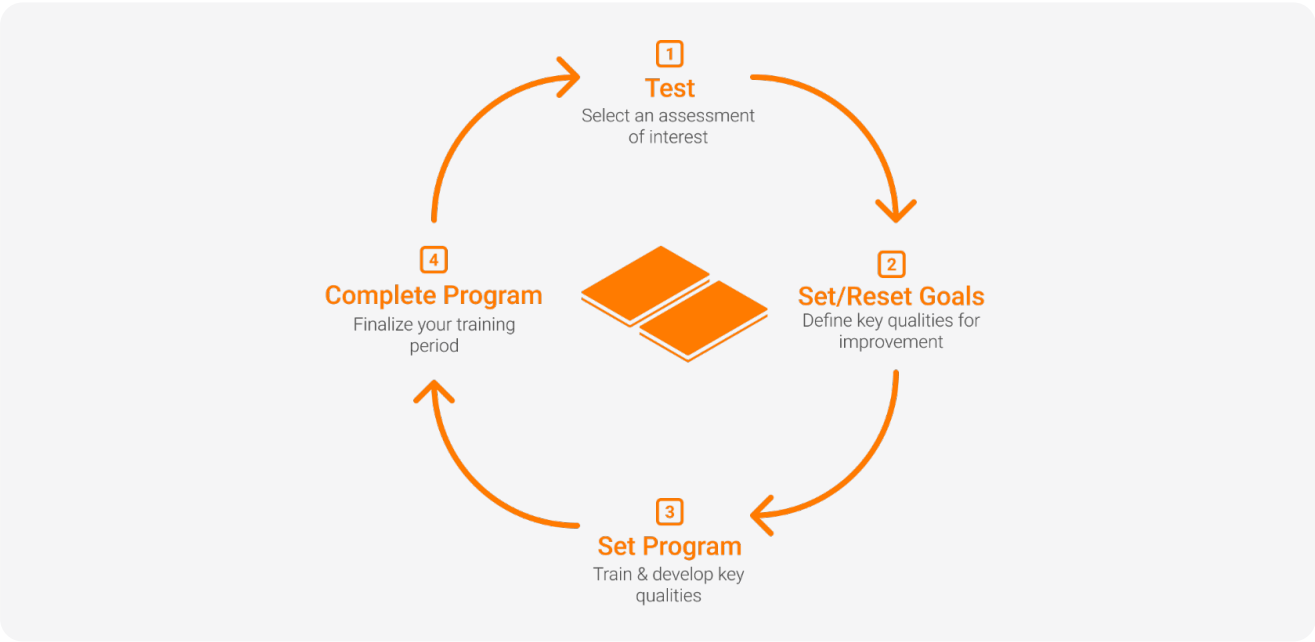


Clinical Applications for Force Plates

Force Plates have a role in almost any clinical setting and population – anywhere that strength, asymmetry, power, balance, or other physical functions play a role in criteria-based decision-making. By breaking down the phases and qualities of movements, intervention programs can be specifically targeted – for example, unilateral vs. bilateral, concentric vs. eccentric, strength vs. power, balance direction (medial-lateral vs. anterior-posterior), and more.

Here we will discuss the application of force plates in **injury rehabilitation, injury prevention, high performance**, and chronic or degenerative conditions such as **aging, neurological, or other medical conditions**.

This list of applications is far from exhaustive and is not intended to be prescriptive, but simply illustrates the breadth of clinical scenarios in which force plates can be used.



Injury rehabilitation

Given most patients present to the clinic or hospital after an injury has occurred, the most common application of force plates in clinical settings is in injury rehabilitation.

With criteria-based (rather than time-based) rehabilitation now regarded as best practice, clinicians are shifting towards more accurate, sensitive, and reliable, evidence-based assessment tools such as force plates, so that they can be more confident in the process to base their criteria-based decisions on more data and insights.

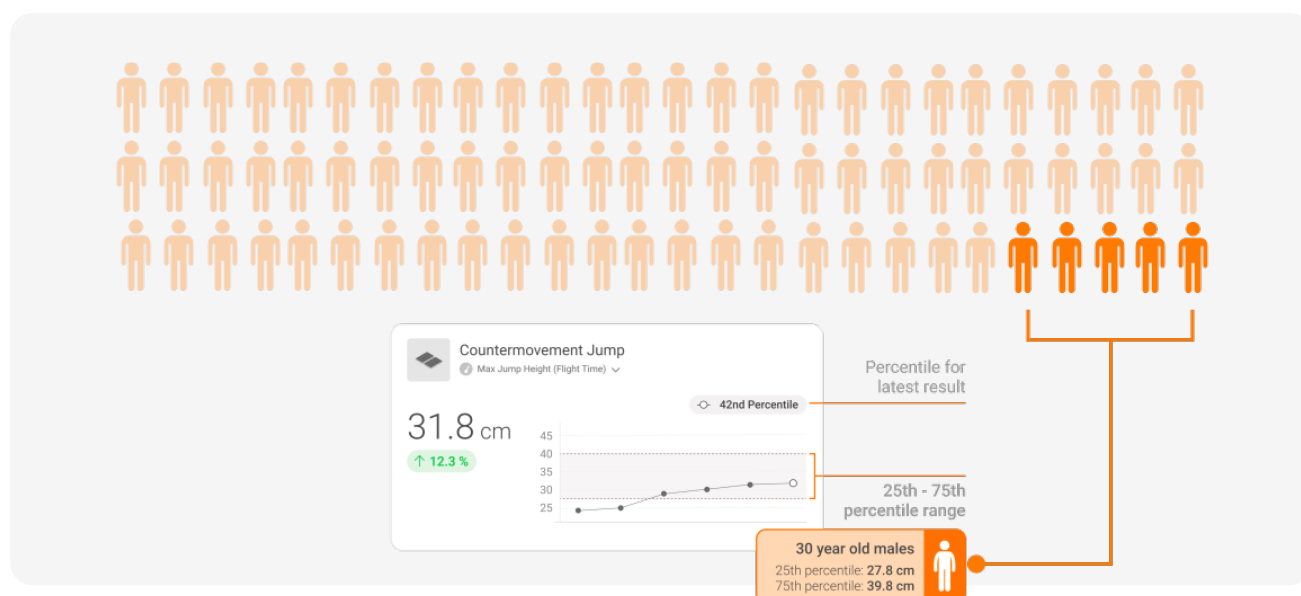


Single Leg Balance	Traditional Assessment	Measurement (Description)	ForceDecks Metric	What it Means
	Balance Time	Time (seconds)	Mean Velocity	Average speed the CoP travels throughout the test.
	Amount of Sway	'Moderate' Sway	CoP Translation Medial-Lateral Anterior-Posterior	Distance between furthest CoP points in frontal and sagittal planes.

Contrary to what some might think, force plates **do not replace the rehabilitation framework** that practitioners are taught and use day-to-day.

Contrary to what some might think, force plates do not replace the rehabilitation framework that practitioners are taught and use day-to-day. Whilst there are many nuances, the most common reference points a practitioner may use for decision-making in injury rehabilitation (other than physiological tissue healing time frames) – each of which can be measured by force plates – are:

- **Normative data** – benchmarking the injured patient against data for their demographic (age, sex, sport, industry) to understand their current deficits, then using that normative data as a goal to work towards. For example, ForceDecks features [Norms](#) – integrated normative data – in its reports to provide this context immediately after an assessment.
- **Pre-injury data** – if pre-injury data is available (it often is not in clinical settings), aiming to restore strength, movement, or other functions to their pre-injury levels.
- **Limb Symmetry Index (LSI)** – in the absence of normative or pre-injury data, practitioners may identify the magnitude of asymmetry between limbs as a reference point, then gear rehabilitation towards restoring the injured limb to within an acceptable percentage of the healthy limb.



Beyond these decision-making reference points, force plates enable a range of other valuable use cases throughout the rehabilitation journey.

- **Discover new metrics** and data that are not possible to measure without force plates. You may uncover deficiencies or strengths you did not expect – allowing for tailored rehabilitation.
- **Monitor progress** during rehab with accuracy and make decisions with confidence.
- **Reference normative data** to provide more context and meaning to results, both for you and for your patient.
- **Biofeedback** enhances the patient's experience through gamified data visualization and real-time results.
- **Enhance communication** with clear objective data that can be easily explained to your patient and tracked over time.
- **Automatic logging** of testing data, removing the need for pen and paper, spreadsheets, or manual entry.
- **Automatic reporting** makes it simple to communicate results to stakeholders.

Common examples of force plates in rehabilitation settings include:

- Pre-operative physical assessments.
- Post-operative recovery.
- Muscle and tendon joint injury.
- Acute and degenerative joint pathologies.

Injury Risk Management

Whether they work with athletes, active populations, people with physically demanding occupations, or patients with a history of injury, practitioners play a significant role in injury risk management. Whilst technology does not enable practitioners to predict injury, it can play a significant role in supporting decision-making in the pursuit of minimizing injury risk.

Whilst technology does not enable practitioners to predict injury, it can play a significant role in supporting decision making

Force plates can calculate hundreds of metrics from jumps, functional movements, isometric strength tests, and balance tasks. This data can then be actioned in ways such as:

- **Benchmarking** to identify risk factors.
- **Monitoring** for any concerning or encouraging changes over time.
- **Fatigue or readiness** assessment (mainly in athletic populations, but also applicable in other populations).
- Developing targeted **intervention programs**.
- **Post-injury analysis** to identify potential risk factors that could be used for future injury prevention strategies.

Data from force plate testing can be benchmarked against:

- **Normative data** – for the person’s sport, functional demands, or occupation. For example, ForceDecks features integrated Norms and VALD users can access a range of sport- and demographic-specific normative data reports.
- **Task-specific benchmarks** – where a known benchmark is required to complete a task. For example, a requirement may be to lift up to 20kg in a manual labor role.
- **Limb Symmetry Index** – assessing limb asymmetries and comparing the data to acceptable thresholds given the context of a person’s sport, occupation, or functional goals.

Squat Assessment	Traditional Assessment	Measurement (Description)	ForceDecks Metric	What it Means
	Asymmetry	Visual description of weight tolerance - ie 'mild weight shift to right'	Eccentric and Concentric Mean Force Asymmetry	Average force generated by each leg when squatting in eccentric and concentric phases.
	Depth of Squat	'1/2 depth'; 'Thigh parallel'	Maximum Negative Displacement	Vertical distance translation of center of mass during the squat.



High Performance

Force plates are well-suited to a high-performance environment. They provide accurate, granular data, are capable of testing fast and high-force movements, are convenient for athletes to use, and -even before force plate data became quick and easy to analyze – many high-performance teams have staff dedicated to analyzing complex data, including from force plates.

Some common applications for force plates in high performance sports include:

Benchmarking

- Assessing athletes against normative data or other benchmarks, commonly performed when athletes first join a team or when returning from a break.

Profiling

- Use force plates to assess starting points for rehabilitation, and the effectiveness of your training programs.

Monitoring

- Regular athlete assessment to determine their readiness to train or to compete.

Rehab

- Force plates can monitor rehabilitation progress and assist return-to-play decision-making.

Performance profiling or benchmarking are also often offered to athletes by clinics as a stand-alone service. Many clinics work with local sporting clubs or individual athletes to provide insights on how to improve performance or minimize injury risk.

Force plate tests, when performed in isolation, can provide immediate feedback on an individual's physical characteristics. However, when certain groups of tests are performed, they can yield more detailed insights into performance trends, and provide information that can shape the way an exercise intervention is designed.

For example:

- **DSI (Dynamic Strength Index)** is composed of two force plate tests (isometric mid-thigh pull (IMTP) and countermovement jump (CMJ) [link to both tests later in the document]) that are used to profile an individual's force/velocity characteristics.
- **F/V (Force/Velocity) profiling** is a technique whereby a group of dynamic or ballistic tests are performed on force plates with various loads to create an even more detailed understanding of an individual's force/velocity behavior.
- **EUR (Eccentric Utilization Ratio)** uses both the squat jump (SJ) and CMJ to determine how reliant someone is on utilizing the stretch-shortening cycle (SSC) during ballistic actions.

For more information on using force plates in performance settings, check out [VALD Performance blogs](#) and [VALD Performance webinar series](#).

Chronic and Degenerative Conditions

There are many other cases where patients present to a practitioner for assistance in improving, maintaining, or preventing further decline of physical capacity. For these conditions, there may be no acute injury to rehabilitate, but the patient's physical capacity must still be assessed and managed.

Such presentations include:

- Neurological conditions
- Degenerative diseases
- Aging
- Side effects from other treatments (such as deconditioning due to chemotherapy)

Including force plates as part of the management strategy for chronic conditions ... can help in cases where **traditional testing may be insensitive to change**

Researchers have [used force plates for sit-to-stand assessments of patients with strokes](#) in order to quantify force output. Further, by improving the position of the limbs to produce larger vertical force or accept a greater proportion of bodyweight on the paralyzed limb, they found motor function could also be improved.

The following are two case examples ([shared by real ForceDecks users](#)) where a traditional objective assessment was insensitive to progressive changes during a patient's treatment.

65-year-old male with **Parkinson's disease**

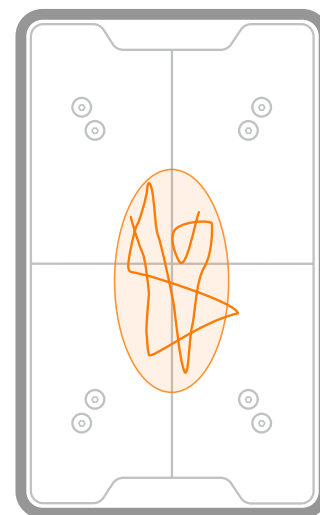
Over four months of rehabilitation, the patient's 30-second sit-to-stand test (30STST) results remained the same at 14 repetitions. However, he had a 21% increase in strength as measured by an isometric mid-thigh pull (IMTP) test. These changes would not have been possible for the practitioner to detect without force plates.

Metric	Initial	Reassessment <i>(4 Months Later)</i>	Improvement	
No force plates 30s Sit to Stand	14 reps	14 reps	0 %	
IMTP with ForceDecks Peak Force/ Body Mass	18.5 N/kg	22.4 N/kg	+21 %	
IMTP with ForceDecks RFD 200 ms	942 N/s	2,208 N/s	+134 %	

31-Year-Old Male, **Severed Peroneal Nerve with Foot Drop**

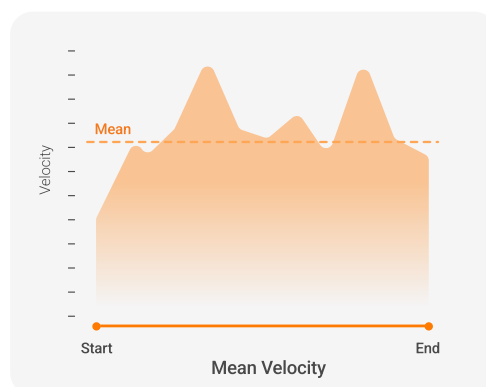
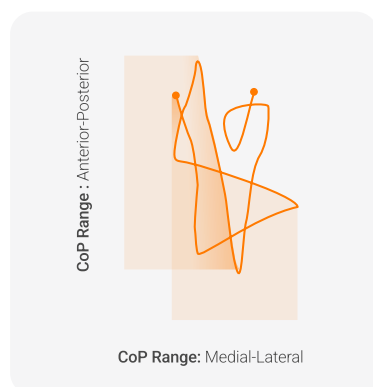
Despite the patient reporting an ongoing feeling of ‘unsteadiness’ on his right side, he was able to balance on each leg for 45 seconds. However, when performing a single leg balance test using ForceDecks, he displayed a significant asymmetry that was then able to be managed with a more targeted rehabilitation program.

Metric	Left	Right
No force plates Single Leg Stand Duration	45s	45s *
With ForceDecks Area of CoP Ellipse	954 mm ²	2,488 mm ²
With ForceDecks CoP Range Anterior-Posterior	50 mm	104 mm
With ForceDecks CoP Range Medial-Lateral	31 mm	32 mm
With ForceDecks Total Excursion	903 mm	1,619 mm



Total Excursion with Area of 95% CoP Ellipse.

* Client felt 'less steady' on right



For many chronic conditions, treatment may be funded by a third-party insurer or medical system. There are many examples of force plate data (or data from other technologies, for that matter) assisting in justifying and maintaining adequate treatment funding by demonstrating progress that was undetectable to traditional methods.

Types of Force Plate Tests

Force plates are best known for assessing jumps and isometric strength, which were made popular in high-performance sports.

force plates can test almost any movement that **involves predominantly vertical forces.**

However, force plates can test any movement that involves predominantly vertical forces, which means they are capable of much, much more. This includes being able to test balance tasks such as quiet stand and single leg stand, functional movements such as

squats, push-ups, and STS – and, of course, jumping, and isometric strength tests.

To illustrate force plates' versatility, the range of tests ForceDecks can perform are summarized below.

Each of these tests is automatically analyzed by ForceDecks software, and produces dozens (or even hundreds, depending on the test) of metrics that can be applied to a wide range of clinical cases.

Jumps		Functional	Isometric
Countermovement Jump (CMJ) *	Single Leg Drop Jump *	Squat Assessment	Isometric Mid-Thigh Pull (IMTP)
Countermovement Jump - Loaded *	Drop Jump *	Single Leg Squat Assessment	Isometric Squat
Abalakov Jump	Land and Hold *	Push-Up	Isometric Shoulder I-Y-T
Single Leg Jump *	Single Leg Land and Hold *	Sit-to-Stand-to-Sit	Single Leg Isometric Test *
Squat Jump *	Hop Test *	Balance	Custom Isometric Test *
Squat Jump - Loaded *	Single Leg Hop Test *	Quiet Stand	
Countermovement Rebound Jump *	Hop and Return *	Single Leg Stand	
Single Leg Countermovement Rebound Jump *		Single Leg Range of Stability	

* Test types that can be automatically detected by ForceDecks apps.

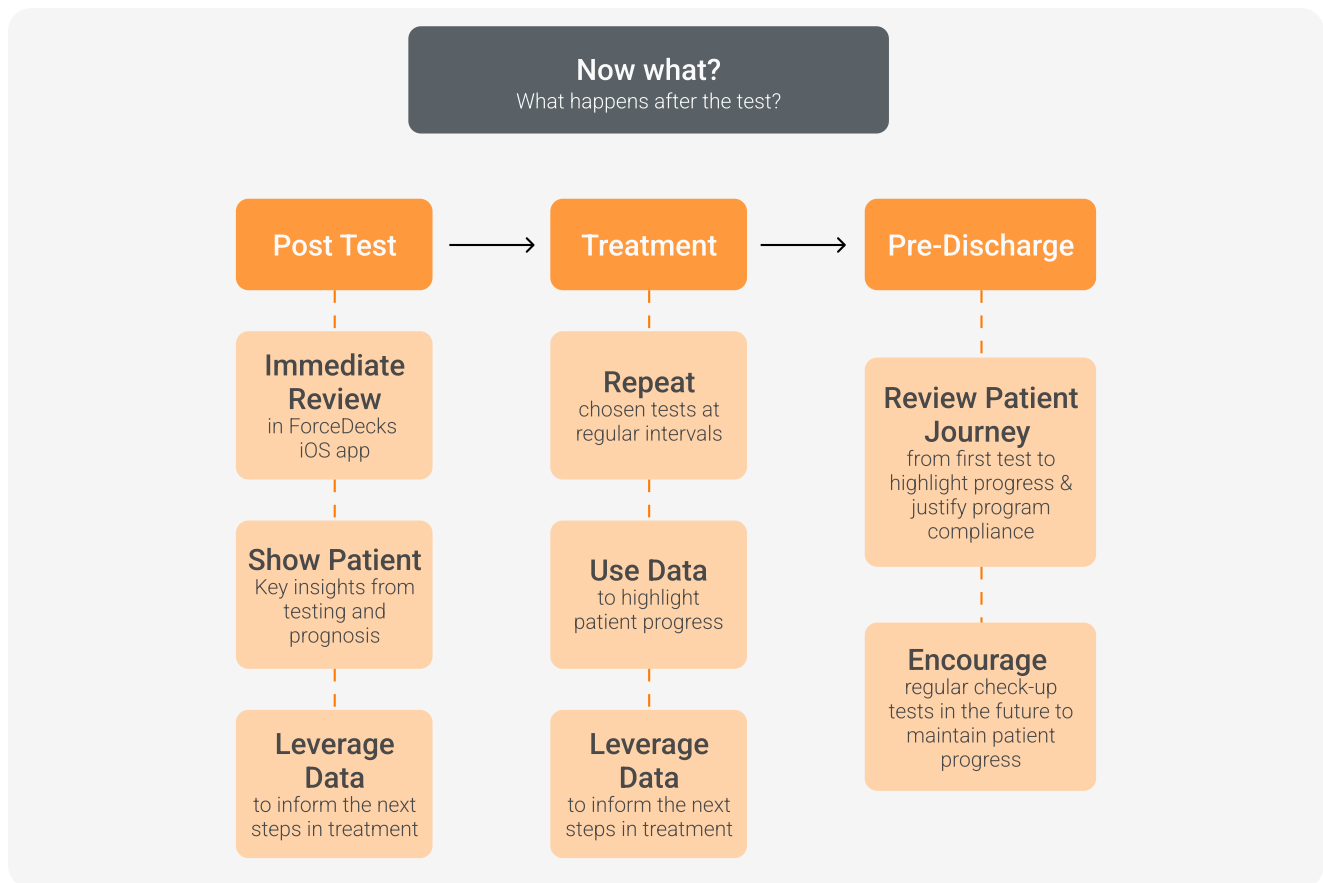
The other way to look at types of tests is by the physical attribute that you wish to assess.

While there is a wide range of force plate tests available to clinical users, it is typically considered best practice to instead begin by identifying the physical qualities you wish to assess. From that point, the most appropriate test can be selected.

There are many frameworks shared and published by force plate experts and users to help select the

appropriate tests and metrics to perform, and below is one such example. This section will explore the different types of tests that can be performed on force plates and their applications in clinical practice.

However, before we review the different types of tests, it is important to understand what happens after the test. Here is an example framework of how a practitioner can use the information gained from assessments performed on force plates.



Jumps

Jumps (including unilateral and bilateral) are great tests of ballistic movements and are favored for athletes or athletic populations. In rehabilitation settings, force plate jump tests can help identify

and quantify elements that would be very difficult to distinguish visually, such as inter-limb asymmetries. The practitioner can even break down the phases of the jump to target their interventions:

- Is the patient stronger or faster in the eccentric component versus the concentric component?
- How quickly are they able to perform the movement?
- Do they favor one limb over the other?

In rehabilitation settings, force plate jump tests can help identify and quantify elements that **would be very difficult to determine by eye**

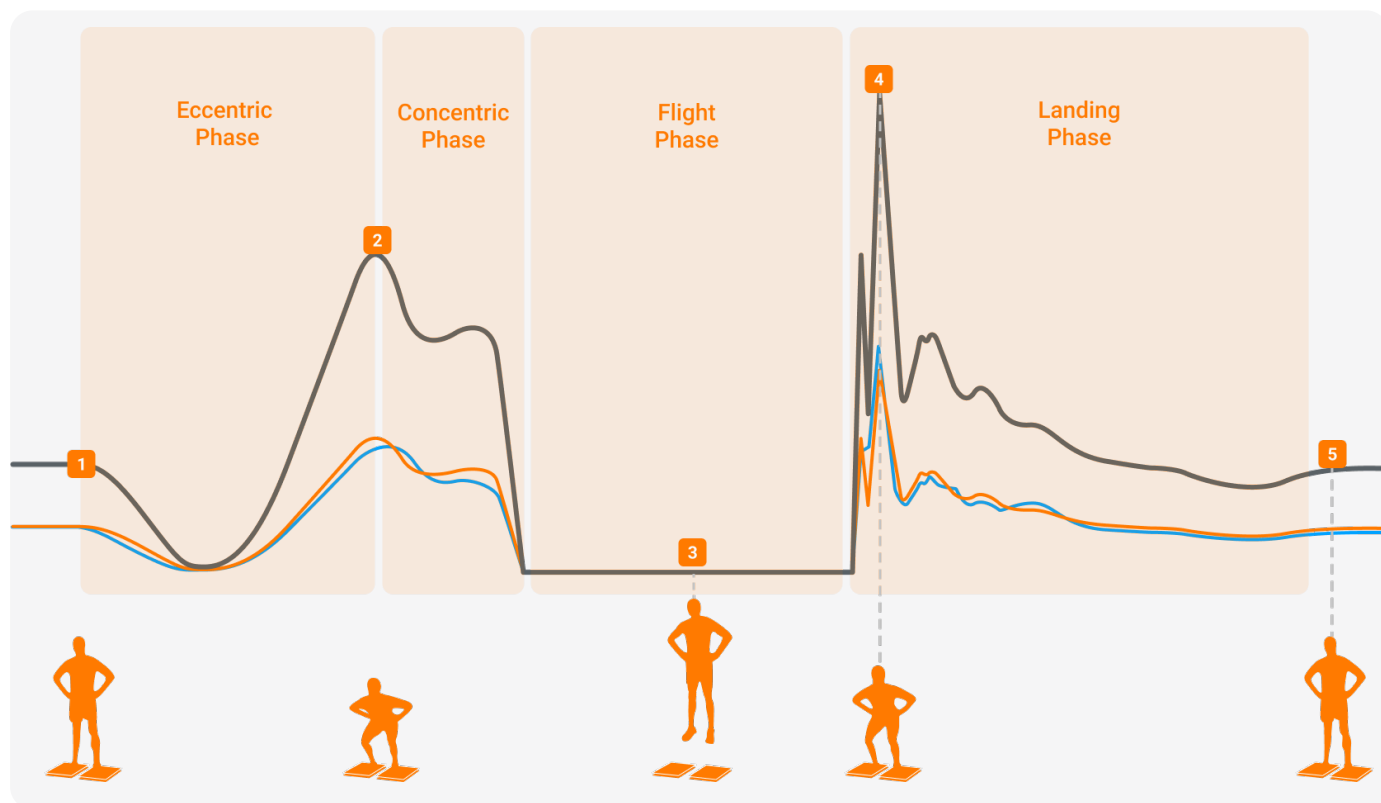
Jump tests play a vital role in return-to-play criteria with a growing body of evidence around these tests and the associated metrics.

While injured patients may have difficulty jumping, jump tests are relatively low impact for healthy individuals and provide dozens or hundreds of metrics, making them powerful tests for a wide range of use cases, including:

- **Fatigue/readiness** – common metrics include flight time: contraction time and RSI-modified.
- **Performance** – jump height, peak power, etc.
- **Injury risk management** – trends, asymmetry
- **Rehabilitation** – asymmetry, RFD, peak power
- **Late-stage rehabilitation** – more challenging than functional tests like squat/STS, potentially exposing lingering deficiencies.

Some common examples of jump tests used in clinical settings include:

Countermovement Jump (CMJ)

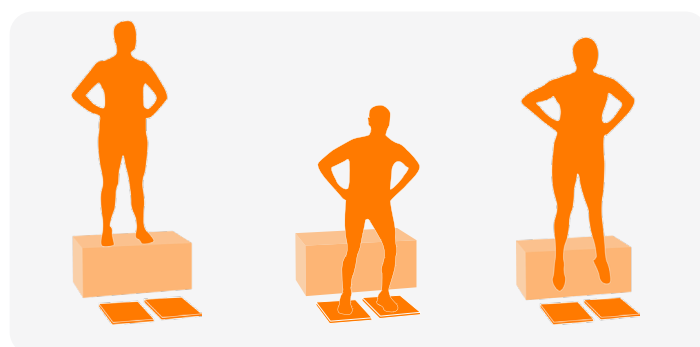


The CMJ is – by far – the most popular force plate test in health and performance settings (and some may argue the most popular neuromuscular test in the world – period) due to its simplicity, broad applications and the enormous body of research supporting it. The CMJ has been featured in thousands of research publications.

While jump height is undoubtedly its most commonly understood metric, the CMJ provides hundreds of metrics and insights into how a patient handles movement. It is a test that can be reliably repeated over time and can be used for almost any purpose: assessing readiness, performance, injury risk management and rehabilitation.

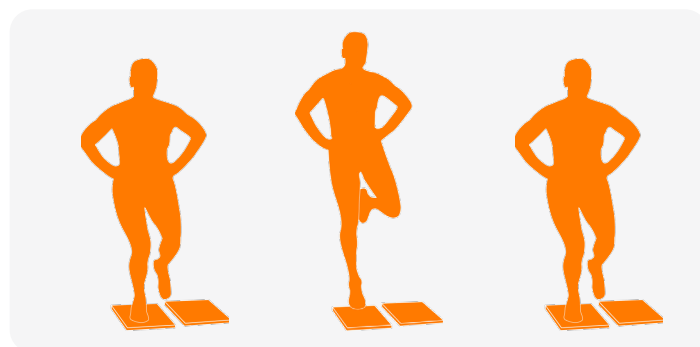
Drop Jump (DJ)

The DJ assesses reactive strength and the individual's stretch-shortening cycle ability. The test involves dropping from a specific height (usually a platform or box), landing, and quickly reproducing force to perform a rebound jump. It is commonly used in late-stage rehabilitation and performance settings.



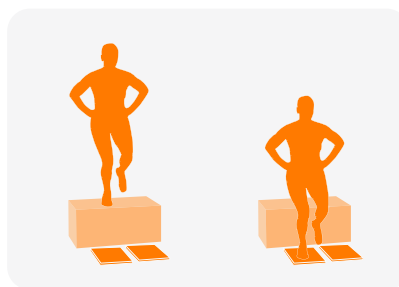
Single Leg Jump (SLJ)

Isolating each limb, the SLJ is used to assess similar functions to that of the CMJ, but with a higher degree of challenge and a focus on determining inter-limb asymmetries. This provides a true insight into capacity, rather than self-organization strategies in bilateral movements.



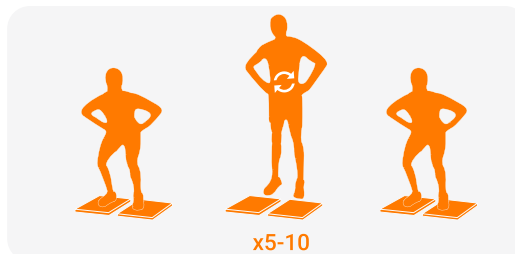
Single Leg Land and Hold (SLLAH)

This test involves stepping down from a height and “sticking the landing”. It focuses on the patient’s ability to not just absorb force but stabilize themselves quickly after landing from a drop.



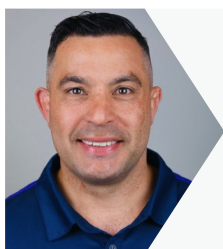
Hop Test (HT)

The HT assesses a patient’s ability to repeatedly rebound for numerous hops in succession, assessing predominantly ankle strength and stiffness.



Isometric Strength

Isometric tests on force plates use the same principles as HHDs – or MMT before them – measuring static strength, asymmetries between limbs, and magnitude of impairment, and doing so in a safe and simple manner in comparison to repetition maximum testing. However, force plates provide more: precise asymmetry, peak force measurements, and advanced metrics like time to peak force.



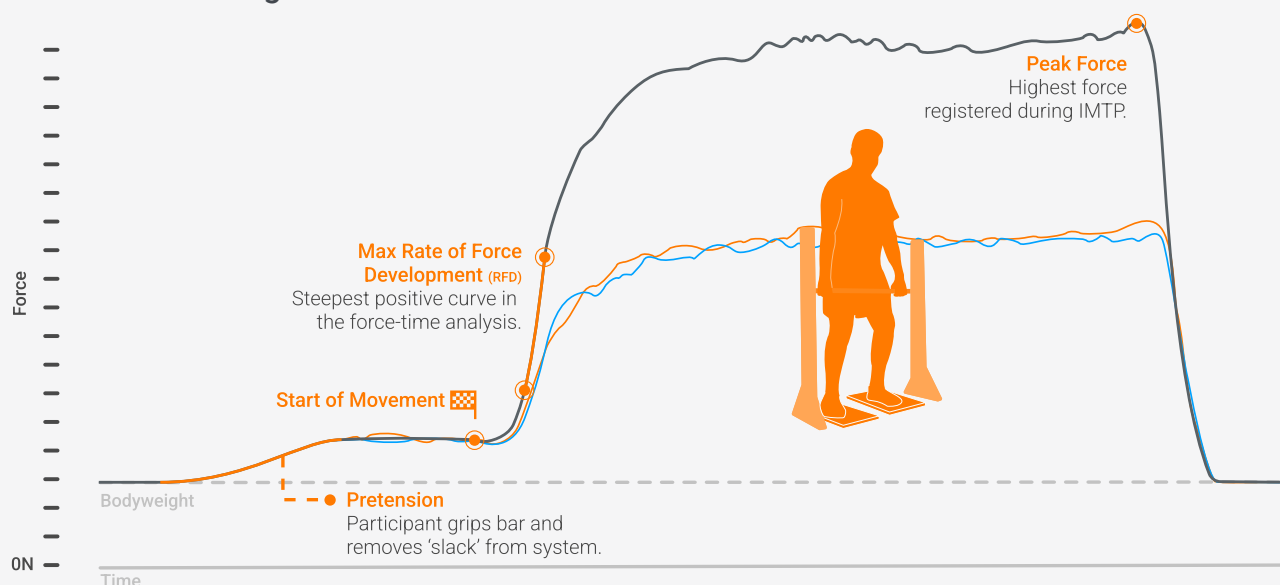
“In strength assessments of the past we might have done a 3-repetition maximum squat which was time consuming and fatiguing. Now, **with force plates, you can do a maximal isometric strength test quickly and safely every day if you wish**, and get more than simply a maximal strength number, but also asymmetry and rapid force generating ability.”

Alex Natera

Performance Science Manager, NSW Institute of Sport and creator of Run-Specific Isometric Strength Testing (RSIST)

Force plates can test isometric strength for many body parts and have given rise to a range of creative isometric testing protocols.

Isometric Mid-Thigh Pull



Isometric Mid-Thigh Pull (IMTP)

The **IMTP** is a reliable way of safely and accurately assessing maximal strength. The IMTP is also considered a safer alternative to traditional 1-3RM strength testing. Results have been shown to correlate with both sprinting and jumping performance.

The IMTP is not just for athletes, either – it is suitable for almost all patients, including untrained populations

(e.g., elderly) as it is low impact, self-limiting, and easy to teach.

In addition to IMTP, isometric squat variations can also be performed to assess strength. A key difference is that it removes grip strength as a limiting factor.

Strength Test	Traditional Assessment	Measurement (Description)	ForceDecks Metric	What it Means
	Rep Maximum	% Rep Maximum Amount of Weight Lifted	Peak Vertical Force	How much vertical force can be generated.
	Manual Muscle Test	Subjective Strength Level	Time to 80% Peak Force	How quickly a patient can get close to peak force. Speed of force production.

Athletic Shoulder (ASH) Test

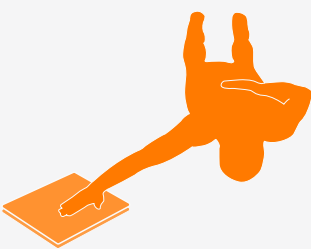
1 ASH Test I

Grading	Absolute	Relative
ASH I Poor	< 150 N	< 1.47 N/kg
ASH I Good	> 180 N	> 1.85 N/kg
ASH I Excellent	> 200 N	> 2.1 N/kg



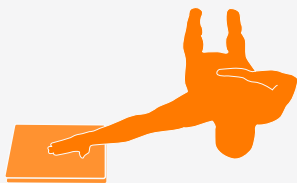
2 ASH Test Y

Grading	Absolute	Relative
ASH Y Poor	< 125 N	< 1.25 N/kg
ASH Y Good	> 155 N	> 1.6 N/kg
ASH Y Excellent	> 170 N	> 1.76 N/kg



3 ASH Test T

Grading	Absolute	Relative
ASH T Poor	< 115 N	< 1.15 N/kg
ASH T Good	> 135 N	> 1.4 N/kg
ASH T Excellent	> 150 N	> 1.58 N/kg



Example ASH test normative values – Net Peak Force as [published in this article](#)



Ben Ashworth
Director
Athletic Shoulder

“The ASH test was created to solve the problem of **quantifying long lever force transfer and rate of force development**. We previously had no reliable way of quantifying these more vulnerable positions when put under load.”

Developed by physiotherapist and performance manager Ben Ashworth, the **Athletic Shoulder (ASH)** test was developed to quantify force across the shoulder girdle in athletes and patients requiring strength at long lever lengths, for assessment, monitoring, and return-to-play decision-making.

The ASH test is a battery of three test positions, designed to test the shoulder in a range of positions to expose strengths, deficiencies, and asymmetries.

Run-Specific Isometric Assessment Battery

Quickly growing in popularity, [Run-Specific Isometric tests](#) (developed by performance science manager and running strength specialist Alex Natera) assess lower body strength in positions that are key to running. These actions can be used for training as well as testing and are often used in conjunction with jump tests for assessing plyometric capabilities. Alex has also established helpful normative reference data for these tests.

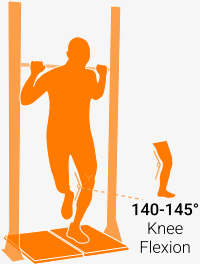
1 Hip Iso Push

Team sport Males	2.2 - 2.5 x system weight *
Team sport Females	1.95 - 2.15 x system weight
Elite track Males	> 3 x system weight



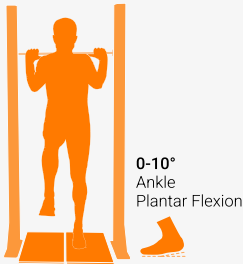
2 Knee Iso Push

Team sport Males	4.2 - 4.4 x body weight
Team sport Females	3.85 - 4.2 x body weight
Elite track Males	> 5.5 x body weight



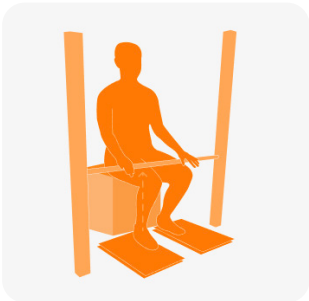
3 Ankle Iso Push

Team sport Males	3.1 - 3.3 x body weight
Team sport Females	2.75 - 2.9 x body weight
Elite track Males	> 4 x body weight



Run Specific Isometric test with threshold values as described by Alex Natera

Isometric Calf Strength



As with other isometric tests, [assessing calf strength with force plates](#) can provide insights beyond simple peak force, including RFD and time to peak force. This is another informative, safe test commonly used for managing ankle and calf pathologies.

Functional

Of all force plate tests, functional movement tests will typically be most familiar to practitioners, as most would already use these movements regularly in clinical practice.

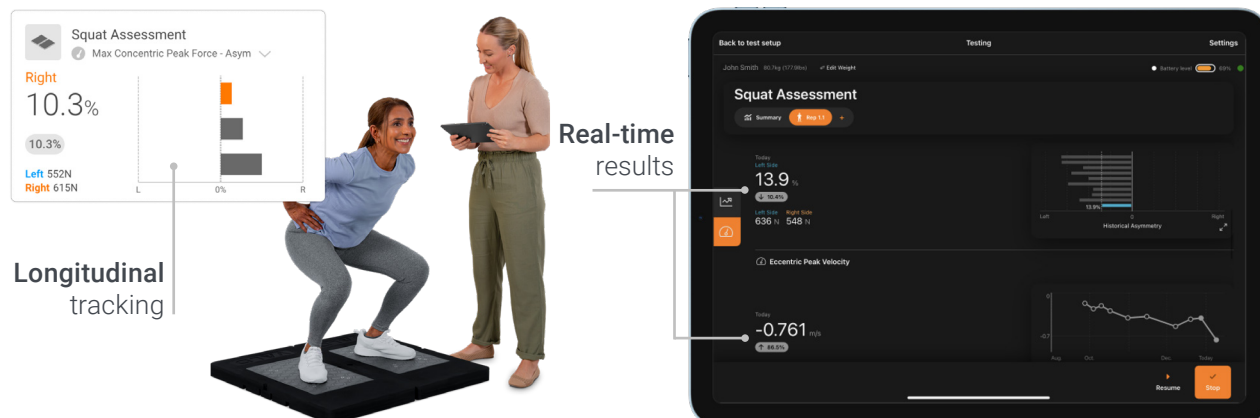
ForceDecks can automatically analyze the following functional tests:

- Squat (both loaded and unloaded)
- Single Leg Squat
- Push-Up
- Sit-to-Stand-to-Sit

While these are very common clinical tests, it is important to note that most force plate brands and models cannot automatically analyze them. If these tests are important to your clinical practice, it is worth considering this when making your force plate purchasing decision.

Squat Assessment

Where practitioners may assess a typical squat based on visual depth, speed, and movement irregularities ... Force plates can measure **eccentric and concentric asymmetry, forces, power and speed, and determine the precise depth of the squat.**

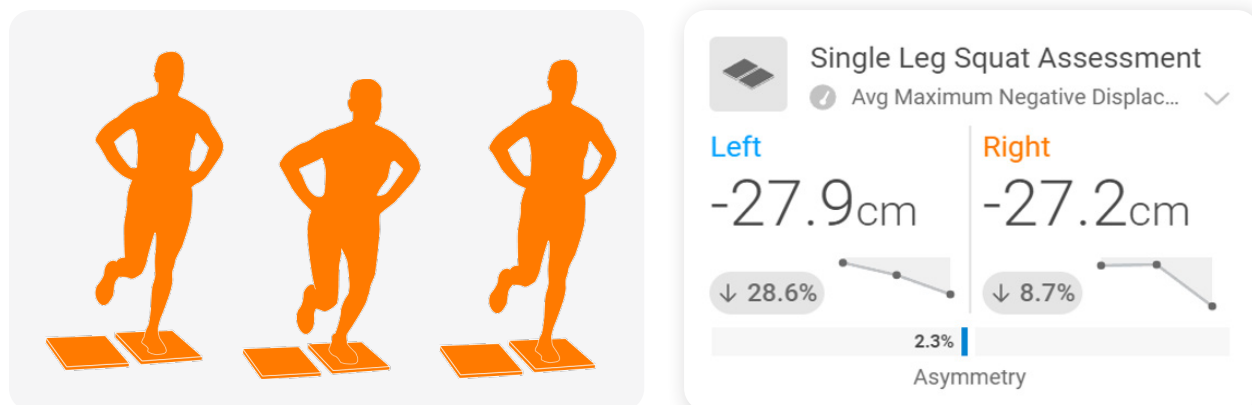


Where practitioners may assess a typical squat based on visual depth, speed and movement irregularities, force plate squat assessments enable more detailed analysis. Force plates can measure eccentric and concentric asymmetry, forces, power, and speed, and

determine the precise depth of each squat.

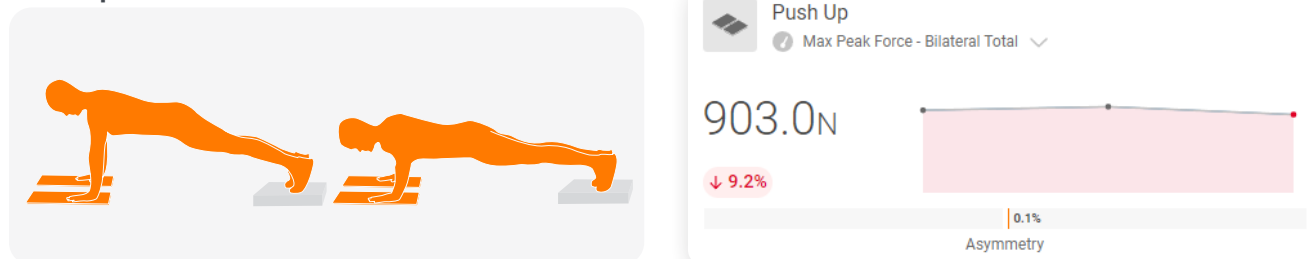
This is an appropriate test for most populations, and for athletes or strong patients, external load can be added for further analysis.

Single Leg Squat Assessment



Similar to the squat assessment, single leg (SL) squat assessments can identify a range of metrics not visible to the naked eye, as well as expose asymmetries between limbs.

Push-Up



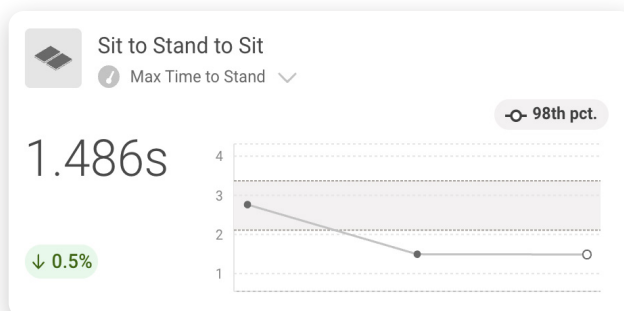
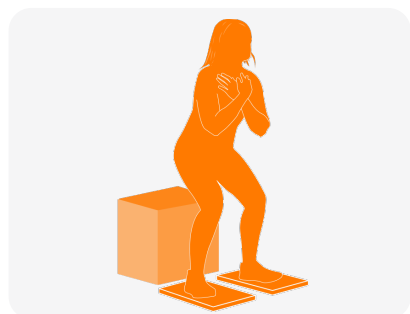
Much like squat assessments, the Push-Up test is a functional and familiar test, simply for upper body strength. Force plates can provide all the additional

insights you would expect at this point in your journey, including eccentric and concentric phase analyses, asymmetry, power, and more.

Sit-to-Stand-to-Sit (STSTS)

A clinical staple for aging, neurological, and other movement-compromised patients, the STS test has long been a simple, easy-to-administer, reliable assessment. However, it has historically only been measured crudely – for example in the common test of 30-second STS for reps.

By introducing force plates, a well-known and simple clinical test can yield a range of new insights.



With force plates, a number of new metrics can be derived from a STS (or even more so a STSTS) test – even from a single rep. Key metrics include:

- Time to stand
- Time to sit
- RFD

- Forces during the sitting and standing phases
- Peak force asymmetry

By introducing force plates, a well-known and simple clinical test can yield a range of new insights into patients' strength, movement, and ability to perform common daily tasks independently.

Balance

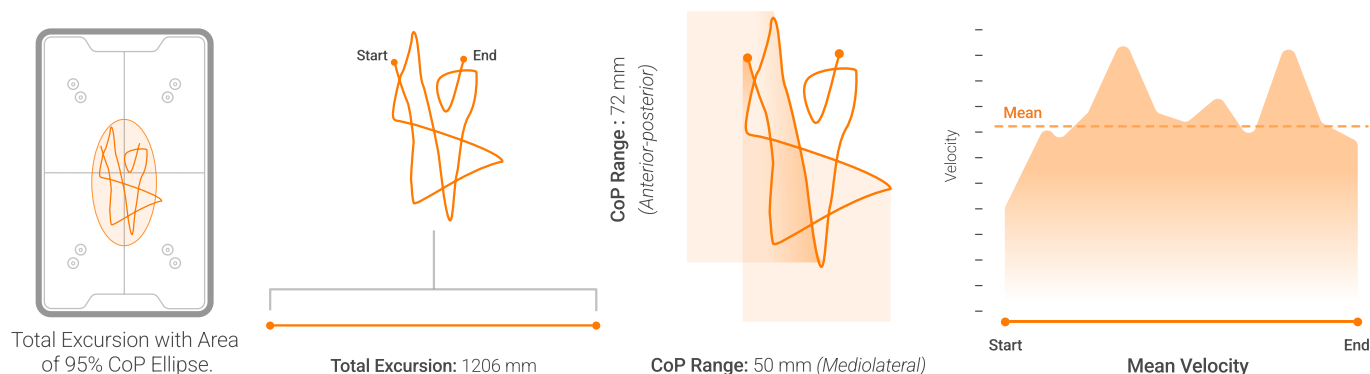
Balance testing is one of the most common clinical assessment populations, ranging from assessing high-level athletes as a preseason screening measure, to evaluating an elderly patient for fall risk.

Traditionally, balance has been assessed as an endurance task, by measuring how long someone can maintain their balance, often with some subjective assessment by the assessor of the participant's balance "strategy".

Force plates – in particular, those with capabilities of measuring **CoP** - have revolutionized balance assessments, allowing practitioners to quantify their clients' balance strategies.



ForceDecks can assess several balance tests including quiet stand, single leg stand, and single leg range of stability. Some key metrics calculated in these tests are illustrated here.



Pathologies

Up until this point, we have focused on what force plates can do: how they measure force, which tests they can perform and what metrics they generate.

However, practitioners typically work the other way around – a patient presents with a complaint and then the practitioner uses the clinical presentation to

determine which test(s) would be most appropriate.

This section will present some **fictional case examples** to demonstrate how force plates can be applied to pathologies, using clinical principles that will be familiar to most readers.

Important note: no information in this section is intended to be prescriptive or definitive - all names are fictional and all scenarios are theoretical only. In reality, there are nuances to every case that cannot be accounted for in a strict set of guidelines, even for similar patients with the same pathology.

Instead, think of these fictional examples as inspiration for how you might take your unique clinical practices and incorporate force plates into them. Ultimately, you know your patients better than anyone, and force plates will never replace your clinical intuition, but they might enhance it.

Ankle Sprain

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ACL Reconstruction

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Shoulder Injury

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Total Knee Replacement

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Total Hip Replacement

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Aging Patient

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Neurological Condition

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Ankle Sprain



Patient:

Jane Smith (37 years old)

Jane presented to the clinic with a **right lateral ankle inversion injury** sustained while landing during a social basketball game the prior weekend.

Her clinical presentation includes: **walking with a limp**, **reduced weight-bearing tolerance**, **reduced balance**, and **reduced ankle ROM**.

Example early-stage force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Quiet Stance Balance		Mean Force Asymmetry	How much force is being distributed between each limb. (The average amount of force registered during a given time period or phase).	Asymmetry % should decrease as weight distribution equalizes.
Single Leg Stand Balance		CoP Translation (Medial-Lateral & Anterior-Posterior)	The horizontal displacement of the CoP in both the sagittal (anterior/posterior) and frontal (medial/lateral) planes.	Displacement numbers should decrease as stability increases, since fewer corrections are required.

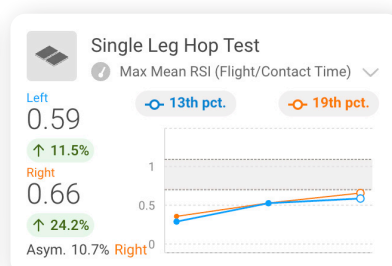
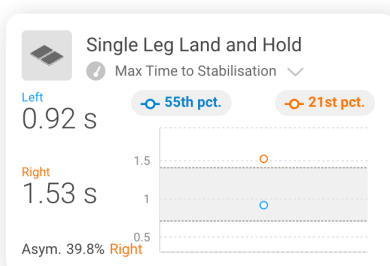
Jane progresses through rehabilitation and can now walk unaided and without a limp, can full weight bear with good stability on her right side, and has sufficient strength to do single leg calf raises. Accordingly, her testing progresses to more advanced assessments.

Example later stage force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Single Leg Land and Hold		Time to Stabilization	How quickly can the patient “stick the landing” on one leg after landing on the force plates from an elevated platform.	Asymmetry % should decrease as weight distribution equalizes.
Single Leg Hop		Jump Height	How high can someone jump compared with their other side and norms.	Jump height should increase as strength, power, speed, and movement quality improve.
Single Leg Jump		RSI	The ratio of flight time and the time spent on the ground between start of movement and takeoff.	RSI will increase as reactive strength improves.

Once Jane has progressed to advanced tests (using these as examples only), the practitioner’s standard clinical reasoning can determine when she is ready to return to playing basketball. For example, the practitioner may rely on one or more of the reference points we discussed earlier:

- **Pre-injury data (if available):** have Jane’s results returned to (or sufficiently close to) her pre-injury levels?
- **LSI:** are Jane’s results adequately symmetrical between her involved side and healthy side and is this appropriate for her sport?
- **Normative data:** are Jane’s results at a good level relative to her age and sex?



Anterior Cruciate Ligament Reconstruction (ACL-R)



Patient:

Freya Jones (24 years old)

Freya presented to clinic after having **left knee ACL-R surgery approximately 3 weeks earlier**.

Freya's clinical presentation includes: **reduced weight-bearing tolerance**, quadriceps (and general lower limb) **muscle weakness**, **sufficient inner range quadriceps strength**, **reduced balance**, and **reduced knee flexion ROM**.

Example early-stage force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Single Leg Stand Balance		CoP Translation (Medial-Lateral & Anterior-Posterior)	How much force is being distributed between each limb. (The average amount of force registered during a given time period or phase).	Displacement numbers should decrease as stability increases, since fewer corrections are required.
Squat Assessment		Eccentric & Concentric Mean Force Asymmetry	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg.

Freya progresses through rehabilitation and returns to a good level of lower limb strength and symmetry. They are now ready to be assessed for impact tolerance on their injured limb.

Example force plate tests:

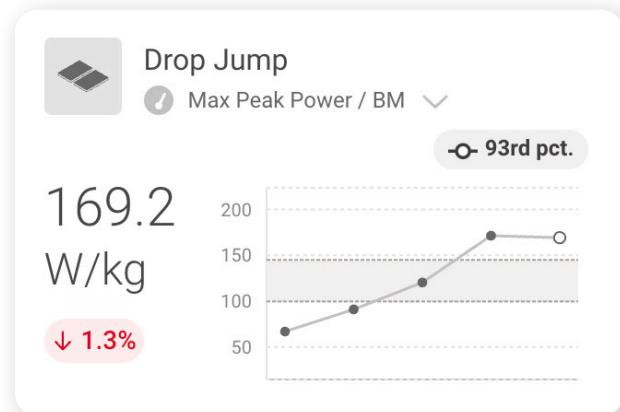
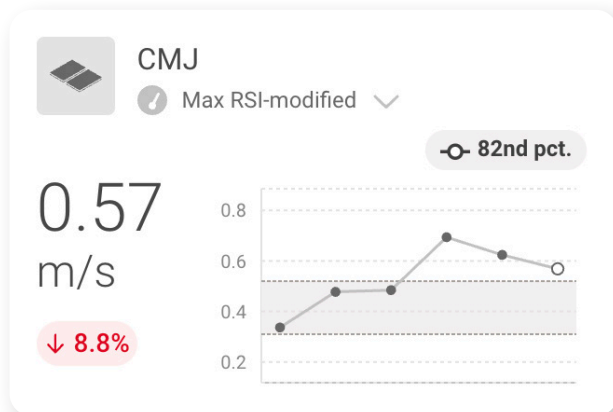
Test	Test Image	Key Metric	What it Means	Expected Progression
Counter Movement Jump		Jump Height	The vertical height achieved from the jump. Jumping is determined by force produced over time.	Jump height value should improve with rehab.
		RSI-Modified	The relationship between how high someone can jump and how much time they spend on the ground before takeoff. This will provide insight into how the jump is executed.	RSI-Modified should improve as the efficiency of the jump improves. Especially important when Jump Height plateaus.
Drop Jump		Jump Height	The vertical height achieved from the jump, which is the performance outcome.	Jump height value should improve with rehab.
		RSI	The relationship between how high someone can rebound during a DJ and how much time they spend on the ground in between the drop landing and the rebound takeoff. This will provide insight into how the jump is performed.	RSI should improve as the efficiency of the jump improves. For example, less time on the ground and more time in the air.

These tests could then be progressed to single leg tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Single Leg Jump		Jump Height	As above but comparing left to right.	Left and right should trend towards symmetry over rehabilitation.
		RSI-Modified	As above but comparing left to right.	Left and right should trend towards symmetry over rehabilitation.
Single Leg Drop Jump		Jump Height	As above but comparing left to right.	Left and right should trend towards symmetry over rehabilitation.
		RSI	As above but comparing left to right.	Left and right should trend towards symmetry over rehabilitation.

As Freya progresses to the end stages of rehabilitation, the practitioner's standard clinical reasoning (which may involve consulting recent literature guidelines) can be applied to return-to-function decisions. For example, the practitioner may rely on one or more of the reference points we discussed earlier:

- **Pre-injury data (if available):** have Freya's results returned to (or sufficiently close to) their pre-injury levels?
- **Evidence based benchmarks:** are Freya's results of a sufficient standard to meet evidence-based guidelines for benchmarks?
- **Normative data:** are Freya's results at a good level relative to their age and sex?



Shoulder Injury



Patient:

Jerry Lloyd (28 years old)

Jerry presents to clinic diagnosed with a moderate-grade rotator cuff injury. Jerry completed early-stage rehabilitation at another facility and has now been cleared by his specialist to progress rehabilitation towards return to activity.

His clinical presentation includes: good shoulder ROM with **minor restrictions** and generalized **shoulder and upper limb weakness**.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Push Up		Eccentric and concentric mean force asymmetries	The difference in average force distribution across both arms whilst holding a push-up position.	The asymmetry should decrease as the ability to bear weight through the involved limb improves.
Prone I,Y,T		Peak Vertical Force (Asymmetry)	The difference between the maximal vertical force exerted by each arm in each position.	The asymmetry should decrease as the strength equalizes between limbs.
		Time to 80% Peak Force (asymmetry)	The difference between how quickly the patient can produce the majority of their maximal force output with either arm.	The value should decrease as the speed of force production increases. The expression of rapid force may take longer to return than strength.

Jerry progresses through rehabilitation and is now presenting with good strength and symmetry. He would now like to return to a range of recreational sports as well as some high-intensity gym workouts. Accordingly, his testing progresses to a range of more advanced assessments.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Plyometric Push Up		Eccentric and concentric peak force asymmetries	The difference in force between both arms during both eccentric and concentric phases of the push-up before the flight phase.	The asymmetry should decrease as rehab progresses.
Prone I,Y,T		Peak Vertical Force (Asymmetry)	The difference between the maximal vertical force exerted by each arm in each position.	The asymmetry should decrease as the strength equalizes between limbs.
		Time to 80% Peak Force (asymmetry)	The difference between how quickly the patient can produce the majority of their maximal force output with either arm.	The value should decrease as the speed of force production increases. The expression of rapid force may take longer to return than strength.

Once Jerry has progressed to advanced tests such as these, the practitioner's standard clinical reasoning can determine when he is ready to return to high intensity training and recreational sports. For example, the practitioner may rely on one or more of the reference points we discussed earlier:

- **Pre-injury data (if available):** have Jerry's results returned to (or sufficiently close to) his pre-injury levels?
- **LSI:** are Jerry's results adequately symmetrical between his involved side and healthy side?
- **Normative data:** are Jerry's results at a good level relative to his age and sex?

Total Knee Replacement (TKR)



Patient:

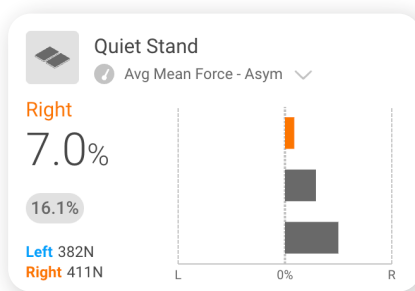
Harold Walker (67 years old)

Harold presents to clinic following a **right total knee replacement surgery approximately 10 days ago**.

His clinical presentation is: **walking with a limp** and using a walking stick and **minimal use of his right leg** while getting in and out of a chair. He has **full knee extension and 70 degrees flexion**.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Standing Posture Quiet Stance Balance		Mean Force Asymmetry	How much force is being distributed between each limb. (The average amount of force registered during a given time period or phase).	Asymmetry % should decrease as weight distribution equalizes.
Squat Assessment (squat to a comfortable depth)		Maximum Negative Displacement Eccentric Mean Force Asymmetry, Concentric Mean Force Asymmetry	The vertical distance of how far the center of mass travels during the squat, and the differences in maximal force exerted by each leg during the descent and ascent of the squat. The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Value will increase as depth of the squat increases. Asymmetry should decrease as weight tolerance increases on the involved leg.



Harold progresses through rehabilitation and can now walk unaided without a limp, can STS, and squat symmetrically, and is doing most of his usual daily activities without concern. However, he is finding that he does not feel as “strong” or “confident” in both of his legs, particularly when walking up hills or stairs, or when walking on uneven surfaces. Accordingly, his testing progresses to more advanced assessments.

Example later stage force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Single Leg Balance – eyes closed OR uneven surface		CoP Translation (Medial - Lateral & Anterior-Posterior)	The average displacement of the CoP in both the sagittal (anterior/posterior) and frontal (medial/lateral) plane.	Displacement numbers should decrease as stability increases, since fewer corrections are required.
Isometric Squat		Peak Vertical Force Time to 80% Peak Force	How much vertical force can the patient's lower body express. How quickly a patient can get close to peak force. Speed of force production.	The value should increase as lower body strength increases. The value should decrease as the speed of force production increases.

Further down the rehabilitation road, Harold now has good lower limb strength and stability and is tolerating all his daily activities including some vigorous yard work. He now wishes to start some light jogging, which his surgeon has cleared him to do. Harold has asked for advice and assistance to achieve this goal.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Hop Test - Double leg "pogo"/"bounces"		Mean Jump Height	What is the average height of the patient's double leg hops. Repeated hops use SSC.	Value should increase as mean height of hops improve.
		Peak Force Asymmetry	The difference in maximal force outputs between involved and uninvolved legs.	Asymmetry should decrease as weight distribution becomes more equal between limbs.
"Stick the landing" Single Leg Land and Hold		Time to Stabilization (Asymmetry)	How quickly can the patient "stick the landing" on one leg after landing on the force plates from an elevated platform. Impaired control can lead to longer time to obtain stabilization.	Time should decrease as landing stability improves.
		Drop Landing Force	The relationship between how high someone can rebound during a DJ and how much time they spend on the ground in between the drop landing and the rebound takeoff. This will provide insight into how the jump is performed.	RSI should improve as the efficiency of the jump improves. For example, less time on the ground and more time in the air.

Once Harold has progressed to advanced tests such as these examples, the practitioner's standard clinical reasoning can determine when his rehabilitation is complete. For example, the practitioner may rely on one or more of the reference points we discussed earlier:

- **Pre-injury data (if available):** have Harold's results returned to (or sufficiently close to) his pre-injury levels?
- **LSI:** are Harold's results adequately symmetrical between his involved side and healthy side?
- **Normative data:** are Harold's results at a good level relative to his age and sex?

Total Hip Replacement (THR)



Patient:

Deborah Jackson (65 years old)

Deborah presents to clinic following a **left THR surgery approximately one week ago**.

Her clinical presentation includes: **reduced weight-bearing tolerance, reduced balance, and unable to get in and out of a standard height chair**.

Example early-stage force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Single Leg Stand Balance		CoP Translation (Medial - Lateral & Anterior-Posterior)	The average displacement of the CoP in both the sagittal (anterior/posterior) and frontal (medial/lateral) plane.	Displacement numbers should decrease as stability increases, since fewer corrections are required.
"mini" Squat Assessment (within post operative hip flexion depth restrictions)		Maximum Negative Displacement.	The vertical distance of how far the center of mass travels during the squat, and the differences in maximal force exerted by each leg during the descent and ascent of the squat.	Value will increase as depth of the squat increases.
		Eccentric Mean Force Asymmetry, Concentric Mean Force Asymmetry	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg. .

Deborah progresses through rehabilitation and is now able to walk comfortably but is still having difficulty getting in and out of a chair without arm support. Accordingly, her testing progresses to more advanced assessments.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Sit-to-Stand		Time to Stand and Time to Sit	Time taken to stand up from a seated position and time taken to sit down.	Time to stand and sit should decrease as ability to stand and sit improves.
		Average Standing & Sitting Force Asymmetry	How equally do they distribute force across both legs when standing up and sitting down.	Asymmetry should decrease as weight distribution becomes more equal between limbs.
"Unrestricted" Squat Assessment		Maximum Negative Displacement,	The vertical distance of how far the center of mass travels during the squat, and the differences in maximal force exerted by each leg during the descent and ascent of the squat.	Value will increase as depth of the squat increases.
		Eccentric Mean Force Asymmetry, Concentric Mean Force Asymmetry	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg.

Deborah is now comfortable with her activities of daily living, has good strength, and has progressed well

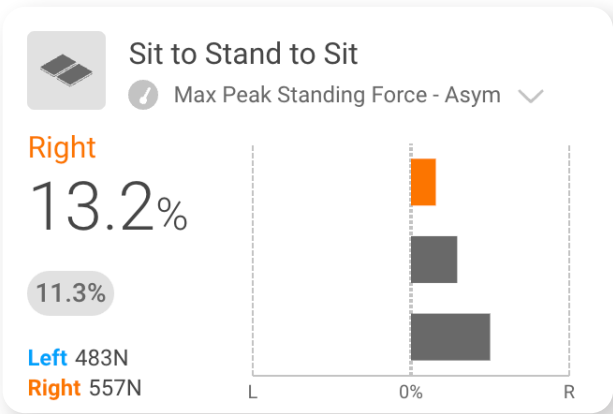
through her rehabilitation. Deborah would now like to return to recreational tennis, which her surgeon is supportive of - providing she completes further rehabilitation to prepare her for this.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
"Mini jump" Counter Movement Jump (effort & cues can be regulated based on clinical judgement)		Jump Height	The vertical height achieved from the jump. Jumping is determined by force produced over time.	Jump height value should improve with rehab.
		Concentric and Eccentric Asymmetry	What is the difference in force distributed between both legs during both phases of the squat prior to take-off.	Asymmetry should decrease as weight distribution becomes more equal between limbs.
"Stick the landing" Single Leg Land and Hold		Time to Stabilization (Asymmetry)	How quickly can the patient "stick the landing" on one leg after landing on the force plates from an elevated platform. Impaired control can lead to longer time to obtain stabilization.	Time should decrease as landing stability improves.
		Drop Landing Force	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg.

Once Deborah has progressed to these advanced tests such as these, the practitioner’s standard clinical reasoning can determine when she is ready to return to tennis. For example, the practitioner may rely on one or more of the reference points we discussed earlier:

- **Pre-injury data (if available):** have Deborah’s results returned to (or sufficiently close to) her pre-injury levels?
- **LSI:** are Deborah’s results adequately symmetrical between her involved side and healthy side?
- **Normative data:** are Deborah’s results at a good level relative to her age and sex?



Aging Patient



Patient:

Thelma McDonald (72 years old)

Thelma presented to the clinic with after being referred from her GP following a minor fall in her garden the month prior. Thelma did not sustain any injuries but would like assistance with reducing her fall risk and rebuilding her confidence to be able to be active with her young grandchildren.

Her clinical presentation includes: **able to walk unaided**, requires **some arm assistance to get in and out of a chair**, and has **difficulty standing on one leg** without support.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
"Standing posture" Quiet Stance Balance		Mean Force Asymmetry	How much force is being distributed between each limb. (The average amount of force registered during a given time period or phase).	Asymmetry % should decrease as weight distribution equalizes.
Squat Assessment		Maximum Negative Displacement,	The vertical distance of how far the center of mass travels during the squat, and the differences in maximal force exerted by each leg during the descent and ascent of the squat.	Value will increase as depth of the squat increases.
		Eccentric Mean Force Asymmetry, Concentric Mean Force Asymmetry	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg.
Sit-to-Stand		Time to Stand and Time to Sit	Time taken to stand up from a seated position and time taken to sit down.	Time to stand and sit should decrease as ability to stand and sit improves.
		Average Standing & Sitting Force Asymmetry	How equally do they distribute force across both legs when standing up and sitting down.	Asymmetry should decrease as weight distribution becomes more equal between limbs.

Thelma progresses well through a functional strength and balance program, and this is reflected in her testing. She has noticed an improvement in confidence in the garden and has not had any further falls. Thelma would now like help with her strength so that she could lift her grandchildren and heavier objects in the garden.

Example later stage force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Single Leg Balance		CoP Translation (Medial-Lateral & Anterior-Posterior)	The horizontal displacement of the CoP in both the sagittal (anterior/posterior) and frontal (medial/lateral) planes.	Value should decrease as stability increases.
Isometric Mid-Thigh Pull (IMTP)		Peak Vertical Force	How much vertical force can be generated.	Jump height should increase as strength, power, speed, and movement quality improve.
		Time to 80% Peak Force	How quickly a patient can get close to peak force. Speed of force production.	RSI will increase as reactive strength improves.

The results from these tests can help formulate and track the progress of the intervention program to assist Thelma with her goals. In addition to tracking her progress through testing and other measures, the practitioner may also include references to **Normative data** to provide additional context.

Neurological Condition



Patient:

John Walsh (65 years old)

John presents to clinic diagnosed with Parkinson's disease and is seeking assistance with his mobility. He reports difficulty with large flights of stairs and walking on uneven surfaces.

He currently **walks with a single-point stick** and **uses both arms to a moderate amount to get out of a chair**. He is **unable to stand on one leg** without support.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
"Standing posture" Quiet Stance Balance		Mean Force Asymmetry	How much force is being distributed between each limb. (The average amount of force registered during a given time period or phase).	Asymmetry % should decrease as weight distribution equalizes.
Squat Assessment		Maximum Negative Displacement	The vertical distance of how far the center of mass travels during the squat, and the differences in maximal force exerted by each leg during the descent and ascent of the squat.	Value will increase as depth of the squat increases.
		Eccentric Mean Force Asymmetry, Concentric Mean Force Asymmetry	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg.

John has been completing the practitioner's rehabilitation program and has noticed some progress. Whilst the number of times he can get in and out of a chair has not changed much, he can now do it with no arm support, and his Time to Stand & Sit has improved. The practitioner now wants to add in some additional force plate assessments to help inform the intervention program and to track progress.

Example force plate tests:

Test	Test Image	Key Metric	What it Means	Expected Progression
Sit-to-Stand		Maximum Negative Displacement.	The vertical distance of how far the center of mass travels during the squat, and the differences in maximal force exerted by each leg during the descent and ascent of the squat.	Value will increase as depth of the squat increases.
		Eccentric Peak Force Asymmetry, Concentric Peak Force Asymmetry	The average amount of force generated by each leg when squatting – both during the concentric phase and eccentric phase of the movement.	Asymmetry should decrease as weight tolerance increases on the involved leg.
Isometric Mid-Thigh Pull (IMTP)		Peak Vertical Force	How much vertical force can be generated.	Value should increase as strength increases.
		Time to 80% Peak Force	How quickly a patient can get close to peak force. Speed of force production.	The value should decrease as the speed of force production increases.

As the practitioner continues to assist John with his goals, they can continue to monitor his progress (or regression) over time - enabling them to tailor his intervention program to how his condition changes.

What do the **Results Mean?**

There are many ways to approach learning about new metrics. We have found that the best way is to relate each metric to physical functions and clinical assessments practitioners are already familiar with. Ultimately, this is why these metrics were created – to quantify physical functions.

Below are some common force plate metrics used in clinical settings and what they mean. These or very similar metrics appear in many different tests, so they are a great starting point for understanding the fundamentals of force plate data.

Metric	Description	Example Metric (Test Type)
Peak Force	The highest amount of force registered during a given time period or phase.	Peak Landing Force (Countermovement Jump): The highest force that is generated at the point of landing/ impact.
Mean Force	The average amount of force registered during a given time period or phase.	Mean Standing Force (Sit to Stand Test): The average amount of force generated by each leg when standing up from a chair.
Eccentric Force	The force registered during the eccentric phase of the movement.	Eccentric Peak Force (Squat Assessment): The highest force generated when descending in the eccentric portion of a squat.
Concentric Force	The force registered during the concentric phase of a movement.	Concentric Peak Force (Squat Assessment): The highest force generated when ascending during the concentric portion of a squat.
Asymmetry	The difference in forces (mean or peak) registered by each limb during a given time period or phase.	Peak Drop Landing Force Asymmetry (Land and Hold): The difference in forces exerted by each leg when landing on the force plates from an elevated platform.
Reactive Strength Index (RSI)	The ratio of flight time (time in the air during a jump or hop) and the time spent on the ground between start of movement and takeoff.	RSI (Drop Jump): The relationship between how high someone can rebound during a DJ and how much time they spend on the ground in between the drop landing and the rebound takeoff.
Time to Stabilization	The time it takes for the body to reach a point of stability after landing.	Time to Stabilization (Single Leg Land and Hold): How quickly can the patient “stick the landing” on one leg after landing on the force plates from an elevated platform.
Time to 80% Peak Force	The time it takes from start of movement to register 80% (i.e., the majority) of peak force in an isometric strength test.	Time to 80% Peak Force (Isometric Mid-Thigh Pull): How quickly a patient can get close to peak force when attempting to lift an immovable bar as quickly as possible while standing on the force plates. 80% is used because it is a more reliable measure than time to 100%.
Center of Pressure (CoP) Excursion	The movement of the CoP - the point representing the average distribution of mass within the patient's base of support.	Center of Pressure Total Excursion (Single Leg Stand): The total distance of ‘wobble’ from the starting point for a patient balancing on one leg, as if the CoP trace had been stretched out into a straight line.

How do I Choose **Which Test to Perform?**

The best place to start is with tests that you already use regularly and are confident in prescribing to patients – then simply choose the same or a close equivalent force plate test. Some may need some slight tweaking in technique and protocol to ensure consistency and reliability, but the principles will remain the same.

Once you have selected a test, you can consider what data will be captured and **which metrics to focus on.**

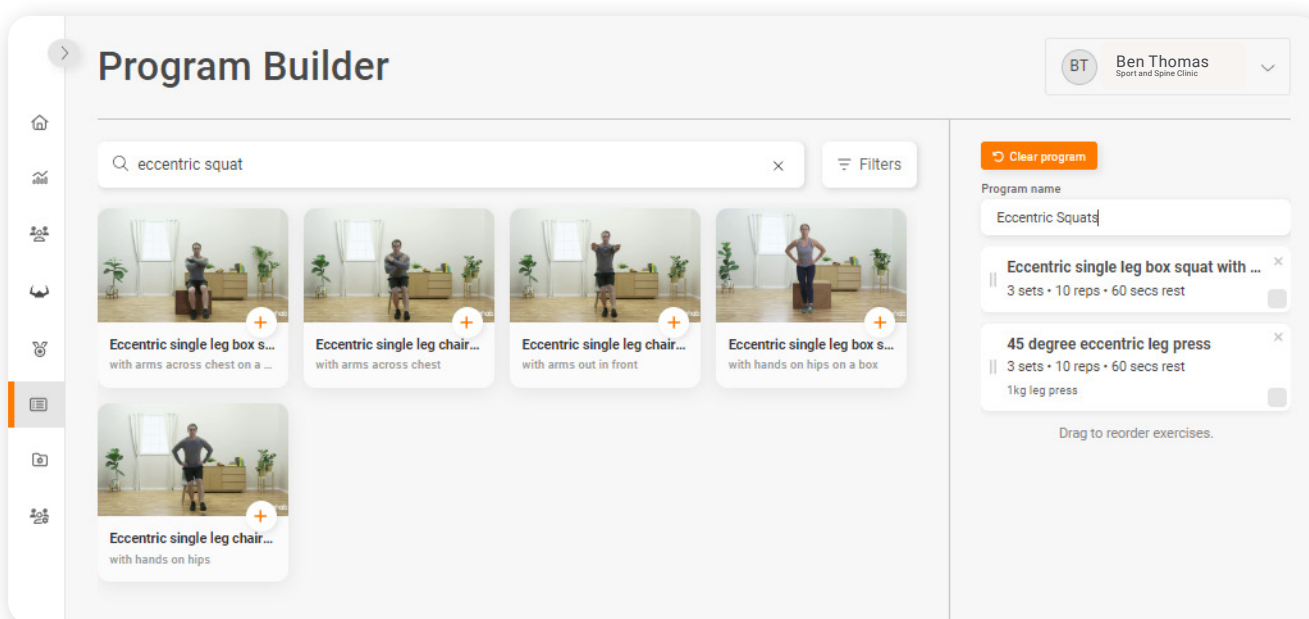
For example, if you typically assess balance in a single leg standing position, the Single Leg Stand test on force plates allows you to perform the same test while collecting valuable insights on your patient's balance strategy (using CoP).

If you would typically assess a squat for symmetry and quality – simply perform a Squat Assessment on force plates and quantify the asymmetry accurately. You will also unlock a range of other data points that

will help you analyze the specific components of the movement and asymmetry, helping you target your rehabilitation strategy.

For example, if there is an asymmetry in Eccentric Mean Force during a Squat Assessment, then you may choose exercises that target the eccentric phase of a squatting movement such as “eccentric focused squats /lunges or even leg press.

If you would typically assess a squat for symmetry and quality – **simply perform a Squat Assessment on force plates and quantify the asymmetry accurately.**



Program builder function in VALD's exercise prescription platform, [TeleHab](#).

When you would typically do a jumping or hopping exercise – do these on force plates. Performing a jump test (such as the CMJ) on force plates will give

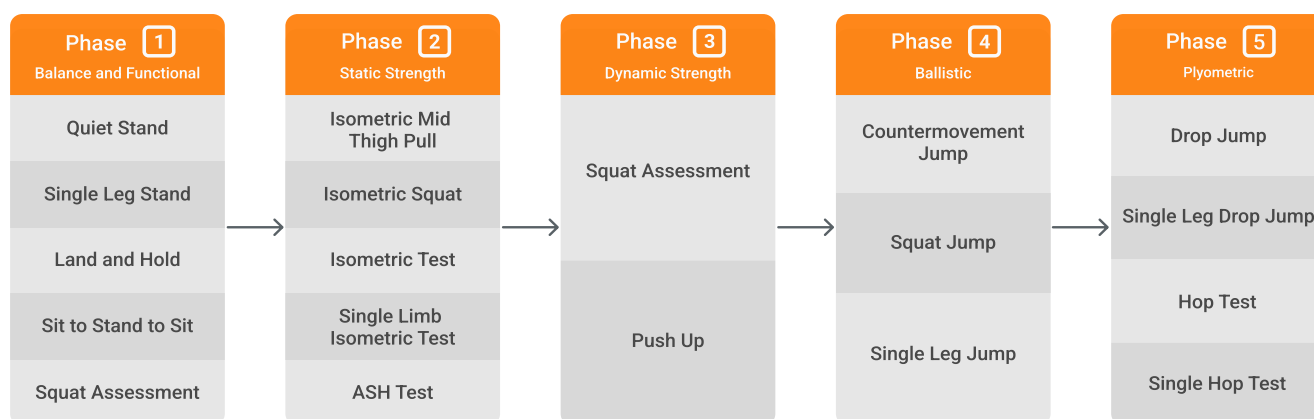
you much more than a standard jump test, including accurate height, power, forces, asymmetry, and more.

Protocols are particularly important for jump tests, so check out our [Golden Rules of Testing \(Appendix 2\)](#) for some helpful tips.

Once you know what you want to measure, it becomes much simpler to determine the best force plate test to achieve it.

As you can see, once you know what you want to measure, it becomes much simpler to determine the best force plate tests to achieve it.

Force plate test selection is not a new challenge, but thankfully several force plate experts have created simple frameworks to help. Included here are a few such examples, which may help with your decision-making. We recommend printing out the one (or more) that resonates with you, so you have it right in front of you when you need it.



Workflow and Administration Tips

Perhaps one of the most common concerns for practitioners implementing force plates is that they will be time-consuming. Clinical notes, reports, and other administrative processes are already time-consuming and are often completed outside of consultations (and often on personal time), so the fear of adding to this burden is understandable.

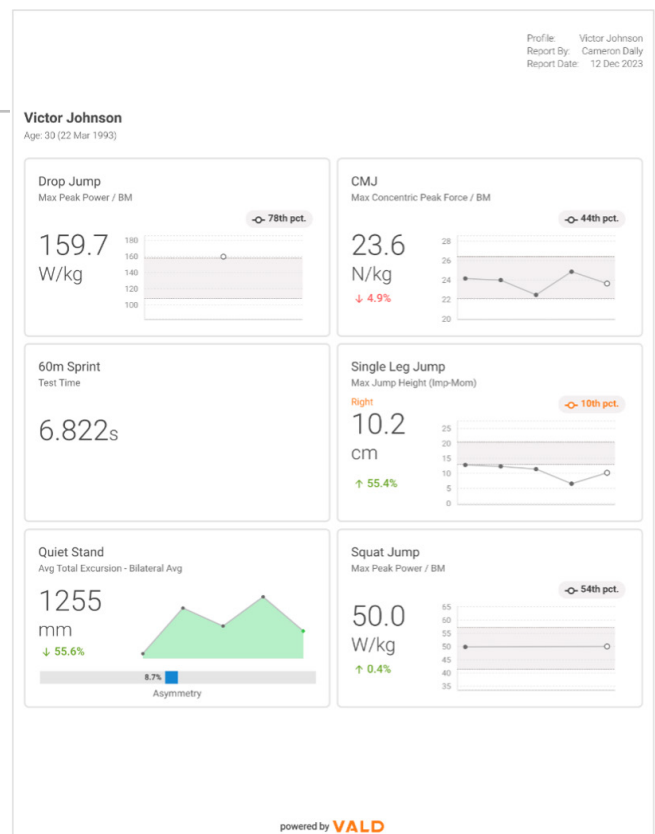
In fact, the opposite can be the case, so we have compiled some tips and tricks for using force plates to improve your efficiency while improving your clinical services.

Clinical Notes & Reports

One of the most time-consuming and – at times – unrewarding parts of a practitioner’s daily workflow is clinical note-taking and report writing. Force plates will not eliminate notes, but they can reduce the burden.

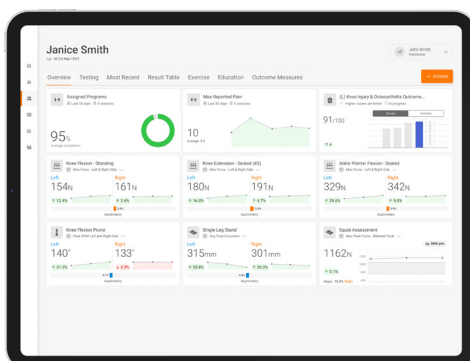
Force plates will not eliminate notes, but they can reduce the burden.

Rather than manually entering objective assessment results, data is uploaded and appears automatically in the patient’s profile. With ForceDecks, for example, you can use [VALD Hub](#) to generate reports for clinical notes or letters with a single click.



Personalized Dashboards

Some modern force plate systems such as ForceDecks allow you to configure dashboards to show the exact test results and metrics you want to see for a patient, all on one screen.



Setting up such a dashboard can take a little bit of extra time at the beginning of a treatment journey but can save hours in the long run. Plus, once your dashboard is set up, you can share it with your patient or referrer, print it or monitor it at a glance with minimal effort.

Doing this can have an extremely positive effect on patient engagement and referrer satisfaction, without taking up much time.

**you can share it with your patient
or referrer, print it or monitor it
at a glance with minimal effort.**

This is particularly valuable if you can visualize more than simply force plate data on your dashboard. For example, VALD Hub allows users to create dashboards with data from any VALD system, allowing users to visualize a patient's data from many systems on one screen.

Groups, Categories and Tags

If you work with groups of individuals regularly, for example, local sporting clubs, or you treat many patients with the same or similar pathologies, it can be difficult to sift through all the data you have to see just the subset of patients you are interested in.

To help with this, force plate systems like ForceDecks offer a range of data categorization tools, which can be thought of as folders on your computer or inbox – designed to help make data easy to find. Below is an example of how ForceDecks ‘Groups’ and ‘Categories’ functions can be used to organize your patients, and how ‘Tag Types’ and ‘Tags’ can be used in a similar way to categorize your test data.

Example VALD User	Categories	Groups
Active Living Clinics Allied health clinic catering to general population and local sporting clubs.	Clinic site 1	Clinician A
		Clinician B
		Clinician C
		Men's
	Sporting club name	Women's
		Academy
		Physical therapy
		Podiatry
		Exercise physiology

Example structure for organizing data in a multidisciplinary clinic

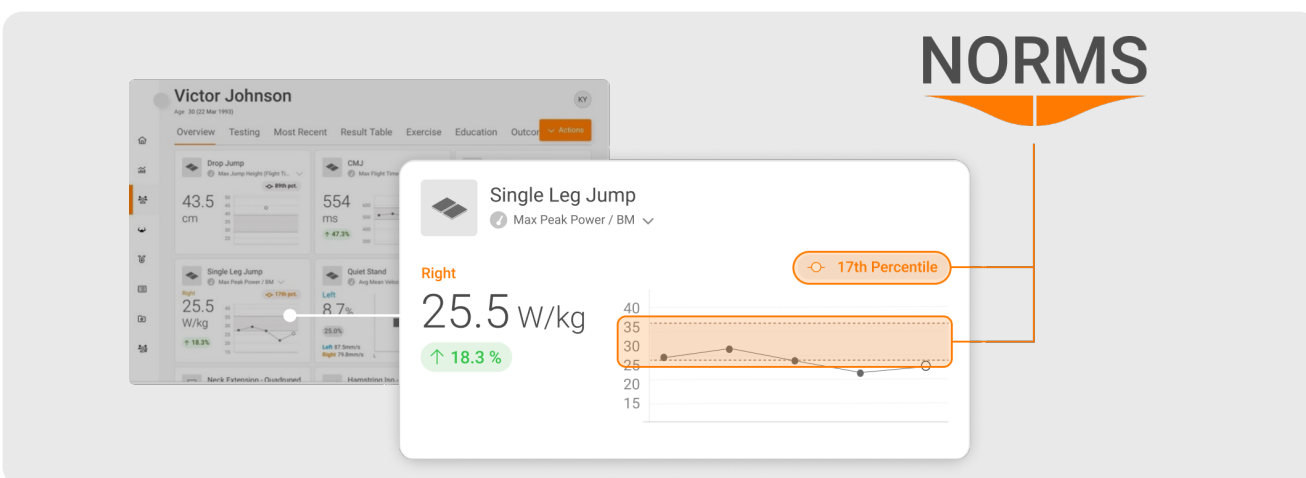
Normative Data

ForceDecks shows **Norms** (integrated normative data) against patients' results, giving you and your patient a contextually accurate, immediate reference point when reviewing their results, glancing at a dashboard, or sharing a report.

If you have many patients whose demographic data requires updating, updating them one by one may be very time-consuming. However, depending on which

force plate system you use, it may be possible to do this in bulk, as is the case with ForceDecks, using VALD Hub.

Tip: If you are struggling to update your patients' demographics, VALD's Client Success Managers are here to help – simply email clientsuccess@vald.com and the team will help solve your challenges.



Ideas for Implementation

Beyond implementing force plates into day-to-day clinical practice, practitioners – particularly those in the private sector – often have other common questions about how to implement force plates into their **businesses**.

- “I can see the clinical benefits of force plates, but **how do I cover the cost** so I’m not just adding another expense to my business?”
- “**How have other clinics achieved ROI** on their force plates?”

These are important considerations for anyone managing a business. At VALD, we have had these exact discussions with thousands of business owners around the world – ever since we started our business. This section will answer these questions by sharing some of the most successful strategies we have seen businesses use in implementing force plates.

Before we dive in, it is important to note that most of our clients have experienced the value of implementing ForceDecks without needing to change very much at all. Namely:

- Their **patients** are more engaged.
- Their **staff** are more engaged.
- **Compliance** is improved.
- This regularly leads to **additional appointments** and **improved outcomes**.

Ultimately, for most clients, it is likely that this effect alone will justify their investment in ForceDecks.

most of our clients have experienced the value of implementing ForceDecks **without needing to change very much at all.**

However, many practitioners and business owners will use the introduction of force plates into their clinic as an opportunity to add new and innovative models of care and services. These initiatives have not only helped these clinics get value from force plates, but in many cases have played a pivotal role in growing their businesses.

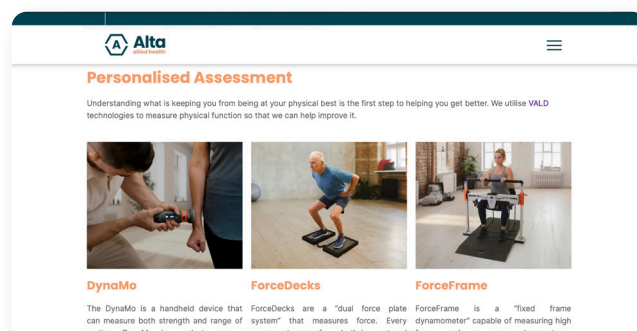


ORKA Performance online educational course for private sector health and performance businesses.

New Services

Performance and Functional Testing

Some clinics offer discrete testing services, allowing patients to get tested. This testing service could be aimed at injury prevention, general MSK screenings, or even return-to-play clearance. Patients get an engaging testing experience and can compare themselves with elite athletes and their own demographic using Norms.



Example business' webpage explaining their clinic's technology offerings.

Some VALD clients have even created dedicated “Testing Labs” or “Sports Science Areas,” as well as dedicated webpages which are a great way of promoting their new offerings and enhancing the clinic’s brand.

High performance

With force plate technology providing data that is also used in elite sports settings, practitioners treating athletes can now provide an extension of the testing

they receive from their teams or clubs. In such cases, clinics may also share data with those teams to ensure continuity of care.

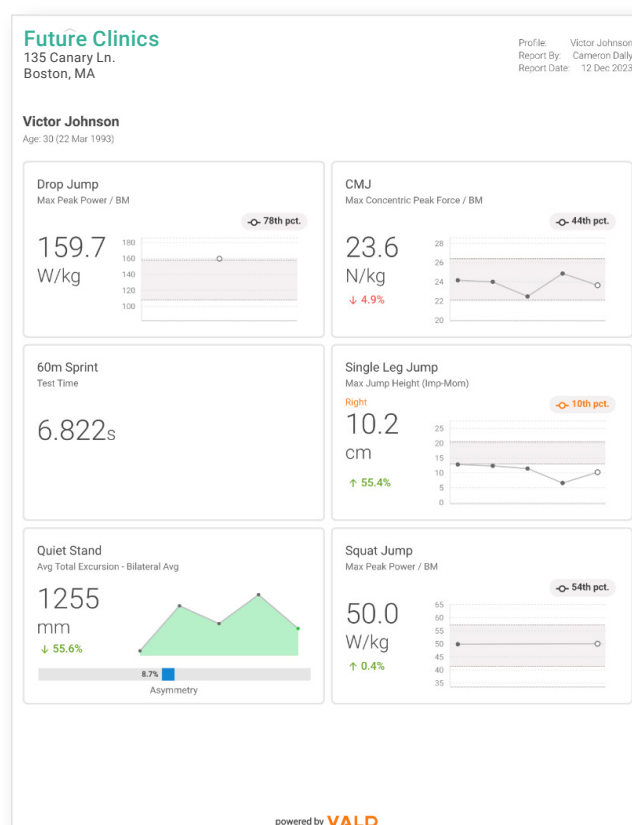
This can help retain patients for longer and establish links between the business and elite sporting organizations, but perhaps most importantly, can be an enormous source of professional job satisfaction for practitioners who are passionate about high-performance sports.

Referrer Engagement

Many force plate users find that the technology has added a new, valuable dimension to their referral letters, and has led to a greater number of referrals from other medical professionals such as GPs and surgeons.

With VALD Hub, users can generate a patient report with a click, creating a highly visual, multi-layered report featuring key ForceDecks metrics, along with data from other VALD systems, exercise adherence, pain trends, and more. Referring medical professionals have shown **great appreciation for such detailed insights** – significantly improving traditional referral letters and increasing the likelihood of referring more business to the clinic again in the future.

With VALD Hub, users can generate a patient report **with a click.**



Patient Engagement and Retention

Perhaps one of the most common and easiest-to-implement initiatives involves charging no additional fee nor creating any new service, but simply building force plates into – within reason – the majority of treatment pathways.

Even in the absence of discrete new revenue-generating services, force plate data can significantly help patients understand their journey and help to de-couple pain from their perception of progress, a key element in potentially preventing patients from early self-discharge.

force plate data can significantly help patients understand their journey and **help to de-couple pain from their perception of progress**

Outreach Programs

Many force plate users leverage the technology – which may be new, exciting, and futuristic to the uninitiated – for outreach initiatives. They may offer force plate testing at community events like school competitions, running events, or sporting carnivals.

Some users have also successfully approached large labor-intensive businesses such as factories and distribution centers, to offer testing services to their staff.

Local Sporting Clubs

Similarly, many clinics work with local sporting teams to offer MSK screening for their athletes.

In addition to building a relationship with the athletes and coaching staff, you will capture healthy baseline data. This means that – should any athletes be injured in the future – your clinic will be the obvious choice, as you have not only their pre-injury data but also the tools to compare it to in their rehabilitation.



Occupational Health

Technology (including force plates) has been the point of difference for many clinics in winning contacts with local employers to provide occupational health services.

These services can range from pre-employment screenings to early intervention programs, ongoing workforce monitoring, and injury prevention programs. As in other examples, the data generated by force plates is a powerful tool for communicating with all stakeholders and demonstrating value.

“By continually testing and tracking ‘industrial athletes’ over time we can build a picture around likely outcomes which leads to a more targeted approach to our prevention strategy.”

Technology has led to an increase in practitioner engagement and a 300% increase in client engagement in our prevention program year-over-year.

All the above leads to better outcomes for the client, more engaged practitioners with purpose, and decreased TRIs, Injuries, and Incidents.”

Justin Smith

Manager, EMP Onsite

Staff Engagement

It is well known that in professional services industries such as healthcare, staff satisfaction, and engagement significantly impact the quality of services and the patient experience. Today’s graduates are technology-savvy, eager to use data to inform their decisions, and want to be engaged in their work.

VALD clients have regularly reported that after introducing force plate technology they experienced a significantly increased engagement from their staff. They found that accurately identifying physical

impairments, developing targeted interventions, and tracking progress over time helped create an environment with a high level of professional satisfaction.

“Our team certainly love using the technology and now many say they could not see themselves doing their jobs without it.”

Mitchell Vautin

Owner, Exercise Healthcare Australia

What **Next?**

This document includes all the basics you require to implement force plates into your practice ... **but it is also just the tip of the iceberg.**

We know that force plates can be daunting, but with today's technology and intuitive force plate products such as ForceDecks, they no longer need to be.

We hope this guide has helped answer some of your questions, dispel some misconceptions, and make force plates seem a little more accessible to you and your practice, business, or team. No matter which force plate brand you choose, at VALD we think a healthcare industry with more skilled force plate users is a better, more informed, and more efficient industry.

This document includes all the basics you require to understand and successfully implement force plates into your clinical practice, but it is also just the tip of the iceberg. Force plates can provide so much more data and insights than we could hope to cover here.

So, we have provided recommendations below for other great educational resources, research, and industry experts worth following, to help you continue your force plate journey.

At VALD, we strive to help you on this journey. Born out of university research, education is in our DNA. We have our own in-house [Client Success](#) team, made up of 20+ (and growing) experienced physical therapists, physiotherapists, exercise physiologists, performance specialists, and beyond. These team members around the globe are dedicated to helping you succeed in implementing technology into your practice.

If you ever want to discuss force plates, implementing technology into your practice, or anything else covered in this guide and beyond, get in touch with us at info@vald.com.

Other Great **Force Plate Resources**

VALD HEALTH

News &
Research

Webinar
Series

Knowledge
Base

Or [get in touch: info@vald.com](mailto:info@vald.com)

Online Educational Content

Learn.Physio

Educational content for physical therapists and physiotherapists

SportSmith

Podcasts, blogs and courses for sports performance professionals

Force Plate Leaders Worth Following

[@mikereinold](https://twitter.com/mikereinold)

[@mickhughes.physio](https://twitter.com/mickhughes.physio)

[@alex.natera](https://twitter.com/alex.natera)

[@joclubbsportssci](https://twitter.com/joclubbsportssci)

[@ryan.vald](https://twitter.com/ryan.vald)

[@paulread1010](https://twitter.com/paulread1010)

[@enda_king](https://twitter.com/enda_king)

[@roulakotsifaki](https://twitter.com/roulakotsifaki)

Appendix 1: Purchasing Considerations

When purchasing force plates, there are three main questions you need to ask: **who**, **what** and **where**.

Who will you be testing?

Are they professional athletes? Are they youth, adult, or geriatric population? Are they patients recovering from an injury or surgery?

- **Do you work with large adults or very strong athletes?** If so, you may need force plates with a bigger surface area and higher capacity, such as ForceDecks Max.
- **Do you work with aging patients?** If so, their feet may not leave the plates during testing, so a smaller model such as ForceDecks Mini may be suitable.

What tests will you be performing?

Do you want to test balance, plyometric performance, isometric strength (lower body or upper body), asymmetry, or gait?

- **Do you care about asymmetry?** If so, ensure you choose a dual force plate solution.
- **Do you want to measure balance?** If so, ensure you choose a force plate that can measure CoP – not all dual force plates can!
- **Do you plan to run a number of different tests?** Switching between tests in force plate systems, so if you will be doing so regularly, ForceDecks' 'Auto-Detect' feature will be beneficial, as it automatically detects which test is being performed and allows multiple test types to be performed in the same seamless recording.
- **Which tests do you want to assess (and which metrics will you monitor)?** Force plate software is perhaps where brands and models differ most and can make or break your experience. Before making your decision, check that the force plate model can automatically analyze the tests you need and calculate the metrics you will use.
- **Do you need to measure running or walking gait?** If so, you may need triaxial plates, which are very expensive and complex to use, and as such typically reside in research laboratories. Uniaxial plates (such as ForceDecks) can typically perform almost all of the same assessments as triaxial plates, so consider whether the additional expense and time will be worth it to you.

Where will you be testing?

Do you work from a gym, a clinic, a hospital, in a university research lab or are you mobile, taking your services directly to your clients?

- **Where will you use your force plates?** If you are in a small space or travel with your force plates, consider a model that is portable and offers travel accessories such as hard cases.

Budget and Other Considerations

Lastly, of course, you must consider your budget. Some brands (including ForceDecks) offer [convenient subscription models](#) that break up payments into small, manageable amounts.

ForceDecks offer a solution that satisfies all the above considerations for the vast majority of users, which is why it has become the most popular force plate solution for practitioners. ForceDecks offers high-capacity, portable, feature-rich force plates in three different models, all compatible with software that offers the widest range of tests and metrics and the easiest-to-use and most engaging interface. Combined with VALD Hub, ForceDecks are the force plates of choice for most practitioners.

We know that purchasing force plates can be an overwhelming process, but at VALD **we want to help you make the right decision**

Not all force plates are created equal, so having clarity on your own needs is beneficial in deciding which brand and model will best satisfy them. We know that purchasing force plates can be a daunting process, but at VALD we want to help you make the right decision – even if it turns out that ForceDecks is not the best choice for you.

For more tips, check out our [Buyer's Guide to Force Plates](#). If you would like help in your decision-making process, contact us at info@vald.com.



Appendix 2: Golden Rules of Testing

Force plate testing is easier now than it has ever been, however, there are still some important things to be aware of to ensure you get consistent, accurate, reliable, and actionable data every time.

Appropriate Testing Environment

Force plates are made for use on solid, flat surfaces. If they are used on soft surfaces such as carpet, grass or sprung floors, your readings are likely to be inaccurate. Use the adjustable leg of ForceDecks to ensure the plates are completely stable every time, every test.

Consistent Testing Setup

Each time you prepare to test, you should focus on a few key actions that will help ensure your data is as accurate:

- Ensure your force plates are zeroed (or 'tared'). A common mistake is to zero the force plates with some weight applied to them, which will create an 'offset' and affect all the data you subsequently collect.
- Weigh your patient as accurately as possible. Bodyweight is used to calculate many force plate metrics, so an inaccuracy of even a few ounces can lead to significant errors. Ensure your patient stands completely still while being weighed until the software confirms their weight is accepted.

Consistent Testing Conditions

Just as important as the environment and the setup is how you perform the test with your patient. Use best practice protocols wherever possible and keep your test procedure as consistent as possible to minimize the impact of external variables.

- Use best practice protocols. The VALD Knowledge Base includes effective and easy-to-understand [protocols for every ForceDecks test](#), designed to help practitioners perform their tests consistently.
- Use consistent cues. If your instructions change each time, you perform a test, you may find the patient responds differently, which may affect the consistency of their data. We recommend using simple, easy-to-understand terminology like "jump as high and as fast as you can" and keeping your tone consistent – typically positive and firm to drive intent.
- Enforce quiet periods between reps. Force plates rely on a 'quiet period' – a period of very stable force readings – to determine the start of movement (and as a result, many of the metrics that follow) for each rep in a test. If the patient is moving – such as turning their head, speaking, or weight-shifting between limbs – when a rep begins, the start of movement may not be detected accurately. Patients can adjust between reps, but ensure they are completely still before the next rep starts.