



KineticSense

**Modular Scoring
Interpretation**

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Kinetisense Modules Included in Kinetisense 360 License

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please note this is a list of all Kinetisense modules, some modules may not be available on your current Kinetisense license. Please contact info@kinetisense.com if you would like to add additional modules to your account

Section 1: General Modules

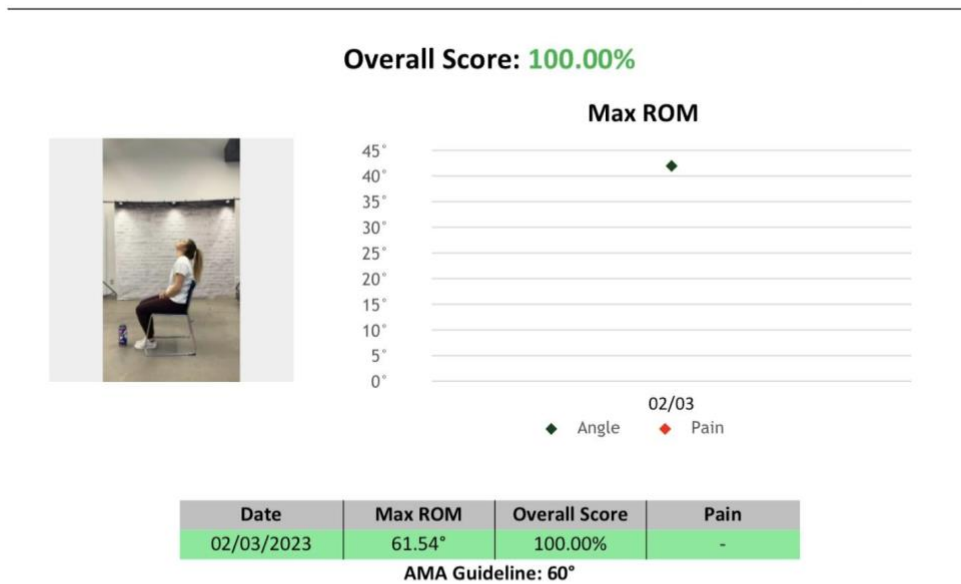
Range of Motion (ROM)

Range of Motion (ROM) can be used in many different ways. The most common application is to assess a patient who lacks ROM in a joint of the body or has an injury to a specific joint. This module can be used to determine when pain is present while moving through a ROM, track progress and improvement over time and can be used as an intake assessment to determine a patient's baseline ROM. This is a great pre and post treatment exam that can be performed in one session; assess, correct, reassess.

Score and Report Interpretation

Range of Motion (ROM) scores are based on AMA Guidelines. Any Range of Motion greater than the threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example (74° achieved / 90°AMA Guideline) x 100 = 82%

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100). An example report is provided below.



Compiled Notes:

Assessment:

2:46 PM - Neck Extension Side On (Pre-tx- 61.5 degrees) Active Seated

1. Rondinelli, R. D., Genovese, E., Katz, R. T., Mayer, T. G., Mueller, K., Ranavaya, M., & Brigham, C. R. (2008). *AMA guides to the evaluation of permanent impairment* (6th ed.). American Medical Association. <https://doi.org/10.1001/978-1-57947-888-9>
2. Andersson, G. B. J., & Cocchiarella, L. (2000). *AMA Guides to the Evaluation of Permanent Impairment* (5th ed.). American Medical Association.
3. American Academy of Orthopaedic Surgeons. (1965). *Joint motion: Method of measuring and recording*. Churchill Livingstone.

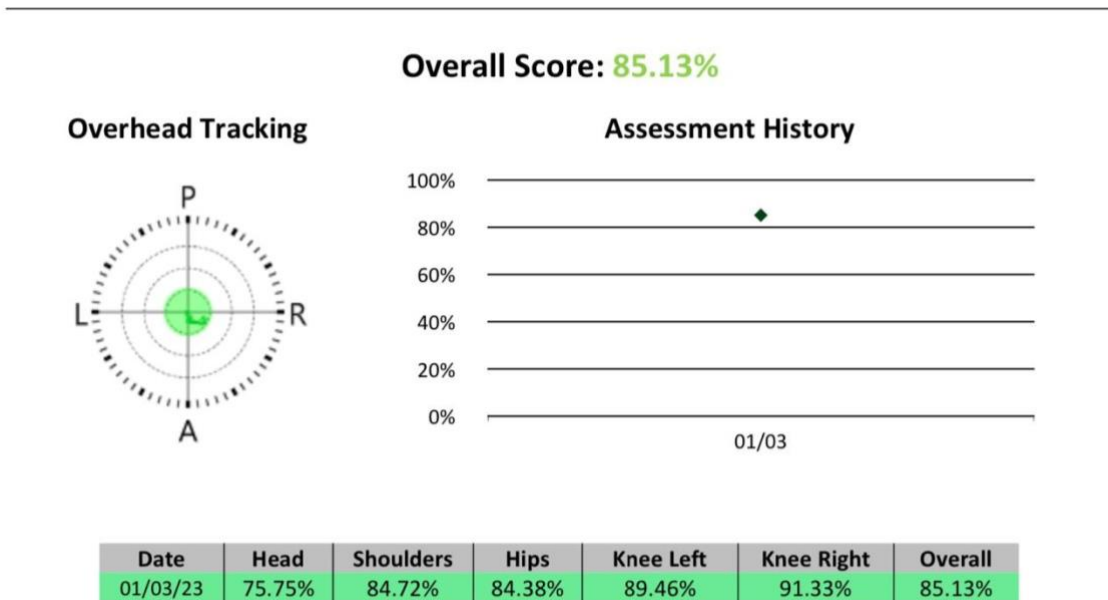
Balance

The balance module has a wide range practical applications for specific conditions or age related disorders. Understanding specific conditions will determine how to prepare for the assessment(s). If the BESS Test Protocol is being completed, a two inch foam pad is required. If the SCAT5 Concussion baseline balance protocol is being completed, a foam pad is not necessary. For Geriatric Risk of Fall, all of the assessments are performed on the floor. For specific athletic performance training, this can vary based on the practitioner preferences. Balance is a great way to screen athletes for a concussion and get valuable baseline data.

Score and Report Interpretation:

The overall score for the balance assessments is composed of scores from 4 body segments including: head, shoulders, hips, and knees. Tilt and sway are monitored throughout the entire balance assessment. A score of 100% indicates zero tilt or sway was observed and lower scores indicate progressively more tilt and sway.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100). An example report is provided below.



Overhead Squat

The overhead squat is a triple flexion squat, monitoring the shoulders, hips and knees. This multi-segmental movement is a common way that the body naturally moves throughout the day. Performing a correct squat requires the upper and lower body to work in unison activating over 200 muscles. In addition to musculature stability and postural control, dysfunctional movement patterns are also identified.

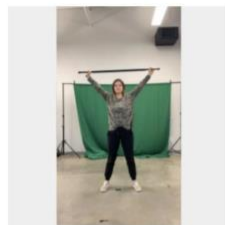
Score and Report Interpretation:

The overall score for the overhead squat assessment is composed of 9 factors taking into consideration the upper and lower body. These factors include: ability to squat and return to standing, thighs reach horizontal, knee valgus, knee over toe, shoulder-wrist inline, shoulder lateral tilt, shoulder axis rotation, heels raised, and lumbopelvic rounding. Individual scores all contribute to the overall score and can be found in the subjective notes following the assessment. Individual factor scores can be represented as “Yes/No” or as a percent. A score of 100% indicates zero deviation and lower scores represent progressively more deviation. The heels raised and lumbopelvic rounding factors are selectable checkboxes once the assessment has been completed. These are to be observed by the practitioner and selected if applicable.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)

Overall Score: **82.75%**

Assessment History



Date	Did Squat	Knee Over Toe		Shoulder-Wrist Inline		Valgus		Shoulder Lateral Tilt	Shoulder Axis Rotation	Overall Score
		Left	Right	Left	Right	Left	Right			
01/23 /2023	Yes	Yes	Yes	No	No	100%	100%	86%	76%	83%

Compiled Notes:

Subjective:

2:09 PM - Did Squat: YES Felt pain: NO Thighs Reached Horizontal: YES Valgus left: 100% Valgus right: 100%
Knee over toe Left: NO Knee over toe Right: NO Shoulder-Wrist Inline Left: NO Shoulder-Wrist Inline Right: NO
Shoulder Lateral Tilt: 86% Shoulder Axis Rotation: 76%

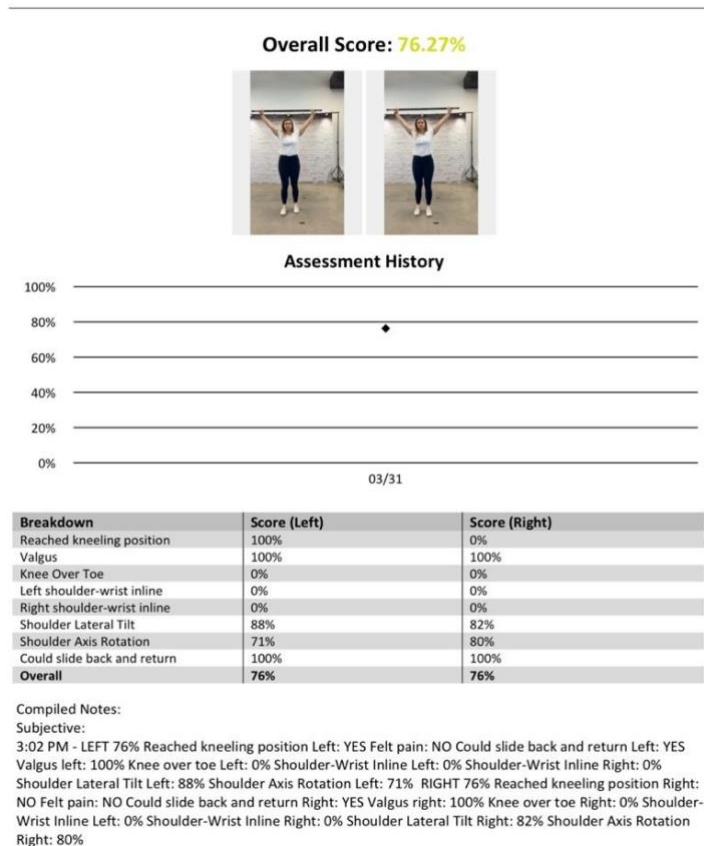
Reverse Lunge

The reverse lunge is another multi-segmental movement our body naturally performs throughout the day. The lunge is functionally pertinent exemplifying walking, running, stair climbing, balance, and change of direction in sport (i.e., agility). This is one of the most well-tolerated and challenging single leg movements.

Score and Report Interpretation:

The overall score for the reverse lunge assessment is composed of 7 factors taking into consideration the upper and lower body. These factors include: ability to lunge and return to standing, reach kneeling position, knee valgus, knee over toe, shoulder-wrist inline, shoulder lateral tilt, and shoulder axis rotation. Individual scores all contribute to the overall score and can be found in the subjective notes following the assessment. Individual factor scores can be represented as “Yes/No” or as a percent. Scores are represented similar to overhead squat except for knee over toe and shoulder- wrist inline. For these 2 factors, a score of 0% indicates knees passed the toes or shoulders and wrists did not remain in line respectively.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)



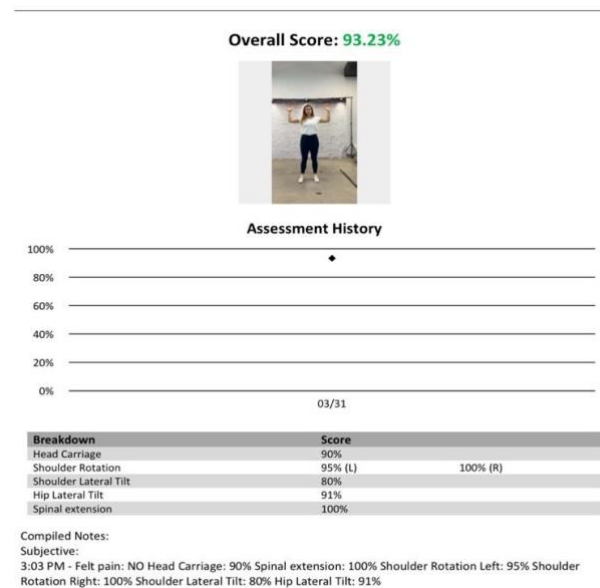
Posture Angel

The Posture Angel assessment is more commonly referred to as wall angel. Traditionally, the movement is performed against the wall in order to determine shoulder rotation, scapular mobility, upper back activation and chest and shoulder muscular release. Due to prolonged periods of sitting the muscles in the back begin to fatigue resulting in the head progressing forward, rounding of the shoulders and an overly arched back. The Posture Angel assessment helps to determine the degree of rounding in the shoulders and spine as well as the degree in which the head has moved forward from the cervical-thoracic junction.

Score and Report Interpretation:

The overall score for the posture angel assessment focuses on 1 primary factor: external rotation at the shoulder joint. As with the other Range of Motion assessments, any Range of Motion greater than the 90° threshold is considered 100%, any range of motion less than the Guideline threshold is represented as a percentage of the Guideline. Example (88° achieved / 90° AMA Guideline) x 100 = 98%. There are 4 secondary factors that also contribute to the overall score including: head carriage, spinal extension, shoulder lateral tilt, and hip lateral tilt. Individual factor scores can be represented as “Yes/No” or as a percent. A score of 100% indicates zero deviation and lower scores represent progressively more deviation. The spinal extension factor is a selectable checkbox on the assessment scorecard. This is to be observed by the practitioner and selected if applicable.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)



Reference: Sportsmed. (2022, February 17). What is the wall angels exercise?: Sport Orthopedic: Dallas & Frisco. SPORT Orthopedic + Rehabilitation. <https://sportsmedtexas.com/blog/what-is-the-wall-angels-exercise/>

Functional

The Functional Module allows for a large amount of freedom for the user to be creative and adapt the system to their personalized assessments. The functional module can be used to break down a variety of movements, this can be anywhere from looking at an overhead squat with a patient who is unable to reach 90 degrees with their thighs to watching an athlete swing a golf club. In this module, the body tracker will automatically lock onto the body and joint angles will be displayed, data points can be captured at any point by playing the video playback button and selecting capture. (Training video)

Due to the freedom allowed within this module there are no scoring components. Joint angles during a movement can be captured and analyzed by a practitioner. In this module you will be able to see real time playback of the frontal plane, transverse plane and sagittal plane.



Head located 7cm FWD the shoulder line.

Head carriage is 8.0° FWD

Eyes tilt 2.61 degrees to Left.

Right shoulder is 3 cm below left and 2 cm in front of Left.

Shoulder axis is 5.83 degrees tilt to Left compared to horizontal.

There is 0.47 degree spinal tilt to the Right.

Right hip is 0 cm in front of the left hip, and 1 cm below the left hip.

Hip axis is 1.65 degrees tilt to Right compared to horizontal.

Right knee is 1 cm in front of left and 0 cm below Left.

Knee axis is 0.43 degrees tilt to Right compared to horizontal.

Shoulder Plane Rotation is 12.1 Right.

Hip Plane Rotation is 11.6 Right.

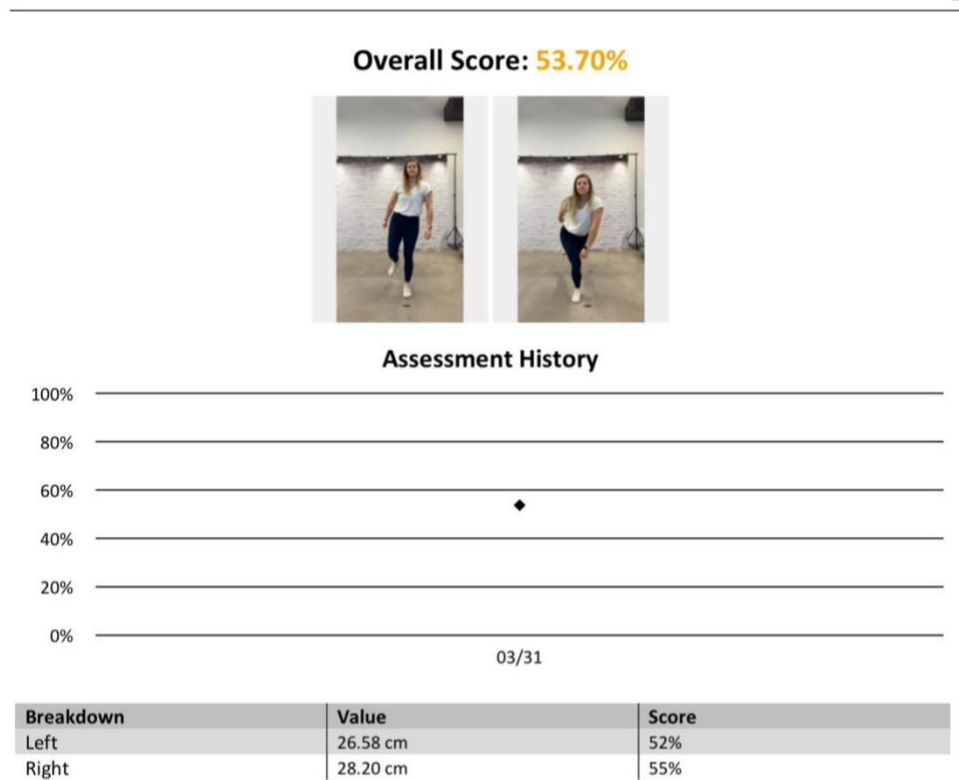
Vertical Jump

Our vertical jump module is based on the Sargent Jump principles. This test is designed to measure lower limb explosive power by measuring the height a patient is able to jump. By looking at both the left and the right lower limbs individually we are able to determine if there is a power deficiency between sides.

Score and Report Interpretation:

The overall score for the vertical jump assessment is an average of the left and right scores which are based on jump height and gender. Jump height values are in accordance with NCAA athlete norms which are 50 cm for females and 60cm for males. Any jump height greater than the threshold is considered 100%, any jump height less than the threshold is represented as a percentage. Example Female-right: (34cm / 50cm) x 100 = 68%; Female-left: (28cm / 50cm) x 100 = 56%; Female-overall = 62%.

Poor (0-25), Moderate (26-50), Good (51-75), Great (76-100)



Compiled Notes:

Subjective:

3:04 PM - Vertical Jump Left: 52% 27 cm Vertical Jump Right: 55% 28 cm

Single Leg Hop

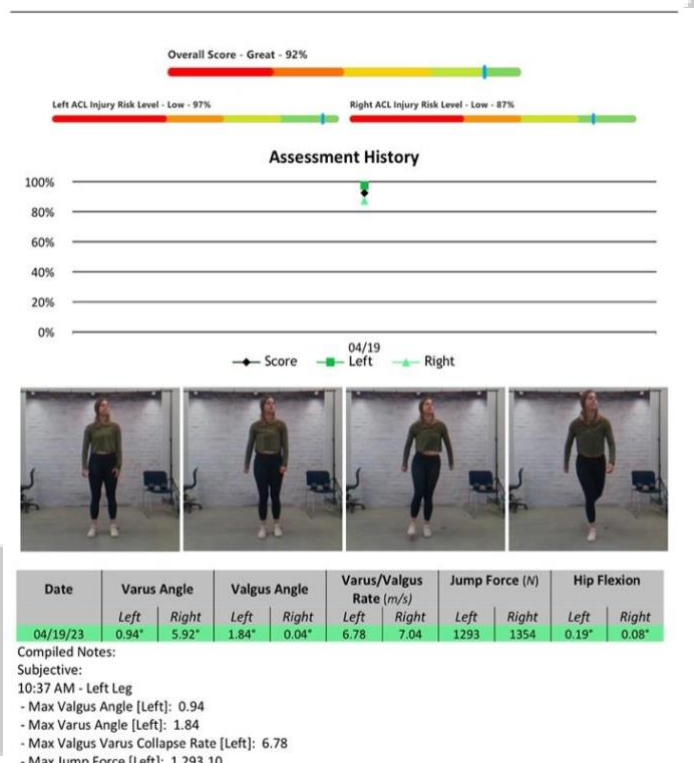
The single leg hop module was created to analyze a patient's risk of Anterior Cruciate Ligament (ACL) injury. The ACL is one of the four ligaments located within the knee, it plays an important role in stabilizing the knee and holding together the femur and tibia bone. An ACL injury is one of the most well-known lower-body injuries and can be significant in nature, often requiring extensive rehabilitation. ACL injuries do not just impact the sporting and athletic communities, but the workforce, youth, and the general population as well.

Outside of the biomechanical factors, age and gender are the most prevalent factors in identifying risk of ACL injury. Females, specifically around the age of 16, are at a significantly higher risk of ACL injury than males due to neuromuscular, anatomical, and hormonal differences. For this reason, young athletes are the best candidates for this assessment. This module can also be used as a functional fatigue assessment as more than one hop can be assessed during the period of the assessment. Advanced athletes can be tracked throughout a training protocol. Assess-correct-reassess.

Score and Report Interpretation:

The overall score for single leg hop is an average between both the left and the right ACL injury risk level. The ACL injury risk level has 5 factors taken into consideration. These factors include: knee varus angle, knee valgus angle, the varus/valgus collapse rate (m/s), jump force (N) and hip flexion. All factors are calculated for both the left and right side. The system detects jumping mechanics and landing mechanics. Individual scores all contribute to overall score and can be found in the subjective notes following the assessment. Individual scores are represented as numbers, all scores are represented in different units. It is critical that a patient's age, gender and weight are accurate for this assessment as we use these factors to calculate jump force.

Poor (0-25), Moderate (26-50), Good (51-75), Great (76-100)



Posture

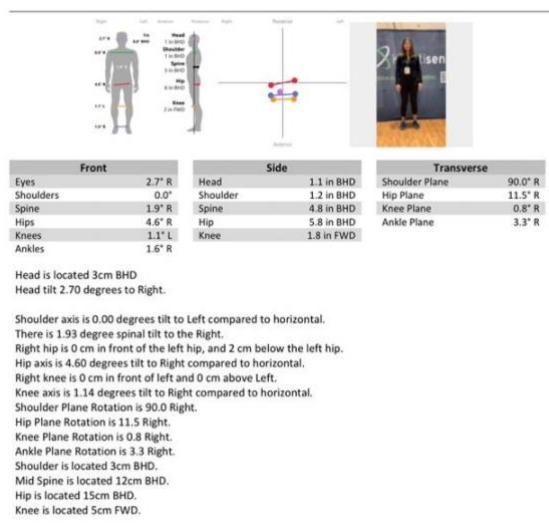
The term “posture” means the position of the body in space. It indicates the position of the body in space and has the purpose of maintaining the body in balance throughout the day. Posture has historically been a subjective assessment that practitioners have eye-balled to identify dysfunctions. Maintaining proper posture keeps joints and bones in alignment which decreases the amount of abnormal wearing of joint surfaces, reducing stress on the ligaments holding the spinal joint together and allowing your muscles to work more efficiently. Good posture can help prevent muscle strain, overuse disorders and back and muscular pain.

Score and Report Interpretation:

Our posture module does not currently provide an overall score, this is because there are a wide variety of factors that take place when analysing someone's posture. All three planes of the body are analysed in our posture module; frontal plane, sagittal plane and transverse plane.

- **Frontal Plane:** This plane of motion is looking at the body from the front, it is comparing the left and right side of the body, which indicates if there is any tilt (measured in degrees) between the two sides. A perfectly symmetrical patient would have no tilt between the left and right side. The larger the tilt between the left and right side, the more out of line a patient is.
- **Sagittal Plane:** This plane of motion is looking at the body from a side view, the numbers provided depict how anterior or posterior a patient is standing from the Plumb line. The Plumb is an imaginary line from the top of the head to the floor, FWD indicates how far forward a person's joint is and BHD indicates how far backwards a person's joint is.
- **Transverse Plane:** This plane of movement is looking at the body from the top-down, each line is colour coded to be associated with a joint. This indicates how a patient's joints are stacking, note that all joints are anchored to the hips (red line).

The largest factor in determining if a patient displays good posture is by looking for irregularities between the left and right side of the body (frontal plane), any large FWD or BHD in the sagittal plane and looking for rotations of the body in the transverse plane.



Reference: Mayo Clinic. (2023, March 23). *Good Posture*. Mayo Clinic. <https://www.mayoclinic.org/healthy-lifestyle/adult-health/multimedia/back-pain/sls/20076817#:~:text=When%20you%20practice%20proper%20posture,muscles%20to%20work%20more%20efficiently.>

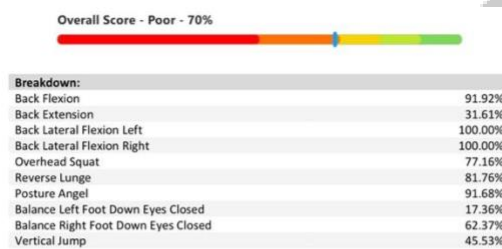
Kinetisense Advanced Movement Screen (KAMS)

Kinetisense Advanced Movement Screen (KAMS) is designed to be our functional movement screen. This 10 assessment movement screen detects the top three joint dysfunctions of the upper body region and top three joint dysfunctions of the lower body region in three minutes. Each assessment has been chosen to identify movement pattern asymmetries and deficiencies by comparing the body's compensatory factors between basic movement patterns required in daily activities. KAMS calculates joints that require the most amount of mobility and stability within the body.

Functional movement screening and injury detection are the main purpose of utilizing this module. There are a few avenues to implement KAMS into your practice or organization. This can be done by conducting a baseline KAMS analyzing the FPM results, KAMS indexes and looking at the individual KAMS movements (such as overhead squat). The user can then apply corrective strategies for the next 4-6 weeks to positively impact these results. Depending on the clinic or organization, one or all three avenues can be focused on. A follow up KAMS assessment 4-6 weeks post corrective strategies can be conducted to determine changes over time. Reports such as a KAMS report or FPM report can be used to track changes over time with trend data.

Score and Report Interpretation:

KAMS captures over 250 possible joint dysfunctions. Joints that are mapped in Kinetisense are the cervical, thoracic and lumbar spine along with the sacroiliac, glenohumeral, hips, knee and ankle joints. The FPM tool creates a functional score card that outlines the individual's overall score, along with indexes for the following: balance, flexibility, core stability, dynamic posture, lower extremity power, functional asymmetry and susceptibility to injury. The FPM tool identifies the top three dysfunctions in the upper body and the top three dysfunctions in the lower body. It will identify if the dysfunction is a mobility or stability issue and what plane of movement it is occurring in. In the FPM report there is a section for the functionality of the joints ranging from 0% to 100%. 100% indicating the joint has no dysfunction and is highly functional, and vice versa. Functional indexes are also identified and can be tracked over time by generating an FPM report and selecting multiple assessments.



Primary Dysfunction Regions



	Region	Plane	Dysfunction Type	Score
1	Right Shoulder	Transverse	Mobility	24.42%
2	Left Scapula	Transverse	Stability	35.46%
3	Right Scapula	Transverse	Stability	57.31%
4	Right Hip	Sagittal	Mobility	83.91%
5	Right SI Joint	Sagittal	Mobility	84.42%
6	Left Hip	Sagittal	Mobility	92.25%

Joints are ordered from the most - least dysfunctional



KAMS Scoring Breakdown



Assessment	Score Break Down
Overall	<p>The overall score is an average of all the assessment scores in the workflow (total score / # of assessments). Example $691/10 = 69\%$. If an assessment is skipped, a score of 0 is recorded for the skipped assessment and the overall score is reduced accordingly.</p> <p style="color: green;">Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Flexion	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 90° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example (74° achieved / 90° AMA Guideline) $\times 100 = 82\%$</p> <p style="color: green;">Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Extension	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 25° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example (22° achieved / 25° AMA Guideline) $\times 100 = 88\%$</p> <p style="color: green;">Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Lateral Flexion Left	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 25° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example (20° achieved / 25° AMA Guideline) $\times 100 = 80\%$</p> <p style="color: green;">Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Lateral Flexion Right	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 25° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example (18° achieved / 25° AMA Guideline) $\times 100 = 72\%$</p> <p style="color: green;">Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>

Overhead Squat	<p>The overall score for the overhead squat assessment is composed of 9 factors taking into consideration the upper and lower body. These factors include: ability to squat and return to standing, thighs reach horizontal, knee valgus, knee over toe, shoulder-wrist inline, shoulder lateral tilt, shoulder axis rotation, heels raised, and lumbopelvic rounding. Individual scores all contribute to the overall score and can be found in the subjective notes following the assessment. Individual factor scores can be represented as “Yes/No” or as a percent. A score of 100% indicates zero deviation and lower scores represent progressively more deviation. The heels raised and lumbopelvic rounding factors are selectable checkboxes once the assessment has been completed. These are to be observed by the practitioner and selected if applicable.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Reverse Lunge	<p>The overall score for the reverse lunge assessment is composed of 7 factors taking into consideration the upper and lower body. These factors include: ability to lunge and return to standing, reach kneeling position, knee valgus, knee over toe, shoulder-wrist inline, shoulder lateral tilt, and shoulder axis rotation. Individual scores all contribute to the overall score and can be found in the subjective notes following the assessment. Individual factor scores can be represented as “Yes/No” or as a percent. Scores are represented similar to overhead squat except for knee over toe and shoulder wrist inline. For these 2 factors, a score of 0% indicates knees passed the toes or shoulders and wrists did not remain in line respectively.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Posture Angel	<p>The overall score for the posture angel assessment focuses on 1 primary factor: external rotation at the shoulder joint. As with the other Range of Motion assessments, any Range of Motion greater than the 90° threshold is considered 100%, any range of motion less than the Guideline threshold is represented as a percentage of the Guideline. Example (88° achieved / 90° AMA Guideline) x 100 = 98%. There are 4 secondary factors that also contribute to the overall score including: head carriage, spinal extension, shoulder lateral tilt, and hip lateral tilt. Individual factor scores can be represented as “Yes/No” or as a percent. A score of 100% indicates zero deviation and lower scores represent progressively more deviation. The spinal extension factor is a selectable checkbox on the assessment scorecard. This is to be observed by the practitioner and selected if applicable.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>

Balance Left Foot Down	<p>The overall score for the balance assessments is composed of scores from 4 body segments including: head, shoulders, hips, and knees. Tilt and sway are monitored throughout the entire balance assessment. A score of 100% indicates zero tilt or sway was observed and lower scores indicate progressively more tilt and sway.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Balance Right Foot Down	<p>The overall score for the balance assessments is composed of scores from 4 body segments including: head, shoulders, hips, and knees. Tilt and sway are monitored throughout the entire balance assessment. A score of 100% indicates zero tilt or sway was observed and lower scores indicate progressively more tilt and sway.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Vertical Jump	<p>The overall score for the vertical jump assessment is an average of the left and right scores which are based on jump height and gender. Jump height values are in accordance with NCAA athlete norms which are 50 cm for females and 60cm for males. Any jump height greater than the threshold is considered 100%, any jump height less than the threshold is represented as a percentage. Example Female-right: $(34\text{cm} / 50\text{cm}) \times 100 = 68\%$; Female-left: $(28\text{cm} / 50\text{cm}) \times 100 = 56\%$; Female-overall = 62%.</p> <p>Poor (0-25), Moderate (26-50), Good (51-75), Great (76-100)</p>

KAMS Functional Planar Mapping & Movement Index

Index	Score Breakdown
Overall	<p>Every assessment in the workflow can identify specific joint dysfunctions. Combining all the assessments in the workflow, the 3 most prominent upper body and lower body dysfunctions are identified. Dysfunctions are classified as either stability (red) or mobility (blue) and can be identified in the transverse (tp), sagittal (sp), or frontal (fp) planes. Identified dysfunctions are displayed on the human skeleton diagram.</p>
Balance	<p>The balance index is derived from balance left foot down and balance right foot down assessments. Dysfunctions include: head, shoulder, hip, knee, and ankle axis deviations.</p> <p>Very Poor (0-30), Poor (31-40), Moderate (41-60), Good (61-80), Great (81-100)</p>

Flexibility	<p>The flexibility index is derived from back flexion, back extension, lateral flexion left, lateral flexion right, overhead squat, reverse lunge, and posture angel assessments. Dysfunctions include: reduced back flexion and extension, reduced back lateral flexion left and right, inability to maintain arms overhead in squat and lunge, not reaching depth in squat and lunge, reduced shoulder extension and external rotation, and low back hyperextension.</p> <p>Very poor (0-20), Poor (21-40), Moderate (41-60), Good (61-80), Great (81-100)</p>
Core Stability	<p>The core stability index is derived from overhead squat, reverse lunge, and posture angel assessments. Dysfunctions include: frontal plane tilt of the hip and shoulder axis.</p> <p>Very Poor (0-30), Poor (31-50), Moderate (51-70), Good (71-90), Great (91-100)</p>
Dynamic Posture	<p>The dynamic posture index is derived from the posture angel assessments. Dysfunctions include: forward head posture, shoulder axis tilt and rotation, and hip axis tilt and rotation.</p> <p>Very poor (0-30), Poor (31-50), Moderate (51-70), Good (71-90), Great (91-100)</p>
Lower Extremity Power	<p>The lower extremity power index is derived from the vertical jump assessments. Dysfunctions include: vertical jump heights and asymmetries.</p> <p>Very poor (0-30), Poor (31-50), Moderate (51-70), Good (71-90), Great (91-100)</p>
Functional Asymmetry	<p>The functional asymmetry index is derived from back flexion, back extension, overhead squat, reverse lunge, balance left, balance right, and posture angel assessments. Dysfunctions include: left and right asymmetries in back lateral flexion, maintaining arms overhead, and balance.</p> <p>Very poor (0-30), Poor (31-50), Moderate (51-70), Good (71-80), Great (81-100)</p>
Susceptibility to Injury	<p>The susceptibility to injury index is derived from back flexion, vertical jump, overhead squat, reverse lunge, and posture angel assessments. Dysfunctions include: reduced shoulder mobility, valgus knee collapse, vertical jump height asymmetry, and reduced back flexion.</p> <p>Very High (81-100), High (71-80), Moderate (51-70), Low (31-50), Very Low (0-30)</p>

Section 2: Active Aging Modules

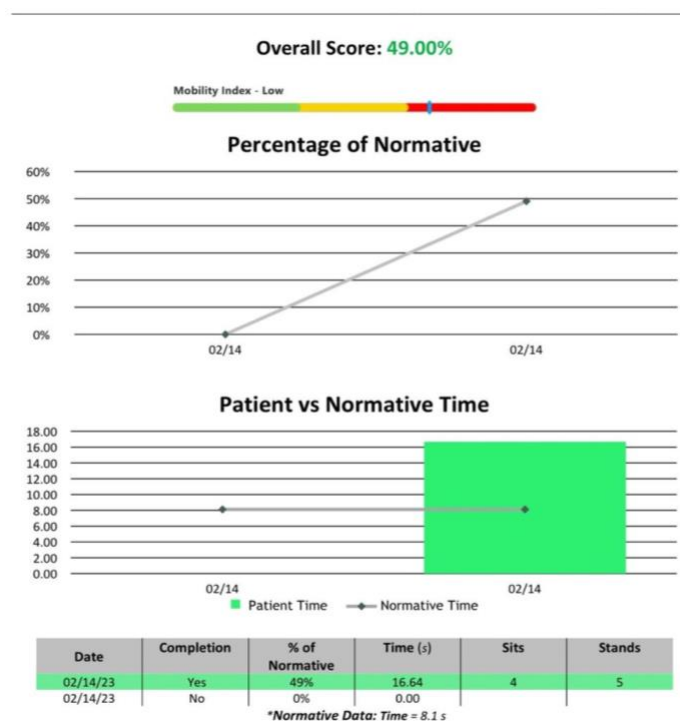
5 Times Sit to Stand

The 5 Times Sit to Stand is a simple way to assess lower extremity strength, mobility, balance and endurance in active aging adults. The module is designed to count the total stands within a period of time, then compare the results to normative values. This assessment can be used alongside other assessments to determine a patient's risk of fall.

Score and Report Interpretation:

The overall score for 5 x STS is based on 3 factors. The primary factor in getting a score for 5 x STS is the amount of time taken to complete the assessment, the second factor is age. We have compiled normative data from the age of 20+, each age range has a time value associated with it. The final factor is if the patient is able to complete 4 sits and 5 stands. Example a patient is 75 years old which has a normative data time of 10 sec. They completed 4 sits and 5 stands in 7.73 seconds which is under the normative ranges, they will automatically score 100%. If they take longer than the normative data for that age range their time taken to complete the assessment will be divided by their normative data. (12.46 sec (time taken to complete) the assessment/10sec (normative data) = overall score of 80%)

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)



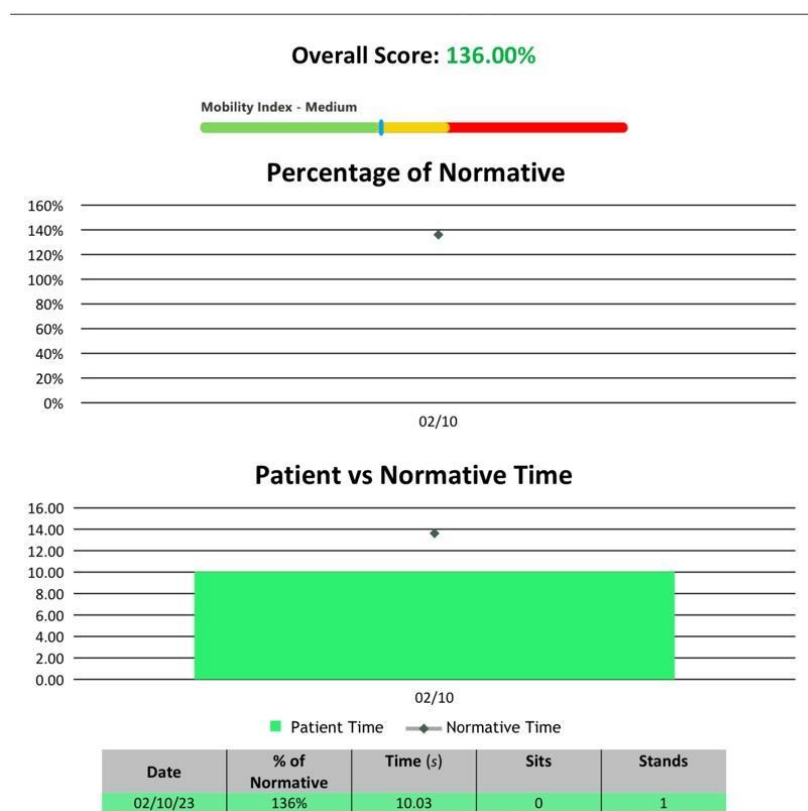
Timed Up And Go

The Timed Up And Go (TUG) assessment is a simple screening test that is a sensitive and a specific measure of probability for falls among older adults. The patient is to start seated in a chair approximately 17 ft from the camera sensor. They begin the test by standing from the chair, walk towards the camera sensor, then turn around and sit back down. A recent 2022 published study found that the TUG test is a strong mortality predictor displacing other established risk factors such as chronic diseases in geriatric populations of low and middle income countries.

Score and Report Interpretation:

TUG is a time and age based assessment. This means that there are validated normative values that determine the time it should take a patient to complete this assessment. The time value is dependent on a patient age, as a patient ages the time allowance increases.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)



Reference: Timed up and go test (TUG). Physiopedia. (n.d.). [https://www.physio-pedia.com/Timed_Up_and_Go_Test_\(TUG\)](https://www.physio-pedia.com/Timed_Up_and_Go_Test_(TUG))

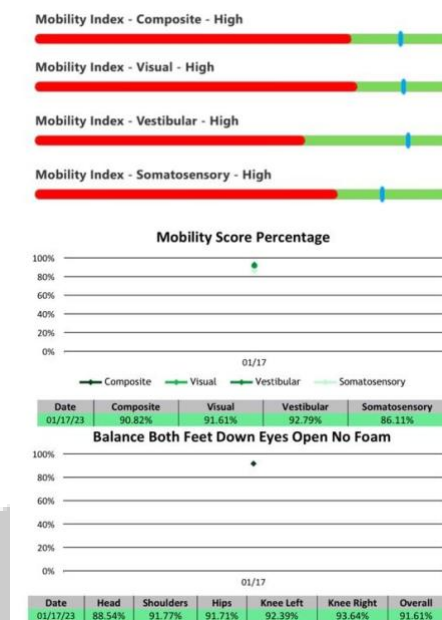
Modified Clinical Test of Sensory Interaction in Balance (MCTSIB)

The Modified Clinical Test of Sensory Interaction in Balance (MCTSIB) is a balance assessment specifically designed for older adults. This test is performed using sensory inputs when one or more sensory systems are compromised. There are four different sensory inputs investigated; composite, visual, vestibular and somatosensory. In condition one, all sensory systems (i.e., vision, somatosensory, and vestibular) are available for maintaining balance. In condition two, vision has been removed and the older adult must rely on the somatosensory and vestibular systems to balance. In condition three, the somatosensory system has been compromised and the older adults must use vision and the vestibular system to balance. In condition four, vision has been removed and the somatosensory system has been compromised. The older adults must not rely primarily on the vestibular inputs to balance.

Score and Report Interpretation:

There are 4 balance assessments in mCTSIB. Balance both feet down, eyes open with no foam, balance both feet down with eyes closed with no foam, balance both feet down, eyes open on foam and balance both feet down, eyes closed on foam. Each balance assessment has an overall score, which is composed of scores from 4 body segments including: head, shoulders, hips, and knees. Tilt and sway are monitored throughout the entire balance assessment. A score of 100% indicates zero tilt or sway was observed and lower scores indicate progressively more tilt and sway. A final overall score is created by taking an average of all 4 individual balance assessment scores. If an assessment is skipped, a score of 0 is recorded for the skipped assessment and the overall score is reduced accordingly. 4 mobility index sliders will be seen alongside the overall score, these take into account composite, visual, vestibular and somatosensory mobilities. Current research does not show a medium mobility range, meaning assessments yield either a high or low mobility result based on normative data ranges.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)



Reference: Wrisley, D., & Dannenbaum, E. (2013). Modified clinical test of sensory interaction on balance. Shirley Ryan AbilityLab. <https://www.sralab.org/rehabilitation-measures/modified-clinical-test-sensory-interaction-balance>

Risk of Fall Gait

Gait is defined as the manner or style of walking. By analyzing a patient's gait, we are able to gather information about their nervous system, musculoskeletal system and cardiovascular system. Each component of a patient's gait provides insight into a patient's risk of fall. Research has determined a correlation between a patient's gait speed and their likelihood of falling, as a person ages there is a gradual decrease in gait speed. Measuring this decline in gait speed allows researchers to determine general health and survival.

Falls are the leading cause of injury and death of older adults, over the age of 65 years old. One out of four older adults will fall each year in the United States, making falls a public health concern, particularly among the aging population. The Risk of Fall Gait module can be used in multiple different ways. Baseline testing patients over the age of 65 years of age will allow practitioners to track gait velocity over time. This module can be used to triage a patient to determine the level of assisted care they may need in a senior living facility. It can also be used to fit a patient with an assisted walking device such as a cane or walker. Considering many ototoxic medications can affect a patient's gait speed and balance, the Risk of Fall Gait module can objectively monitor this.

Score and Report Interpretation:

It has been reported that variations in gait parameters such as walking speed, stride length, and time spent in double-leg support are all associated with risk of falls in the geriatric population. The overall score for our Risk of Fall Gait is determined based on many parameters. The most important parameter is gait speed, each patient is compared against normative data for their gender and age range. Kinetisense also looks at stride length for both the left and right, gait velocity, compensatory patterns of the body such as shoulder axis tilt, hip axis tilt (Trendelenburg angle), center of mass tracing (COM) and sway.

Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)



References: Physiopedia. (2023, July 14) Gait, <http://index.php?title=Gait&oldid=338520>.

CDC. (2023, April 12). Older Adult Falls. Centers for Disease Control and Prevention. <https://www.cdc.gov/falls/index.html>

Kinetisense Advanced Movement Screen Independent Living (KAMS IL)

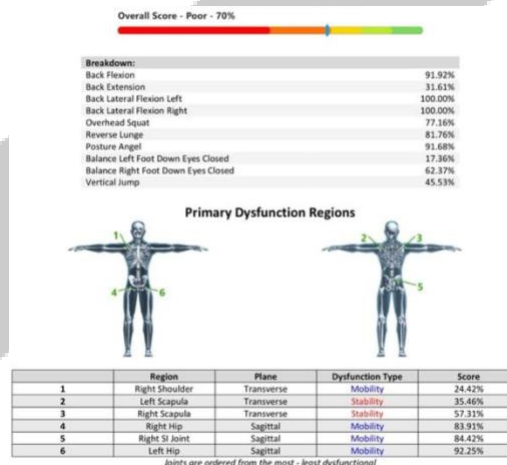
The Kinetisense Advanced Movement Screen Independent Living (KAMS IL) is an advanced movement assessment for high-functioning independent living (IL) aging adults. KAMS IL is a functional movement screen with eight specific movements chosen to gather data on compensatory movement patterns in aging adults. Although there are no age restrictions or requirements for this module, it's important to understand that some assessments in KAMS IL have been designed for aging adults, therefore some normative data will be compared against patients who are 65 years and older. This movement screen detects the top three joint dysfunctions of the upper body region and top three joint dysfunctions of the lower body region in three minutes. Each assessment has been chosen to identify movement pattern asymmetries and deficiencies by comparing the bodies compensatory factors between basic movement patterns required in daily activities. KAMS IL calculates joints that require the most amount of mobility and stability within the body.

Functional movement screening and injury detection are the main purpose of utilizing this module. There are a few avenues to implement KAMS IL into your practice or organization. This can be done by conducting a baseline KAMS IL analyzing the FPM results, indexes and individual movements (such as overhead squat). The user can then apply corrective strategies for the next 4-6 weeks to positively impact these results. Depending on the clinic or organization, one or all three avenues can be focused on. A follow up KAMS IL assessment 4-6 weeks post corrective strategies can be conducted to determine changes over time. Reports such as a KAMS IL report or FPM report can be used to track changes over time utilizing trend data.

Score and Report Interpretation:

KAMS IL captures over 250 possible joint dysfunctions. Joints that are mapped in Kinetisense are the cervical, thoracic and lumbar spine along with the sacroiliac, glenohumeral, hips, knee and ankle joints. The FPM tool creates a functional score card that outlines the individual's overall score, along with indexes for the following: balance, flexibility, core stability, dynamic posture, lower extremity power, functional asymmetry and susceptibility to injury. The FPM tool identifies the top three dysfunctions in the upper body and the top three dysfunctions in the lower body. It will identify if the dysfunction is a mobility or stability issue and what plane of movement it is occurring in. In the FPM report there is a section for the functionality of the joints ranging from 0% to 100%. 100% indicating the joint has no dysfunction and is highly functional, and vice versa. Functional indexes are also identified and can be tracked over time by generating an FPM report and selecting multiple assessments.

Each individual module scoring can be seen below





KAMS IL Scoring Breakdown

Assessment	Score Break Down
Overall	<p>The overall score is an average of all the assessment scores in the workflow (total score / # of assessments). Example $589/8 = 74\%$. If an assessment is skipped, a score of 0 is recorded for the skipped assessment and the overall score is reduced accordingly.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Flexion	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 90° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example $(74^\circ \text{ achieved} / 90^\circ \text{ AMA Guideline}) \times 100 = 82\%$</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Extension	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 25° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example $(22^\circ \text{ achieved} / 25^\circ \text{ AMA Guideline}) \times 100 = 88\%$</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Lateral Flexion Left	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 25° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example $(20^\circ \text{ achieved} / 25^\circ \text{ AMA Guideline}) \times 100 = 80\%$</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Back Lateral Flexion Right	<p>Range of Motion scores are based on AMA Guidelines. Any Range of Motion greater than the 25° threshold is considered 100%, any Range of Motion less than the guideline threshold is represented as a percentage of the guideline. Example $(18^\circ \text{ achieved} / 25^\circ \text{ AMA Guideline}) \times 100 = 72\%$</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
Posture Angel	<p>The overall score for the posture angel assessment focuses on 1 primary factor: external rotation at the shoulder joint. As</p>

	<p>with the other Range of Motion assessments, any Range of Motion greater than the 90° threshold is considered 100%, any range of motion less than the Guideline threshold is represented as a percentage of the Guideline. Example (88° achieved / 90° AMA Guideline) x 100 = 98%. There are 4 secondary factors that also contribute to the overall score including: head carriage, spinal extension, shoulder lateral tilt, and hip lateral tilt. Individual factor scores can be represented as “Yes/No” or as a percent. A score of 100% indicates zero deviation and lower scores represent progressively more deviation. The spinal extension factor is a selectable checkbox on the assessment scorecard. This is to be observed by the practitioner and selected if applicable.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
<p>mCTSIB - Balance Assessment</p>	<p>There are 4 balance assessments in mCTSIB. Balance both feet down, eyes open with no foam, balance both feet down with eyes closed with no foam, balance both feet down, eyes open on foam and balance both feet down, eyes closed on foam. Each balance assessment has an overall score, which is composed of scores from 4 body segments including: head, shoulders, hips, and knees. Tilt and sway are monitored throughout the entire balance assessment. A score of 100% indicates zero tilt or sway was observed and lower scores indicate progressively more tilt and sway.</p> <p>A final overall score is created by taking an average of all 4 individual balance assessment scores. If an assessment is skipped, a score of 0 is recorded for the skipped assessment and the overall score is reduced accordingly. 4 mobility index sliders will be seen alongside the overall score, these take into account composite, visual, vestibular and somatosensory mobilities. Current research does not show a medium mobility range, meaning assessments yield either a high or low mobility result based on normative data ranges.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
<p>Reverse Lunge</p>	<p>The overall score for the reverse lunge assessment is composed of 7 factors taking into consideration the upper and lower body. These factors include: ability to lunge and return to standing, reach kneeling position, knee valgus, knee over toe, shoulder-wrist inline, shoulder lateral tilt, and shoulder axis rotation. Individual scores all contribute to the overall score and can be found in the subjective notes following the assessment. Individual factor scores can be represented as</p>

	<p>“Yes/No” or as a percent. Scores are represented similar to overhead squat except for knee over toe and shoulder-wrist inline. For these 2 factors, a score of 0% indicates knees passed the toes or shoulders and wrists did not remain in line respectively.</p> <p>Very Poor (0-25), Poor (26-50), Moderate (51-75), Good (76-100)</p>
5 Times Sit to Stand	<p>The overall score for 5 x STS is based on 3 factors. The primary factor in getting a score for 5 x STS is the amount of time taken to complete the assessment, the second factor is age. We have compiled normative data from the age of 20+, each age range has a time value associated with it. The final factor is if the patient is able to complete 4 sits and 5 stands. Example a patient is 75 years old and has normative data time of 10 sec. They completed 4 sits and 5 stands in 7.73 seconds which is under the normative data, they will automatically score 100%. If they take longer than the normative data for that age range their time taken to complete the assessment will be divided by their normative data. (12.46 sec (time taken to complete) the assessment/10sec (normative data) = overall score of 80%)</p> <p>Poor (0-25), Moderate (26-50), Good (51-75), Great (76-100)</p>

KAMS IL Functional Planar Mapping & Movement Index

Index	Score Breakdown
Overall	<p>Every assessment in the workflow can identify specific joint dysfunctions. Combining all the assessments in the workflow, the 3 most prominent upper body and lower body dysfunctions are identified. Dysfunctions are classified as stability (red) or mobility (blue), stability/mobility (purple) and can be identified in the transverse (tp), sagittal (sp), or frontal (fp) planes. Identified dysfunctions are displayed on the human skeleton diagram.</p>
Balance	<p>The balance index is derived from the mCTSIB balance assessments. Dysfunctions include: head, shoulder, hip, knee, and ankle axis deviations.</p> <p>Very Poor (0-30), Poor (31-40), Moderate (41-60), Good (61-80), Great (81-100)</p>
Flexibility	<p>The flexibility index is derived from back flexion, back extension, lateral flexion left, lateral flexion right, reverse lunge, and posture angel assessments. Dysfunctions include:</p>

	<p>reduced back flexion and extension, reduced back lateral flexion left and right, inability to maintain arms in lunge, not reaching depth in lunge, reduced shoulder extension and external rotation, and low back hyperextension.</p> <p>Very poor (0-20), Poor (31-40), Moderate (41-60), Good (61-80), Great (81-100)</p>
Core Stability	<p>The core stability index is derived from reverse lunge, 5 x STS and posture angel assessments. Dysfunctions include: frontal plane tilt of the hip and shoulder axis.</p> <p>Very Poor (0-30), Poor (31-50), Moderate (51-70), Good (71-90), Great (91-100)</p>
Dynamic Posture	<p>The dynamic posture index is derived from the posture angel assessments. Dysfunctions include: forward head posture, shoulder axis tilt and rotation, and hip axis tilt and rotation.</p> <p>Very poor (0-30), Poor (31-50), Moderate (51-70), Good (71-90), Great (91-100)</p>
Lower Extremity Power	<p>The lower extremity power index is derived from the 5 x STS assessments. Dysfunctions include: not completing all 4 sits and 5 stands and taking longer than normative time for the age category.</p> <p>Very poor (0-30), Poor (31-50), Moderate (51-70), Good (71-90), Great (91-100)</p>
Functional Asymmetry	<p>The functional asymmetry index is derived from back flexion, back extension, reverse lunge, mCTSIB, posture angel assessments. Dysfunctions include: left and right asymmetries in the back lateral flexion, maintaining arms overhead and balance.</p> <p>Very poor (0-30), Poor (31-50), Moderate (51-70), Good (71-80), Great (81-100)</p>
Susceptibility to Injury	<p>The susceptibility to injury index is derived from back flexion, back extension, reverse lunge, and posture angel assessments. Dysfunctions include: reduced shoulder mobility, valgus knee collapse, vertical jump height asymmetry, and reduced back flexion.</p> <p>Very High (81-100), High (71-80), Moderate (51-70), Low (31-50), Very Low (0-30)</p>