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Integrated Tripartite Empowerment Model in Accelerating Literacy of Acute Injury Management Based on POLICE Protocols in Football Academies

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A B S T R A C T

This Community Service (PkM) activity aims to eliminate the health literacy gap and accelerate the psychomotor skills of the tripartite ecosystem (coaches, athletes, and parents) in football academies in injury management using contemporary protocols of RICE and POLICE. Interventions were carried out to 63 target partners (3 coaches, 30 youth athletes, and 30 parents) at Batu Football Academy (BAFA) through the Tripartite Synergy Program strategy which combines cyber-education methods, clinical workshops, and field emergency simulation assistance. This activity succeeded in triggering a significant surge in understanding in a circular manner. The coach's comprehension category increased from high (67%) to very high (100%). Athletes' comprehension jumped from medium (37%) to high (83%), and the parent group experienced the most massive literacy acceleration from low (33%) to high (77%).

INTRODUCTION

Modern football academies play a vital role in seeding talented talents from a young age through structured and competitive coaching programs. However, the demands of optimal performance in age-group tournaments linearly place adolescent athletes at a high volume and intensity of training loads. The characteristics of football involving explosive eccentric movements, sudden acceleration-deceleration, dynamic changes of direction (cutting movement), and high-density physical contact (body contact) trigger a significant risk of incidences of musculoskeletal injuries, such as sprains, strains, contusions, to the rupture of connective tissue. Epidemiological data show the area of the lower extremities (ankle and knee complex) to be the most dominant pathological locus in adolescent footballers.

Physiologically, the first 24 to 72 hours of treatment when macrotrauma occurs (acute inflammatory phase) is a crucial window of time (golden window) that determines the prognosis of an athlete's functional recovery. Mistreatment in this critical phase, such as massage therapy or deep tissue manipulation in the area of acute trauma, can exacerbate macro tears in muscle-tendon units, disrupt blood clotting cascades, and trigger severe internal bleeding (hematoma) that prolongs the athlete's disability.

For decades, the RICE (Rest, Ice, Compression, Elevation) protocol has been the gold standard for emergency handling. However, the modern sports medicine paradigm has transitioned towards the POLICE (Protection, Optimal Loading, Ice, Compression, Elevation) protocol. This change is based on clinical evidence that prolonged total immobilization (Rest) actually induces muscle atrophy, decreases sensorimotor capacity, and inhibits satellite cell regeneration. On the other hand, progressive functional loading (Optimal Loading) is able to stimulate cellular mechanotransduction that accelerates the rearrangement of collagen in injured connective tissue.

Based on the analysis of the situation in the football academy ecosystem, a fundamental structural phenomenon was found: the existence of a chain of injury management that is interrupted due to the health literacy gap. Coaching teams generally have a basic theoretical understanding, but athletes often hide the pain (injury concealment) for fear of losing playing minutes or being eliminated from the main squad. On the other hand, parents at home tend to apply traditional non-medical medicine based on sociocultural myths that are contraindicated with the clinical principles of sports medicine. This literacy inequality is the main predictor of reinjury that threatens the sustainability of young athletes' careers.

Main Novelty of the Program:

In contrast to conventional injury education programs which are generally partial or only target one subject, this PkM program initiates the Integrated Tripartite Empowerment Model. This integrated circular approach brings together Coaches (as field authorities), Athletes (as primary subjects), and Parents (as domestic recovery facilitators) into a single literacy frequency based on RICE and POLICE interventions holistically. This strategic step aims to create a safe, sustainable, and evidence-based talent protection ecosystem in football academies.

IMPLEMENTATION AND METHODS

This service activity was carried out in the football academy environment (Batu Football Academy) by involving all elements of the ecosystem totaling 63 participants (3 coaches, 30 adolescent athletes, and 30 parents). The approach used adopts the Tripartite Synergy Program model which is divided into three structured linear stages (Figure 1).

Figure 1. Implementation Flow of the Tripartite Injury Management Empowerment Program

Methodologically, the operational reconstruction of the program is designed in a linear-circular manner that is divided into four strategic stages to ensure the sustainability of the impact of clinical interventions (Figure 1). These stages are systematically described as follows:

1. Preparation and Planning Stage (Phase 1)
   The initiation phase begins with the formal identification of the target partner ecosystem, the signing of an understanding (MoU) with the management of the football academy, and the recruitment of participants. At this stage, the team designed a curriculum for contemporary injury management materials and prepared a digital questionnaire evaluation instrument that was validated by sports medicine experts and health promotion experts. The socialization of the program was carried out online and offline to equalize the initial perception of the urgency of standardizing athlete safety.
2. Initial Analysis / Pre-test Stage (Phase 2)
   Before clinical intervention is given, an objective assessment is carried out to map the baseline data of the initial level of understanding of all target partners using a digital questionnaire via Google Forms. This assessment is specifically designed to detect the depth of basic theoretical knowledge as well as identify the prevalence of sociocultural misconceptions (such as tissue manipulation habits or acute massage massage) and injury concealment cultures that exist in the internal environment of the academy. The raw scores obtained are then converted into the interval of Azwar's standard academic categorization norms.

3. Program Intervention Stage:
   Synergy of the Four Tripartite Pillars (Phase 3) The core phase of implementation focuses on structured interventions by dividing goals into strategic pillars to simultaneously close the health literacy gap:
   1. Trainer Pillar: The intervention was directed at clinical assistance to design a neuromuscular-based *injury prevention warm-up* program, as well as a procedure for determining controlled *Optimal Loading* to stimulate the tissue healing cascade in the sub-acute phase.
   2. Athlete Pillar: The focus of education uses *cyber-education* and interactive multimedia methods to instill an understanding of *body awareness*. Athletes are trained to reconstruct the perception of pain as a protective nociceptive signal, so that they are able to resist the culture of *injury concealment* for the long-term safety of their sports careers.
   3. Parent/Family Pillar: Implementation in the form of psychomotor workshops (*clinical workshops*) for domestic handling of minor injuries. Parents are trained directly to practice *intermittent application of ice therapy*, compression techniques using *elastic bandages* to reduce the formation of hematoma and edema, and proper fixation arrangement.
4. *Post-test* and Impact Evaluation Stage (Stage 4)
   The service activity ended with a circular impact evaluation through the distribution of post-intervention questionnaires. The quantitative data obtained were analyzed in a comparative descriptive manner to measure the total gain *of* the partner's clinical understanding. This final stage also produced an output document in the form of the preparation of a draft Standard Operating Procedure (SOP) for integrated injury risk mitigation as *a feedback instrument* for the sustainability of independent health management in the football academy environment

RESULTS AND DISCUSSION

Presentation of Data on Changes in Partner Understanding

The implementation of the service program that takes place in an intensive and structured manner through the Integrated Tripartite Empowerment Model has proven to be successful in significantly transforming the knowledge landscape and health literacy of target partners. To measure the degree of change in understanding objectively, evaluation was carried out through circular comparative analysis between the pre-intervention (Pre-test) and post-intervention (Post-test) phases. Before the empirical data of the intervention results are presented, the standardization of the assessment is first determined through the standardized score normalization formula of academic norms as described in Table 1.

Table 1. Academic Categorization Norms Comprehension Level Score

Normalization Formula	Qualitative Classification	Parameter Description
X > M + 1,5SD	Very High	Score above the upper limit
M + 0,5SD < X ≤ M + 1,5SD	Height	Medium upper limit score
M - 0,5SD ≤ X ≤ M + 0,5SD	Medium	Score around average
M - 1,5SD ≤ X < M - 0,5SD	Low	Medium lower limit score
X < M - 1,5SD	Very Low	Score below the lower limit

Adapted from Azwar (2010).

Note: X = individual actual score; M = mean (average) theoretical ideal; SD = the theoretical ideal standard deviation.

Based on the categorization parameters in Table 1, the cumulative distribution of the frequency of changes in the level of injury management literacy from the three target partner groups (coaches, athletes, and parents) is presented in an integrated manner through the *standard Three-Line Table* format of the scientific journal in Table 2 below.

Table 2. Frequency Distribution Matrix of Pre-test and Post-test Results Based on Tripartite Groups

Partner Group	Evaluation Stage	Very High	Height	Medium	Low	Total (n)
1. Trainer	*Pre-test*	0	2	1	0	3
	Post-test	3	0	0	0	3
2. Athletes	*Pre-test*	3	4	17	6	30
	Post-test	12	13	5	0	30
3. Parents	*Pre-test*	2	9	11	8	30
	Post-test	8	15	7	0	30

Note: The data is presented in pure frequency form (f). The "Very Low" column is eliminated because it has a frequency value of zero (0) for the entire group.

Although the pure frequency distribution in Table 2 has shown a migration of subjects from the low/medium category to the high/very high category, more dynamic data visualization is needed to map literacy acceleration in a circular manner. The transformation of the data from absolute numbers to cumulative percentage values aims to highlight the growth rate (*total gain*) of understanding in each tripartite cluster comparatively. This data reduction focuses on the merging of two highest performance standards (the "High" and "Very High" Categories) as the main indicators of the success of the minimum clinical understanding thresholds that partners in the field must have.

To emphasize the significance of the real impact as well as the fluctuations of the cumulative percentage spike of ecosystem empowerment, the combined understanding acceleration profile is visually projected through the graph in the following Figure 2:

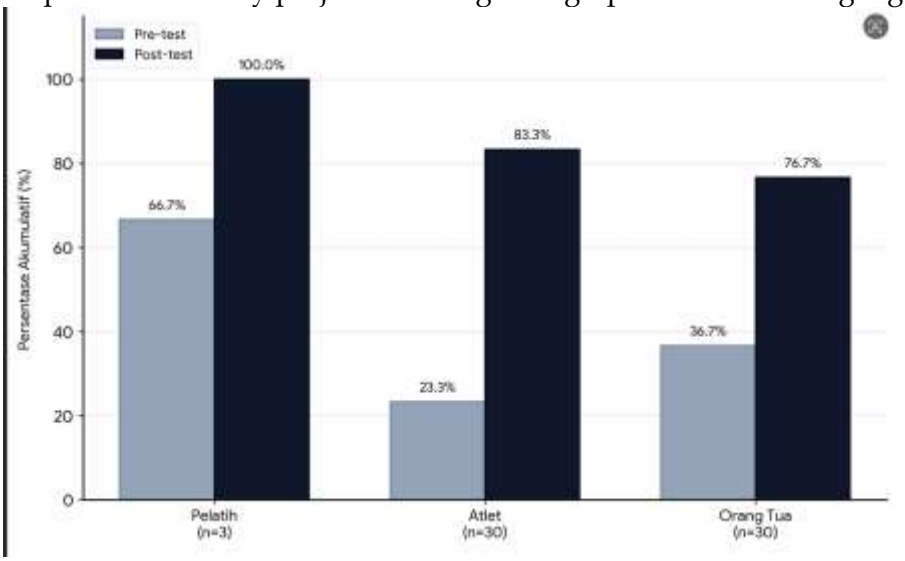

Figure 2. Target Partner's "High" & "Very High" Combined Comprehension Acceleration Profile

The theoretical spike projected in Figure 2 is not simply a shift in numbers on paper, but rather a tangible manifestation of the effectiveness of internalizing the material during a clinical intervention. The success of this paradigm reconstruction is driven by delivery methods that are not only centered on unidirectional knowledge transfer, but also through an applicative, interactive, and *problem-based learning approach*. The atmosphere of the program implementation, the dynamics of circular interaction, and the high enthusiasm of all elements of the target partners during the intervention are summarized in Figure 3.

Figure 3. Documentation of the Tripartite Empowerment Model Activity Series

All portraits of field dynamics recorded in Figure 3 confirm that the success of massively increasing post-test scores is supported by the high level of active *engagement* and the effectiveness of the andragogy approach applied during the service program. The transformation of the quantitative data and visual evidence that has been presented in this sub-chapter of results does not stand alone, but rather requires an in-depth theoretical and clinical reconstruction to understand the mechanisms of behavior change in BAFA's tripartite ecosystem.

Therefore, these empirical findings are further comprehensively dissected in the discussion section below. The analysis focused on three main pillars, namely: the upgrading of the clinical capacity of coaches, the deconstruction of psycho-cultural barriers in athletes, and the reconstruction of *evidence-based injury management behaviors* in the domestic environment by people tua.

Transformation of the Clinical Capacity of Sports Coaches

In the initial condition, the coaching team had a relatively good modality of knowledge (67%). This is a positive impact of the formal education background of the majority of coaches in the sports science cluster as well as the possession of official coaching licenses. The assistance provided by the PkM team is focused on *updating* the paradigm from conventional static injury prevention methods towards neuromuscular-based structured dynamic warm-up protocols, such as FIFA 11+ Kids. Biomechanically, this intervention stimulates dynamic joint stability, improves motor coordination patterns, and has been shown to reduce the risk of non-contact injury by half.

Through clinical workshops, the capacity of trainers was successfully accelerated to reach 100% in the Very High category. A crucial aspect that the trainer managed to master was the understanding of micro-level tissue healing pathophysiology, where the application of early functional load gradually (*Optimal Loading*) is much superior to rigid immobilization (*Rest*). The controlled mechanical stress administered during recovery exercises stimulates the expression of ribonucleic acid (mRNA) for the production of type I collagen (the main structural component of tendons and ligaments), thereby preventing the formation of stiff scar tissue that is prone to secondary injury.

Increasing Independence and Deconstructing Injury Concealment Culture in Adolescent Athletes

Prior to the intervention, the literacy level of athletes was in the low to moderate distribution (57% in the medium category). This low number is strongly correlated with the phenomenon of *injury concealment* (hiding injuries) that is common in youth footballers at the competitive academy level. Athletes tend to hide the pain from the coach in order to keep playing minutes or due to psychological pressure for fear of losing the starting position in the team. This phenomenon is particularly destructive for adolescent age groups, considering that their growth plates (*epiphyseal plates*) are still in the final consolidation phase. Overloading the injured tissue risks triggering long-term chronic biomechanical dysfunction.

Intervention through *cyber-education has* succeeded in boosting athletes' literacy to the High category (83%). The focus of education is directed at the formation of *body awareness* and pain management. Athletes are trained to understand that pain is a protective nociceptive signal from the central nervous system that signals the presence of structural damage to the tissue. With this deconstruction of mindset, athletes no longer view injury reporting as a mental weakness, but rather an emergency clinical action (*Rest* and *Ice*) that must be taken in order to save their future football careers.

A Reconstruction of Parental Behavior: From Traditional Myths to Evidence-Based Medicine

The parent group recorded the most critical initial profile with a low category understanding rate of 33%. Parents in the academy environment remain vulnerable to sociocultural misconceptions regarding the handling of self-inflicted physical injuries. Acute musculoskeletal injuries are often treated directly with the deep *tissue massage method*. Clinically-physiologically, crude mechanical manipulation in the acute inflammatory phase (0–72 hours) is a severe malpractice that damages the capillary structure of the blood that is trying to coagulate, expands the area of the hematoma (internal bleeding), increases interstitial hydrostatic pressure, and triggers *myositis ossificans* (the formation of abnormal bone tissue within the muscle).

Through clinical workshops, the service team succeeded in shifting parents' understanding to the High category (77%). Parents are psychomotorically trained to master the POLICE protocol:

a. Protection: Perform self-fixation using *a simple splint* or *tapping* to prevent secondary injury at home.
b. Optimal Loading: Understand the limits of children's daily activities at home so as not to trigger excessive mechanical stress on the tissue that is undergoing *remodeling*.
c. Ice: Apply ice therapy with intermittent duration (15–20 minutes every 2 hours) to induce vasoconstriction, lowering the rate of cellular metabolism to prevent *secondary hypoxic injury*.
d. Compression: Practice the compressive bandage technique using *elastic bandage* from the distal to the proximal direction to reduce edema (swelling).
e. Elevation: Position the injured leg 15–20 cm above the level of the heart to facilitate venous return (*venous return*).

This restructuring of parental knowledge breaks the chain of mismanagement. The success of the coach-initiated field management is now linearly supported by *evidence-based care* in the domestic environment, creating a safe and supportive tripartite ecosystem for the development of athlete talent in football academies.

CONCLUSIONS AND RECOMMENDATIONS

This community service activity has succeeded in solving the root problem of the gap in sports health literacy in football academies in a complete and circular manner. Integrated interventions through the Integrated Tripartite Empowerment Model were able to significantly boost the understanding of RICE-POLICE-based sports injury management on all elements: coaches achieved competency perfection (100%), athletes transformed into independent preventive agents (83%), and parents were successfully evacuated from the shackles of traditional medicine misconceptions towards appropriate domestic clinical care (77%). This solid tripartite synergy is recommended to be adopted by the management of other football academies as a standard model for standardizing the safety and asset protection of future Indonesian football athletes.

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