FAST BREAK

Publication for team medical personnel

March 2024

ISSUE 14

WELCOME to FAST BREAK!

Welcome to Fast Break, the official quarterly news bulletin of the FIBA Medical Commission. Our goal is to introduce our FIBA sports medicine and sports science community to newsworthy research topics and develop a community of practice among physicians and clinicians involved with basketball at every level of play across the globe.

We hope this publication will foster friendly communication and discussions within the world of basketball. We welcome and encourage your questions, comments, suggestions, and contributions to this publication.

MESSAGE FROM THE EDITOR

While I was sequestered for 2 months in a training facility with the Canadian national team prior to the Tokyo Olympics, we had a referee join our bubble to assist the teams' preparation for the Games. She was dismayed that she would be unable to leave the COVID-training bubble to go outside to run. She explained that she had referee fitness testing coming up soon and she needed to be able to continue her fitness routine. I thought this was just an excuse to be able to leave the bubble, as confinement in COVID- bubble is emotionally and physically challenging.

Online resources suggest that basketball officials can expend around 500 calories/hour officiating a game. It was not until I started to work with the FIBA Medical Commission that I learned of the fitness expectations and standards that are required of the games' officials. Considering the physicality of the game, it makes sense that there is an expectation and standard for the officials to keep pace with the play. The first publication of interest attests to this requirement for the game and suggested to me that one of the future thematic issue of the Fast Break may need to focus on the medial issues pertinent to the officials in the game of basketball.

Marni Wesner, MD, MA, CCFP(SEM), FCFP, Dip Sport Med
Editor, Fast Break
Email: medical@FIBA.basketball

IN THIS ISSUE

SELECTED PUBLICATIONS OF INTEREST

Do you even exercise, ref? Exploring habits of Spanish basketball referees during practice and matches.

Suarez-Iglesias D, Gonzalez-Devesa D, Ayan C, Sanchez-Sixto A, Vaquera A. PeerJ. 12:e16742, 2024.

BACKGROUND: Basketball referees are a vital part of the organised competition system, although they remain an "outgroup" in sport. While physical development and fitness programming are deemed necessary for basketball officiating excellence, there is a paucity of literature exploring strategies for physical fitness management in this population. METHODS: This research was a nationwide cross-sectional, self-administered online survey conducted in 2021. A sample of 628 (531 males, 97 females) referees from 18 regional referee organisations in Spain provided individual responses to gather information on demographic details, level of participation in refereeing, physical fitness practices, and match-day exercise-based regimens. The data were described using summary statistics, and the associations of the assessed variables were subsequently calculated using contingency tables. RESULTS: Our findings reveal that a large fraction of the Spanish basketball referee population focuses on aerobic (83%) and strength (73.6%) activities, while less attention is paid to speed (36.9%) and flexibility (23.2%), and agility, coordination, and balance tasks are somewhat overlooked. No significant differences were observed among the referee categories regarding weekly training days or session duration, with most training for 15-60 min per session. Elite referees were more likely to hire personal trainers and engage in strength and flexibility exercises. Sub-elite referees showed a higher tendency to perform stretching and joint mobility activities post-match, while regional referees did so less frequently. Approximately 30.7% of referees across all competitive levels engaged in re-warm-up (RW-U) activities, with stretching and joint mobility being the most prevalent. CONCLUSIONS: Spanish basketball referees participate in routine physical exercise and fitness practices, irrespective of their competition level. While warm-up activities are prevalent, some sub-elite and regional referees do not consistently perform them, and re-warm-up routines are not extensively embraced.

The role of peripheral vision during decision-making in dynamic viewing sequences.

DeCouto BS, Fawver B, Thomas JL, Williams AM, Vater C. Journal of Sports Sciences. 41(20):1852-1867, 2023 Oct.
https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1080/02640

Decision-making in team sports necessitates monitoring multiple performers located at different distances (i.e., viewing eccentricities) from a critical information source. The processing of peripheral information is generally impaired under anxiety and when responding to stimuli located at larger eccentricities. These hypotheses have not been sufficiently tested in dynamic performance environments. We examined how pressure and eccentricities affect decision-making and visual behaviour in 4v4 basketball defensive scenarios using a head mounted display. Experienced players monitored plays from the first-person perspective (centre position) and made defensive steps towards opponents threatening the basket from different eccentricities under low- and high-pressure. To tax working memory, participants simultaneously performed a backward counting task. Players responded slower and with lower accuracy to opponents at larger eccentricities. Players mostly fixated on the ball-carrier, but over 50% of fixations were located on peripheral players, indicating that information in the periphery must be frequently

updated with foveal vision (i.e., pivot strategy). When pressured, participants increased mental effort and improved counting performance; however, gaze behaviour and decision-making were relatively unaffected. Findings suggest that basketball players respond more quickly to opponents positioned at lower compared to higher eccentricities at the cost of impaired responses to opponents in the periphery.

Quality of lean body mass and jump capacity in high performance young basketball players lean body mass and jump capacity.

Correas-Gomez L, Benitez-Flores S, Calleja-Gonzalez J, Carnero EA. Journal of Sports Sciences. 41(18):1667-1677, 2023 Sep.

https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1080/02640

The lean body mass (LBM) components have been suggested as important predictors of anaerobic performance, which is highly involved in basketball. We explored with descriptive cross-sectional design the relationship between anaerobic performance and full molecular and cellular body composition profile in young male basketball players. Twenty-one players (age = 16.8 +/- 1.6 years; body mass = 76.3 +/- 15.7 kg, height = 189.3 +/- 12.6 cm) were recruited, 11 elite and 10 local level. Participants were evaluated on multicomponent body composition [LBM, appendicular lean soft tissue (ALST), bone mineral content (BMC), total body water (TBW), intracellular water (ICW) and extracellular water (ECW)] and field-based anaerobic performance (vertical jump, linear sprint, and handgrip strength). The stepwise regression analyses adjusted for confounders showed significant relationships of whole-body and regional body composition components with handgrip and jump performance ($P <= 0.03$). Prediction models combining body composition variables assessed by bioimpedance analysis (BIA) and double-energy X-ray absorptiometry (DXA) revealed that lean mass and hydration ratios (ICW/ECW and ECW/TBW) were strongly associated with jump performance (CMJ and CMJ25kg), independently of the competition level ($P < 0.01$). The novel finding in this study was that water quality (ICW/ECW) and water distribution (ECW/TBW, ICW) of total and regional LBM were the main predictors of vertical jump capacity in young basketball players.

Viewing angle, skill level and task representativeness affect response times in basketball defence.

Vater C. Scientific Reports. 14(1):3337, 2024 02 09.

https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1038/s4159

In basketball defence, it is impossible to keep track of all players without peripheral vision. This is the first study to investigate peripheral vision usage in an experimentally controlled setup, with sport-specific basketball stimuli from a first-person perspective, large viewing eccentricities (up to 90degree to the left and right), and natural action responses. A CAVE and a motion-tracking system was used to project the scenarios and capture movement responses of high- and low-skilled basketball players, respectively. Four video conditions were created: (1) a simple reaction time task without crowding (only attackers), (2) a simple reaction time task with crowding (with attackers and defenders), (3) a choice-reaction time task where the player cutting to the basket eventually passed the ball to another player and (4) a game simulation. The results indicated eccentricity effects in all tests, a crowding effect in condition 2, and expertise differences in conditions 3 and 4 only. These findings suggest that viewing eccentricity has an impact on response times, that crowding is a limiting factor for peripheral perception in sports games, and

that high-skilled but not low-skilled players can compensate for eccentricity effects in real game situations, indicating their superior positioning and perceptual strategies.

Basketball specific agility: A narrative review of execution plans and implementation effects.

Li W, Liu Y, Deng J, Wang T. Medicine. 103(6):e37124, 2024 Feb 09.
https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1097/MD.00

This systematic review and evaluation aim to comprehensively overview current international advanced basketball specialized agility training methods. The primary objective is to analyze and synthesize existing literature, offering insights and guidance to enhance agility training levels specifically tailored for basketball players. Methods involved a systematic literature search using keywords like "Basketball," "Agility," and "Training" in major databases (PubMed, Web of Science, and EBSCO), covering studies from 2010 to 2022. Inclusion criteria focused on studies addressing advanced agility training methods for basketball players. Data extraction and analysis were conducted to identify key trends and outcomes. A total of 563 articles were initially identified, and after reviewing titles, abstracts, and full texts, 20 articles were ultimately selected, excluding those with inconsistent outcome measures or unavailable full texts. The findings suggest that plyometric training, comprehensive speed training, and equipment-assisted training methods (SSG, TRX, Bulgarian ball, etc) have demonstrated effectiveness in improving agility indicators in basketball players.

Practice reduces the costs of producing head fakes in basketball.

Boer NT, Weigelt M, Schutz C, Guldenpenning I. Psychological Research. 88(2):523-534, 2024 Mar.
https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1007/s0042

Previous research indicates that performing passes with a head fake in basketball leads to increased response initiation times and errors as compared to performing a pass without a head fake. These so-called fake production costs only occurred when not given the time to mentally prepare the deceptive movement. In the current study, we investigated if extensive practice could reduce the cognitive costs of producing a pass with head fake. Twenty-four basketball novices participated in an experiment on five consecutive days. A visual cue prompted participants to play a pass with or without a head fake either to the left or right side. The cued action had to be executed after an interstimulus interval (ISI) of either 0 ms, 400 ms, 800 ms or 1200 ms, allowing for different movement preparation times. Results indicated higher response initiation times (ITs) and error rates (ERs) for passes with head fakes for the short preparation intervals (ISI 0 ms and 400 ms) on the first day but no difference for the longer preparation intervals (ISI 800 ms and 1200 ms). After only one day of practice, participants showed reduced fake production costs (for ISI 0 ms) and were even able to eliminate these cognitive costs when given time to mentally prepare the movement (for ISI 400 ms). Accordingly, physical practice can reduce the cognitive costs associated with head-fake generation. This finding is discussed against the background of the strengthening of stimulus response associations.

The role of the six factors model of athletic mental energy in mediating athletes' well-being in competitive sports.

Singh A, Kaur Arora M, Boruah B.Scientific Reports. 14(1):2974, 2024 02 05.
https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1038/s4159

In the realm of high-performance sports, athletes often prioritize success at the expense of their well-being. Consequently, sports psychology researchers are now focusing on creating psychological profiles for athletes that can forecast their performance while safeguarding their overall well-being. A recent development in this field is the concept of athletic mental energy (AME), which has been associated with both sporting success and positive emotions. Therefore, the aim of this study was to explore if AME in athletes can mediate this directly observed relationship between performance and psychological well-being. For stronger predictive validity these relationships were examined across two studies with each involving distinct sets of participants engaged in various sports disciplines, including football, cricket, basketball, archery, and more. The self-report measures of sports performance, athletic mental energy (AME), and psychological well-being (PWB) were administered post-competition on the local, regional, state, national, international, and professional level athletes of age 18 and above. Our study found that both, the affective and cognitive components of AME mediated the athletes' performance and psychological well-being relationship. Interestingly, the study found no significant gender differences in AME and PWB scores. While family structures didn't yield significant variations in AME scores, there were some descriptive distinctions in PWB scores across different family structures. Our research offers preliminary evidence suggesting that AME can play a pivotal role in preserving athletes' psychological well-being following competitive events.

Kinematic analysis of the basketball jump shot with increasing shooting distance: comparison between experienced and non-experienced players.

Caseiro A, Franca C, Faro A, Branquinho Gomes B. Acta of Bioengineering & Biomechanics. 25(2):61-67, 2023.

PURPOSE: Basketball jump shot success is determined mainly by the height, velocity and angle of ball release. To achieve a successful shot, these variables need to be adjusted according to the player's position on the court. This study aimed to identify the changes in kinematics variables of the basketball jump shot with an increasing shooting distance performed by players with varying skill levels. METHODS: Seventeen male subjects, divided into experienced (N = 9), and non-experienced (N = 8) players, performed three successful jump shots from the free-throw line (4.23 m) and the 3-point line (6.75 m). All attempts were recorded at 120 Hz with a camera perpendicularly to the sagittal plane, and the kinematics variables were calculated using Tracker software. RESULTS: The increase in shooting distance shows a decrease in height and angle of ball release. In contrast, the velocity of ball release increased for both groups at longer distances. Experienced players presented a higher mean value of the height of ball release in both distances, which allowed for a lower velocity of ball release. CONCLUSIONS: The most meaningful improvement for players training the jump shot technique is to increase the release height of the ball, jumping higher and shooting the ball near the peak of the jump.

Effectiveness of a specific strength program of the gluteus maximus muscle to improve dynamic postural control in female basketball players. A randomized controlled trial.

Sanchez-Morales S, Gutierrez-Martin B, Ibanez-Vera AJ, Rodriguez-Almagro D, Pecos-Martin D, Achalandabaso-Ochoa A

Gait & Posture. 108:90-96, 2024 Feb.
https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1016/j.gai.

BACKGROUND: Basketball is a team sport in which players perform multidirectional movements, jumps and landings, experiencing abrupt accelerations and decelerations and numerous changes of rhythm. In this sport, speed and intensity are two key factors that are associated with an increased risk of injury. The aim of this randomized controlled trial was to determine the effectiveness of a specific gluteus maximus strength programme as preventive work for young female basketball players, to improve dynamic postural stability and to observe its impact in the rate of lower limb injuries, vertical jump, dynamic knee valgus and pain. RESEARCH QUESTION: Is effective a strength programme to improve dynamic postural stability, vertical jump and dynamic valgus in female basketball players? METHODS: A hundred and thirteen female basketball players that play in professional clubs were recruited, reaching the final stage 92 (46 per group). One group (CG) received conventional injury prevention training while the experimental group (EG) added to the conventional team prevention program, a gluteus maximus strength programme of 5 months composed of 4 exercises/2 days per week/2 sets of 10 repetitions per leg. RESULTS: The total injury incidence decreased from 0.33 to 0.16 cases (control group pre=0.43 to post=0.14 cases, EG pre=022 to post=0.19). The EG improved overall ($p = 0.000$), posterior ($p = 0.001$), posteromedial ($p = 0.001$) and posterolateral ($p = 0.000$) dynamic stability of the right leg; anterior ($p = 0.024$), medial ($p = 0.07$) and posteromedial ($p = 0.01$) of the left leg. Both groups improved vertical jump (GC: $p = 0.045$ and GE: $p = 0.000$). There was no significant improvement in pain or valgus. SIGNIFICANCE: This strength programme is effective in improving dynamic stability especially of the dominant leg and jump height.

The Relationship Between Mental Fatigue and Shooting Performance Over the Course of a National Collegiate Athletic Association Division I Basketball Season.

Daub BD, McLean BD, Heishman AD, Peak KM, Coutts AJ. Journal of Strength & Conditioning Research. 38(2):334-341, 2024 Feb 01.

https://dx-doi-org.login.ezproxy.library.ualberta.ca/10.1519/JSC.0

ABSTRACT: Daub, BD, McLean, BD, Heishman, AD, Peak, KM, and Coutts, AJ. The relationship between mental fatigue and shooting performance over the course of a National Collegiate Athletic Association Division I basketball season. J Strength Cond Res 38(2): 334-341, 2024-The aim of this investigation was to examine the presence of mental fatigue and concurrent changes in shooting performance across various experimental weeks throughout a National Collegiate Athletic Association (NCAA) basketball season. Fifteen elite male NCAA Division I collegiate basketball players (age 20.2 +/- 1.2 years, height 199.3 +/- 7.1 cm, and body mass 93.1 +/- 8.6 kg) volunteered for this study. Mental fatigue and basketball shooting performance was evaluated at 4 timepoints with varying seasonal demands: high game volume (GAME), high academic load (ACADEMIC), no games and no academic load (PRACTICE), and standard number of games and academic requirements (TYPICAL). Subjective mental fatigue increased significantly ($p <= 0.05$) from Pre to Post brief psychomotor vigilance test (PVT-B) measurements at the end of the ACADEMIC week ($p = 0.002$, $d = 1.51$) and from beginning to end of the ACADEMIC week ($p < 0.001$, $d = 2.21$). Ratings of mental effort were significantly increased during the ACADEMIC week ($p < 0.001$, $d = 1.67$). Recovery stress questionnaire (REST-Q) showed significant differences between week GAME and ACADEMIC with an increase in Social Stress ($p = 0.001$, $d = 0.84$), Fatigue ($p = 0.021$, $d = 1.12$), Disturbed Breaks ($p = 0.024$, $d = 0.57$), and Emotional Exhaustion ($p = 0.035$, $d = 0.75$). Lower shooting performance was observed during the ACADEMIC week from Pre to Post ($p = 0.009$, $d = 0.35$) and higher scores Pre to Post in the TYPICAL week ($p = 0.008$, $d = 0.25$). Basketball shooting performance was significantly reduced after increased levels of mental fatigue stemming from added academic stress. In addition, an increase in sport-specific training or games had no effect on subsequent basketball shooting performance. Special consideration should be given by coaches around examination periods because the existence of academic stressors can influence basketball shooting performance.

LET'S CHAT ABOUT…

Let us know what is on your mind, what you want to chat about in the next issue of the Fast Break.

E-mail: medical@FIBA.basketball

'Kia ora' all the way from New Zealand!

My name is Shawn Stewart and I have recently begun a new role at Basketball New Zealand (BBNZ) as the Performance and Prevention lead. The purpose of the role is to reduce the risk, incidence, and severity of injury in basketball for New Zealand. The Accident Compensation Corporation (ACC) in New Zealand have partnered with BBNZ to support this work.

Within NZ the Accident Compensation Corporation (ACC) provides cover for rehabilitation and treatment to everyone in NZ based on a no-fault scheme if the injury is the result of an accident. This gives New Zealand a rich source of injury data which supports how the ACC can target where to focus injury prevention – such as sports. Injury prevention tools are also provided by ACC in partnership with sporting organisations such as SportSmart (based on FIFA11+) to produce performance and injury prevention programmes delivered to coaches and participants.

I thought it would be of interest to share what we are doing in New Zealand with regards to injury prevention in Basketball. This role is new and there is plenty of work to be done. A key intervention we are looking to implement is a universal/common neuromuscular warm up for basketball. In 2024 we look to use a holistic approach to injury prevention and wellbeing. Other sports in New Zealand have implemented this successfully, albeit delivered differently.

This is a snapshot of what we are doing in New Zealand to improve the basketball experience for all. I would love to learn more from FIBA medical people. If you have ideas or comments to share, please reach out to me (shawn@nz.basketball).

FROM THE HISTORY BOOK

When James Naismith's students played the first games of basketball in 1891, they did so with a soccer ball. Looking to create something with better bounce, Mr. Naismith turned to the famed baseball manufacturer A. G. Spalding who created the first basketball in 1894. It was made of a rubber bladder covered in leather that was hand-embossed to improve the grip over the surface of the ball. This new invention had more bounce and fostered the concept of dribbling in basketball.

(Source: Wikipedia)

SHARE YOUR PHOTOS

Please send us your funny, interesting, or remarkable basketball pictures that we can share with the medical and sport science basketball community.

Email: medical@FIBA.basketball

This is an edited photo so as not to imply bias in this publication, but I wanted to highlight the thoughtfulness that FIBA and tournament organizing committees put into events.

I suspect that whether you are on the sidelines with the team or watching from the stands or on TV at home, no one stops to think about all the little details that go into successful FIBA events. This photo of the 'ticket' to the Paris Olympic games basketball tournament symbolized – in a small way – the thanks we must give to the FIBA events organizing committees.

THE STUDENT'S CORNER

This space is intended for sport science and medical students, residents, and fellows to contribute to our knowledge and conversation.

Please encourage your students to contribute to the Fast Break on a topic of their choosing related to basketball injury, rehabilitation or sport science. The work published here is reviewed and approved for submission by the student's preceptor.

Unfortunately, no student submitted a contribution for this edition of the Fast Break.

NEWS AND NOTABLE FROM THE FIBA MEDICAL COMMISSION

On February 9, the Medical Commission hosted a webinar that highlighted the important role of the team physician in fostering mental health and wellness among the athletes we care for. Drs. Samantha McLeod and Ranjit Menon presented a very practical, physician focused session that fostered great conversation amongst international colleagues. The FIBA is working on uploading the recording of the webinar, and the link to that recording will be posted here in a future edition of the Fast Break.

As a part of enhancing educational resources for physicians in basketball, the Medical Commission will host further webinar sessions. Future topics may include the role of the team physician in reducing team stress, managing stress at major competition (i.e. the Olympics), women's issues in basketball, RED-S, concussion, cardiac screening, and courtside trauma management.

BASKETBALL CME OPPORTUNITIES

A listing of varied sport medicine and basketball meetings and conferences you may be interested in attending:

A listing of all the American Medical Society for Sports Medicine conferences can be found here:

https://www.amssm.org/Conferences.php

The South African Sports Medicine Association hosts several events throughout the year:

https://www.sasma.org.za/events/

The Society for Sport Exercise and Performance Psychology website lists a number of mental performance educational opportunities:

https://www.apadivisions.org/division-47/about/resources/conferences

A listing of exercise physiology conferences across the world can be found here: **https://conferenceindex.org/conferences/exercise-physiology**

And for something a little different:

https://unconventional.com.au/conferences/south-america/medical-conferences/2024/

Date	Location	Event website
April 28 - May 3, 2024	Phoenix (USA)	American Medical Society for Sports Medicine Annual Symposium
May 28-31, 2024	Niagara Falls (Canada)	Canadian Academy of Sport and Exercise Medicine Annual Symposium
May 28-31, 2024	Boston (USA)	American College of Sports Medicine Annual Symposium
July 2-5, 2024	Glasgow (Scotland)	European College of Sport Science
Nov 7-8, 2024	Coventry (UK)	British Association of Sport and Exercise Medicine annual conference
December 2023/April, 2024	Cairo (Egypt)	International Conference on Recent Advances in Basketball Science
October 23-26, 2024	Las Vegas (USA)	The Association for Applied Sport Psychology annual conference