MANAGING THE HEALTH OF THE ELITE PLAYER

THE ELITE FOOTBALLERS MEDICAL CONUNDRUM

– Written by Andrew Massey, Switzerland

"First question: How will you decrease our injury rates?"

Feeling nervous for the first time since I last played football almost 15 years previously, feeling uncomfortable because it was the first time I needed to wear a shirt and tie for almost the same period and feeling apprehensive because I had spent the previous 48 hours preparing for questions for a job interview, with no sleep, this was the question sent my direction in an interview with the Chief Executive prior to getting a job at Liverpool FC. This above all else highlighted to me the industry I was already a part of and, looking to immerse myself even more into.

We know the importance of lower injury rates and the link this has with team success in national and international matches[1]. We also know that players are commodities to football clubs, and an injury to a player at the elite level can cost the club 20,000+ Euros a day. Since the typical number of absence days in a UCL team with a squad of 25–28 players is around 1100 days a season, the average cost to the club due to injuries is 20 million+ euros a season[2]. In addition, across 24 European clubs, player availability has been positively related to team success, defined by league ranking, and points per match[3].

So why would healthcare professionals think that this is anything other than a standard first question at a job interview for a football team? Well, the simple answer is that, throughout our education, we are taught as doctors to abide by the Hippocratic oath. This pledge is the earliest known expression of medical ethics, establishing several principles of medical integrities which remain of paramount significance today. These include the principles of medical confidentiality and non-maleficence. As the seminal articulation of certain principles that continue to guide and inform medical practice, the ancient text is of more than historic and symbolic value. Swearing a modified form of the oath remains a rite of passage for medical graduates in many countries. It is a requirement enshrined in legal statutes of various jurisdictions, such that violations of the oath may carry criminal or other liability beyond the oath's symbolic nature. Contained within various translations of the oath (it has gone through many alliterations), is the principle of PRIMUM NON NOCERE – "first do no harm". The question asked in my interview made me reflect on this and how the principles of providing healthcare to players, and the governance of this, needs adapted within the elite sporting environment.

So the basis of this article for the Aspetar Journal is on the back of my answer to the question asked in the interview. "Easy", I said, trying my best to act confident, "Tell all the players not to train, and not to run in matches.... Watch the injury incidence drop dramatically".

The concept of primum non nocere is not always in the best interests of elite players. The risk of injury (and illness) is increased during training and matches, but it is these training sessions and matches that ultimately contribute to performance, and performance is inextricably linked to value which goes hand in hand with how a player is rewarded (be that financially or via reputation). Therefore, we enter into a

concept far removed from the first do no harm ideology, to one of a "risk vs reward". And that risk vs reward philosophy has numerous variables that feed into it, some of which may appear unfamiliar to a doctor who has spent their training gearing up to rehearse the Hippocratic Oath at graduation.

But what are we dealing with when we think about the modern-day footballer? Currently, the physical demands placed on elite level footballers are immense. We know football is likely to be played at higher speeds in the future with more dense periods of high-intensity efforts. An analysis of the FIFA World Cup finals between 1966 and 2010 reported an increase in the number of passes per minute by around 35% (from 11 to 15 passes/min) and an increase in game speed, using ball tracking, by 15% (from an average of 8.0 m/s to 9.2 m/s.[2] Assuming a similar trend in the future, the game speed will be increased by ~5% between 2010 and 2025 and by ~7% in 2030, reaching a value of around 9.8 m/s. The number of passes per min may increase to above 16 by 2030 from 10.7 in 1966 and 14.7 passes/min in 2010[4].

Already we see that, in order to be successful, teams need to apply more pressure, press higher in the field more frequently and repress at a faster tempo, with a focus on making even more counterattacks with coordinated multiplayer sprinting. The playing positions with least physical strain in elite football of 2021, the central defenders and the goalkeepers, are expected to contribute more, with central defenders taking a more active role in attacking, and with goalkeepers more active in the building up of attacks[4]. Together, we expect players to cover more distance at high speeds and execute a higher number of passes and kicks. Both components might raise the risk of muscle injuries[5]. So, player loading across various metrics are increasing year on year, and in order to be successful in a game, a player must adapt to these loadings by adapting their body, physically and mentally throughout the preparation phase – in pre-season and in-season training. For a successful team, we are asking more and more of the players over a season to maintain fitness in order to preserve performance. In the calendar year 2019, Liverpool FC played 64 matches, in 13 different countries across 3 different continents, and in fact, were required to play 2 matches with 27 hours of each other on two different continents. Add in the 250+ training sessions and it is easy to see how maintaining the health of elite footballers requires much more than just a stethoscope and prescription pad, and a promise to do no harm.

For the last 25 years, the Football Research Group, led by Jan Ekstrand, have been publishing data looking at injury burden in elite football. The overall incidence of injuries in professional male football players has been shown to be 8.1 injuries/1000 hours of exposure. Match injury incidence (36 injuries/1000 hours of exposure) is almost 10 times higher than training injury incidence rate (3.7 injuries/1000 hours of exposure)[6]. Basic maths shows us we have 250 training sessions (duration of 2 hours) per year, squads of 25-30 players, equalling 12500-15000 training hours of exposure. So, in training alone, each elite club can expect 55+ injuries per season. This is before we even look at the matches. And these are the statistics that Chief Executives, Sporting Directors and Head Coaches need to be aware of when planning for the season. Under the diverse guises of health and safety legislation in various countries, clubs (as employers) have an obligation, so far as reasonably practicable, to ensure the health, safety and welfare at work of all its employees. In respect of players, that requirement is also an express term within many standard playing contracts.

It is these numbers that have driven the biggest change in the philosophy of squad supervision in a number of the top-level clubs throughout the world. Just as

Image: Illustration.

Billy Beane pioneered the "Moneyball" approach to baseball in the early 2000's[7], injury incidence, injury likelihood and player availability (medical management) has been playing a fundamental role in the recruitment and organisation of football squads. Simply put, Moneyball has become a term used to describe a data-driven approach to recruitment and team decisions (mainly in the transfer market) - leading to improved on-field results. It's an overarching descriptor that is used when football clubs do not necessarily recruit the most expensive stars, but rely on cheaper transfers - assuming that some kind of analysis is involved in recruitment. It's the context of this analysis that makes 'Moneyball'. A club must find an inefficiency in a number of different disciplines – (in this case injury management and player availability) but also tactics, gameplay, positions, or transfers to show an ingenuity that maybe other teams have not traditionally shown. To a financial economist, these debates sound familiar. Using statistics, is it possible to find undervalued stocks and bonds and beat the financial markets? However, if such a method existed — word would get out and the bargains would disappear. In other words, the truth or falsity of the Moneyball method is a fluid proposition, changing over time. Everyone can look at the same numbers, there are lots of mathematicians for hire, and so secrets are hard to keep. But in football medicine (and medicine in general), we work in the best interests of the players. The profession needs (and relies on) an open and supportive framework. I learned so much from shadowing so many of whom I considered to be the best clinicians throughout my career. I have been thankful that within our profession we have many outstanding characters that are willing to share knowledge and advance the profession, and many times this knowledge share, was from doctors/physios employed at different clubs/sports. The medical profession relies upon this. I have always had scepticism with gurus. Clinicians that offer "magic bullets" or therapies that only they can provide, primarily because of what I have described above... knowledge being a fluid proposition. If therapies or rehabilitation ideas are successful then this will become more of an accepted form of treatment and the incredible brains that currently work within medical departments at football clubs will, through one form or another, transfer this knowledge across the borders of the individual teams.

So why have I mentioned "Moneyball" if I have just ruined my own argument? Well tradition plays a major role in this. Tradition is often the barrier to innovation. Traditionally, a team doctor would lead the medical team within a football club. Traditionally this doctor may not have been recruited via competitive interview. Traditionally the doctor was part of a hierarchical system where they were the sole medical voice making decisions on behalf of the player and club. And traditionally this was all a very insular environment practised behind very tall walls! Moneyball, within medical spheres needs adapted to be more of a "Shareball", gathering various information from different sources, determining which bits of information may contribute to risk of an adverse outcome and filtering out the information that has little relevance on the decision making. Medical personnel within clubs cannot expect to provide the optimum care if they shut themselves off within their own departments and not benefit from continuous professional development, and likewise, there is a moral obligation on us as a profession to share knowledge, engage in peer reviewed research and progress the profession. To do this we need an understanding of how to lay the foundations, the initial building blocks, of good clinical care within a team environment.

So, building block one... How do you ensure you maintain a higher availability of players? To answer this, we must look at how different medical departments are organised. How many are truly proactive as opposed to reactive. Do medical departments have a link to, and a say in recruitment? I have found it is essentially a fallacy to believe that a medical team within a specific club can change a players availability percentage anymore than 10-15 points. If a player has an availability for 65% for a certain club, there are very few departments, on a consistent basis that can raise this above 80%. Obviously, the demands of the leagues and teams play a major role in this, but working within a highly competitive league and consistently appearing in a confederation championship means that players are expected to play 60+ games a season. This means that elite clubs

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are required more than others to ensure that players are recruited to:

a) Possess the skills required by the club/coach.
b) Be able to physically adapt to the style of play employed by the head coach.
c) Be able to physically and mentally adapt to the demands of the club.

In order to do this, medical teams must have a proactive contribution to the following:

1. **Player recruitment.** Using analytics (and determining which are the important analytics needed to inform, and this will be club/head coach specific), with an emphasis on recruiting the best and most robust players for position-specific team needs[8]. In this instance, robust refers specifically to physical attributes, but care must also be taken when assisting the players with attributes related to mental wellbeing[4].
2. **Preparing the players for game demands that are specific to the competitions played, the coache's philosophy and the club's expectations.** Players should perform sufficient training regimes with an emphasis on the style of play adapted by the head coach and the demands throughout a 12 month cycle[9]. Periodisation within elite clubs has been proven to be difficult given the frequency of games. The more competitive a league or competition is, the more difficult that periodisation becomes. Multicomponent training programmes that include computational algorithms to individualize the risk might be useful and have been gaining more insight in recent years[4].
3. **Monitor and assess injury risk.** This may assist in decision-making with regards to playing formation and the usage of substitutes during match play, and in designing training schedules. The integration of data collected with tracking systems with microsensor inputs in real time has been commonplace for the last 20 years and this field is developing further with the usage of artificial intelligence algorithms that can potentially be adapted to assist in risk quantification[9].
4. **Focus on the most effective recovery methods.** Positional and individual variability in fatigue and recovery patterns should be established. Maintenance of mental health will become a concern, and strategies should be implemented to protect players health and maintain or stimulate performance.

With all this in mind, what is the role of the doctor in managing the physical and mental health of athletes? It is obvious that a doctor who "first does no harm" will not last long in a sporting environment. Would a first do no harm philosophy negate offering a ring block to an uncomplicated fractured distal phalanx? Would it mean we cannot offer a painkiller for a contusion that may impact performance? A doctor's role in leading the medical department is to consider the individual's health benefits to playing/training (both mental and physical) in order to assist in what should perhaps be the ultimate goal – PERFORMANCE BENEFITS.

Performance benefits can be quantified by a number of variables, but essentially it comes down to, what is in the best interests of the player. And this is the ideology that has seen a huge change over the last number of years. It is arguable that a doctor is not in the best position to decide what is in the players best interests...the player is. The doctor must provide all relevant information in order for the player to make a consensual decision. They must appraise the available medical evidence, synthesise this and then communicate it EFFECTIVELY to athletes. So, doctor and player form two important pillars of decision making within team sports. The third pillar is the Head Coach. Just as players have differing personalities, differing ways of assimilating information and differing views on risk stratification, so too do coaches. Invariably, the majority of healthcare discussions with players will congregate to the question – "But what will the Gaffer say?". And this is why the Head Coach must be the third pillar in this "Preference-based" approach to the medical management of elite players, where each pillar has initially equal importance, but at the same time, an understanding that the level of importance will vary depending on the subject matter. For example, let's compare two differing muscle injuries:

1. **The heart.** A serious cardiac issue may represent a life-threatening concern. Playing a match may exacerbate this condition. Here, the importance of the doctor in this preference-based approach, cannot be over stated. The coach needs to understand that the medical guidance is prioritising the players health and wellbeing, as the risks may outweigh the rewards. In this instance the doctor (and the player) should prioritise health concerns over performance concerns
2. **Hamstring.** A player with a tight hamstring that is at increased risk of developing a lesion. Here, the doctor's importance may be based round informing the player and the coach of the risks associated with playing (i.e. a lesion may lead to 6 weeks rehabilitation). In these circumstances, the player and the coaches input increase in importance and a three-way discussion should be had regarding the risks vs rewards in this scenario. A player may think that such a risk is acceptable, and provided the coach is in agreement, the player can and should make a consensual decision (CLINICIANS, ATHLETES and COACHES must integrate all types of information to reach a decision – and there must be an understanding that this can change at any time).

The factors that affect any decision making are similar between these three pillars, but perhaps differ in levels of importance as seen by each pillar. A player may want to take a health risk because their contract is expiring and they need to demonstrate their importance/worthiness for a new contract. They may have appearance bonuses, they may need the exposure etc. The coach may want his best players in the squad for a particular match and may prioritise this match over the next 6 matches. The doctor will want to work in the best interests of the player and must decide what these interests are, and how best to serve them. However, helping an "at risk" player to play, must be separated from serving the interests of the club. Whilst the interests of the club may be inextricably linked to the interests of the player, the doctor must erase club interests from decision making and focus solely on the player.

So, we move into what we call the "Elite Footballers Medical Conundrum". This conundrum looks at the individual player's physical/mental and performance parameters, and seeks to find how best to advise, from a medical perspective, to

optimally serve these parameters. This advice is then delivered to the player, and if deemed necessary by the player, further delivered to the Head Coach in a preference-based approach, quantifying the level of risk that a player will be able to perform, both short term and long term and the immediate risks/benefits associated with this.

This is a continually adapting framework based on a number of key principles and understandings, and should serve as a checklist for all medical decisions involving a player:

- Everyone assesses risk differently:
  - Players, like all subjects will have differing views on what they consider to be undue or insupportable risk. Their level of risk adversity may also change depending on a number of extrinsic and intrinsic factors that present themselves at the time of assessing the risk, and this may change from week to week.
- Supportive structure:
  - The underlying principle is that the head of any medical service must be understanding of any consensual decision made by a player, and supportive of this, independent of the interests of the club and the head coach.
- The player is the priority:
  - This is fundamental to any doctor-player relationship and forms the cornerstone of how the Hippocratic oath should be viewed in modern day sports medicine. This is non-negotiable and again, must be independent of the interests of the club.
- Understanding of the external influences:
  - These can be wide ranging, from family circumstances, to financial pressures to ethical beliefs. This point highlights the importance of having a working relationship with a player, who feels comfortable discussing all external influences with you, so that any advice or information provided factors in these external influences and is packaged together, again, in the best interests of the player.
- Internal ethics should never be compromised:
  - Not all medical advice is good news. In fact, 90% of the time as a football doctor, you are explaining risks or relaying bad news. It is important that medical professionals do not fall into the trap of compromising their ethics. Often in professional sport the ethical line is quite thin. A doctor must constantly focus on this line. Have open discussions with peers regarding the ethical dilemmas. My simple rule of thumb is that, should you feel uncomfortable discussing an (anonymized) case in an open forum, then the likelihood is, it is crossing ethical boundaries.

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Andrew Massey M.D.

Medical Director

Medical Department, Fédération Internationale de Football Association (FIFA)

Zurich, Switzerland

Contact: andrew.massey@fifa.org