

## Flu vaccination in elite athletes: a survey among Serie A soccer teams

*Carlo Signorelli<sup>1,2</sup>, Anna Odone<sup>1</sup>, Alessia Miduri<sup>1</sup>, Paola Cella<sup>1</sup>, Cesira Pasquarella<sup>1</sup>, Armando Gozzini<sup>3,4</sup>, Pasquale Tamburrino<sup>4</sup>, Enrico Castellacci<sup>4</sup>*

<sup>1</sup>Department of Biomedical, Biotechnological and Translational Sciences, University of Parma, Parma, Italy; <sup>2</sup>School of Medicine, University Vita-Salute San Raffaele, Milan, Italy; <sup>3</sup>Azienda Socio-Sanitaria Territoriale di Pavia; <sup>4</sup>Italian Association of Physicians of Professional Soccer Teams (L.A.M.I.C.A.)

**Summary.** Scant data is available on immunization policies and practices among professional athletes. Following up on a recent review on the topic, we conducted a survey among Italian Serie A soccer teams during the influenza season 2015-16, to explore vaccination practices and attitudes as well as influenza vaccine uptake. The survey covered a sample of over 600 professional athletes from 20 teams and was carried out in collaboration with the Italian Association of Physicians of Professional Football Teams (L.A.M.I.C.A.). For each team, the head of the medical staff was interviewed (structured telephone interviews, 100% response rate). Seasonal influenza vaccine was actively offered in 75% of Serie A teams with a median coverage rate of 40% (range 0%-100%). Vaccines are often administered after matches or training sessions. We report vaccine hesitancy associated with fear of adverse events, poor communication and other selected determinants. Vaccination in elite athletes, if correctly managed, represents a powerful, cost-effective and long lasting preventive tool. In times where vaccines are losing public confidence, our findings are a useful basis to inform the planning, implementation and evaluation of interventions to promote prevention in sports medicine. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** influenza, immunization, vaccine hesitancy, professional athletes

A comprehensive review on immunization practices in athletes was recently published (1), where the available evidence on exercise immunology and a conceptual framework to implement immunization programmes targeting professional athletes was presented; this taking into account updated schedules and recommendations (2). As emerged from the review, the topic is of growing interest in the fields of preventive and sports medicine because of multiple factors, including: i) the peculiarity of the immune system's responses during and after intense exercise training (open window(1)), ii) the increasing mobility of elite athletes joining foreign clubs and travelling to international events, iii) their frequent staying in crowded environments (i.e. locker rooms, promotional events)

with increased risk of airborne infection transmission as well as – in general – iv) the crucial importance for elite athletes (and teams) to be healthy and protected against vaccine preventable diseases in order to avoid absences for sickness in the competitions or not-optimal conditions to fulfil the best physical performances.

In this field we reported a lack of original research on immunization practices and vaccine coverage in professional (and non-professional) athletes and stressed the importance of collecting, analyzing and sharing updated data that could raise awareness on the topic as well as inform the planning of effective health promotion interventions (2).

In this context we conducted a survey among Italian Serie A football players (total of 20 teams) during

the influenza season 2015-16 to explore vaccination practices and attitudes as well as influenza vaccine uptake. The study was coordinated by the Unit of Public Health of the University of Parma in collaboration with the Italian Association of Physicians of Professional Football Teams (L.A.M.I.C.A.) and the patronage of the Italian Society of Hygiene, Preventive Medicine and Public Health (SIItI). A semi-structured questionnaire was designed on the basis of: the relevant evidence available in the literature, clinical practice

guidelines and the input from experts in the field. It was administered through telephone interviews to each Serie A team's head of medical staff (some reknown teams such as *AC Milan*, *Juventus*, *Internazionale* may have more than one physician while others only have one) contacted through L.A.M.I.C.A. Results are presented anonymously according to the agreed protocol.

Response rate was 100%. Main findings are reported in Table 1. During influenza season 2015-16 75% (15/20) of Serie A teams organized an active flu

**Table 1.** Relevant answers to Serie A teams' immunization practices

	n° (%)
Response rate	20/20 (100%)
Structured influenza vaccine campaign implemented at the team-level	
yes	15/20 (75%)
no	5/20 (25%)
Among teams where influenza vaccine campaign was offered (n=15):	
Type of recruitment	
Collective	11/15 (73%)
Individual	4/15 (27%)
Type of vaccine	
Split vaccine (vaxigrip)	4/15 (27%)
Subunits vaccine (agrippal)	3/15 (20%)
Adjuvant vaccine (flud)	3/15 (20%)
Intradermal vaccine (intanza)	1/15 (7%)
Not reported	4/15 (26%)
Timing of vaccine administration	
After games	10/15 (67%)
Before training sessions	0/15 (0%)
After training sessions	1/15 (6,5%)
Away from games or training session	3/15 (20%)
Not reported	1/15 (6,5)
Vaccine coverage rate	
Median	40%
Range	0-100%
Rate ≥ 75%	3/15 (20%)
Non-adherence reasons*	
Lack of risk perception	11/15 (73%)
Fear of adverse effects	5/15 (33%)
Allergies and intolerances	2/15 (13%)
Vegetarian/vegan diet	1/15 (6,5%)
Religious beliefs	1/15 (6,5%)
Poor vaccine promotion	2/15 (13%)
Adverse events	
Mild local reactions	2/15 (13%)
None reported	13/15 (87%)

\*total sum up to more than 100% because each interviewed could give multiple answers

vaccine offer programme. Among them, in the majority of cases (73%, 11/15 teams) the campaign was conducted at the team-level during training sessions where team physicians took time to explain to athletes the importance of getting vaccinated against seasonal flu in collegial settings. Only in a limited number of cases communication programmes to promote seasonal flu vaccine uptake were conducted on an individual basis during face-to-face meetings with the team physician. With regard to vaccine administration, in all teams the vaccine was administered by one of the team physicians (not by external physicians, GPs, nurses or other healthcare professionals); 27% of teams used split vaccines, 20% subunits vaccines, 20% adjuvant vaccines, 7% intradermal vaccines, the remaining teams not reporting the use of a specific vaccine. No vaccine adverse events were reported apart from two cases of mild local reactions. Interestingly enough, flu vaccine was reported to be administered after matches or training sessions in over 70% of teams.

Reported influenza vaccine uptake among teams that actively offered immunization was on average 45% (median 40%), this ranging from 0% to 100%. Overall, a total of 5 teams (25%) did not actively offer seasonal influenza vaccine to athletes, some of which reporting to use - instead - homeopathic drugs to reinforce the immune system. In one of these teams two single athletes independently asked the team's physician to get immunized. Qualitative analysis exploring non-adherence reasons showed that athletes' vaccine hesitancy was associated to: fear of adverse effects and lack of risk perception ("I never did and I never got sick", "When I did I got sick anyway", "I prefer to take the influenza"). Other reported justifications were allergies and intolerances, vegetarian or vegan diets, religious beliefs, poor vaccine promotion by medical staff. We found no association between influenza vaccine uptake and teams' ranking in the 2015-16 Serie A league.

## Conclusions

To our knowledge this is one of the few studies published to assess influenza vaccination practices, attitudes and coverage rates in a reknown Sport League. Overall, seasonal influenza vaccine is actively offered in

three quarters of serie A teams with a median coverage rate of 40%. However, 25% of teams do not routinely offer influenza vaccine to athletes and one reported a 0% coverage due to a poor immunization promotion campaign. In addition, hesitancy towards immunization and false myths related to vaccine were reported in a considerable proportion of the study sample (3-6). Last but not least, reported vaccine administration after competitions and intensive training, during the "open window" phase could be associated with sub-optimal immune response and reduced vaccine efficacy according to scientific evidence (1, 7). This theory is characterized by short term suppression of the immune system after intensive physical activity (8, 9).

Our findings provide useful insights into influenza immunization practices in athletes. They are a useful basis to inform the planning, implementation and evaluation of interventions to promote prevention in sports medicine. International and national authorities' recommendations do not make the specific case of athletes (10, 11); however scientific evidence supports the need for athletes to be fully immunized against the vaccines recommended in the Immunization Schedules (12), including seasonal influenza (13). Vaccination in elite athletes, if correctly managed, represents a powerful, cost-effective and long lasting preventive tool for athletes sport teams.

Our data suggest that, in the promotion of vaccination campaigns in professional teams, a crucial role is played by the medical staff of the teams; in fact physicians address the (possible) strategies for influenza prophylaxis. Our data show a relevant proportion of vaccine hesitancy among the physicians here surveyed.

In times where in Italy - as well in other European countries - vaccines are losing public confidence (14, 15), strengthened efforts and resources should be devoted to promote effective immunization strategies (16), train healthcare professionals (17-20) and implement effective educational and communication programs (21-23). In such context, not only improving vaccine adherence among professional athletes would strongly contribute to improve their individual wellbeing and sports performance but it would also play as a positive example toward the general population.

## References

1. Trabacchi V, Odone A, Lillo L, Pasquarella C, Signorelli C. Immunization practices in athletes. *Acta Biomed* 2015; 86(2): 181-8.
2. Gartner BC, Meyer T. Vaccination in elite athletes. *Sports Med* 2014 Oct; 44(10): 1361-76.
3. Odone A, Signorelli C. When vaccine hesitancy makes headlines. *Vaccine* 2015 Dec 2.
4. Signorelli C. Vaccines: building on scientific excellence and dispelling false myths. *Epidemiol Prev* 2015; 39(3): 198-201.
5. Hickler B, Guirguis S, Obregon R. Vaccine Special Issue on Vaccine Hesitancy. *Vaccine* 2015 Aug 14; 33(34): 4155-6.
6. Nyhan B, Reifler J. Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information. *Vaccine* 2015 Jan 9; 33(3): 459-64.
7. Walsh NP, Gleeson M, Shephard RJ, Woods JA, Bishop NC, Fleshner M, et al. Position statement. Part one: Immune function and exercise. *Exerc Immunol Rev* 2011; 17: 6-63.
8. Nielsen HG, Oktedalen O, Opstad PK, Lyberg T. Plasma Cytokine Profiles in Long-Term Strenuous Exercise. *J Sports Med (Hindawi Publ Corp)* 2016; 2016: 7186137.
9. Kakani MW, Peake J, Brenu EW, Simmonds M, Gray B, Hooper SL, et al. The open window of susceptibility to infection after acute exercise in healthy young male elite athletes. *Exerc Immunol Rev* 2010; 16: 119-37.
10. Bonanni P, Azzari C, Castiglia P, Chiamenti G, Conforti G, Conversano M, et al. The 2014 lifetime immunization schedule approved by the Italian scientific societies. Italian Society of Hygiene, Preventive Medicine, and Public Health. Italian Society of Pediatrics. Italian Federation of Pediatric Physicians. Italian Federation of General Medical Physicians. Arezzo Service of Legal Medicine. *Epidemiol Prev* 2014 Nov-Dec; 38(6 Suppl 2): 131-46.
11. Chris H. Seasonal influenza vaccination for professional athletes – who's for the job? *Clinical Journal of Sport Medicine-Blog* 2011.
12. Bonanni P, Ferro A, Guerra R, Iannazzo S, Odone A, Pompa MG, et al. Vaccine coverage in Italy and assessment of the 2012-2014 National Immunization Prevention Plan. *Epidemiol Prev* 2015 Jul-Aug; 39(4 Suppl 1): 146-58.
13. Signorelli C, Gozzini A. [Guidelines for immunization practices in professional athletes]. *Ig Sanita Pubbl* 2011 May-Jun; 67(3): 387-400.
14. Odone A, Chiesa V, Ciorba V, Cella P, Pasquarella C, Signorelli C. Influenza and immunization: a quantitative study of media coverage in the season of the "Fluad case". *Epidemiol Prev* 2015 Jul-Aug; 39(4 Suppl 1): 139-45.
15. Signorelli C, Odone A, Conversano M, Bonanni P. Deaths after Fluad flu vaccine and the epidemic of panic in Italy. *BMJ* 2015; 350: h116.
16. Odone A, Fara GM, Giammaco G, Blangiardi F, Signorelli C. The future of immunization policies in Italy and in the European Union: The Declaration of Erice. *Hum Vaccin Immunother* 2015; 11(5): 1268-71.
17. Odone A, Visciarelli S, Lalic T, Pezzetti F, Spagnoli F, Pasquarella C, et al. Human papillomavirus-associated cancers: a survey on otorhinolaryngologists' knowledge and attitudes on prevention. *Acta Otorhinolaryngol Ital* 2015 Dec; 35(6): 379-85.
18. Signorelli C, Odone A, Pezzetti F, Spagnoli F, Visciarelli S, Ferrari A, et al. Human Papillomavirus infection and vaccination: knowledge and attitudes of Italian general practitioners. *Epidemiol Prev*. 2014 Nov-Dec; 38(6 Suppl 2): 88-92.
19. MD WBH. The Physician and Sports medicine. Volume 31, Issue 2. Preventing Infectious Disease in Sports. 2003.
20. Constantini N, Ken-Dror A, Eliakim A, Galatzkia L, Morag A, Mann G, et al. Vaccinations in sports and recommendations for immunization against flu, hepatitis A and hepatitis B. *Harefuah*. 2001 Dec; 140(12): 1191-5, 228.
21. Signorelli C, Odone A. Advocacy communication, vaccines and the role of scientific societies. *Ann Ig* 2015 Sep-Oct; 27(5): 737-47.
22. Ferro A, Odone A, Siddu A, Colucci M, Anello P, Longone M, et al. Monitoring the web to support vaccine coverage: results of two years of the portal VaccinarSi. *Epidemiol Prev* 2015 Jul-Aug; 39(4 Suppl 1): 88-93.
23. Odone A, Ferrari A, Spagnoli F, Visciarelli S, Shefer A, Pasquarella C, et al. Effectiveness of interventions that apply new media to improve vaccine uptake and vaccine coverage. *Hum Vaccin Immunother* 2015; 11(1): 72-82.

Received: 11 July 2016

Accepted: 19 July 2016

Correspondence:

Anna Odone

Unit of Public Health

Department of Biomedical, Biotechnological and Translational Sciences, University of Parma.

Via Volturno, 39 - 43125 Parma, Italy

Tel. +39 (0521) 033795

E-mail: anna.odone@mail.harvard.edu