

Doctor of Nursing Practice Project

entitled

Evidence Based Practice Improvement Project to Improve

Influenza Vaccination Rate in Intercollegiate Athletes

By

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Submitted as partial fulfillment of the requirements for the

Doctor of Nursing Practice Degree

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## Abstract

Influenza is a highly contagious, respiratory infection that affects between 19-26 million people in the United States annually and is associated with morbidity and mortality. Influenza spreads easily with rapid transmission especially in crowded areas. The Centers for Disease Control recommends the best prevention against influenza is the influenza vaccination. The Advisory Committee on Immunization Practices recommends annual influenza vaccination for all individuals greater than six months who do not have contraindications. Strong evidence supports the safety and efficacy of the influenza vaccine, yet the uptake of the vaccine is low across many populations, especially college students. Healthy People 2020 influenza vaccination initiative goal is 70% vaccination rate. The American College Health Association influenza vaccination goal is 44%. In order to address the low influenza vaccination rate among intercollegiate athletes a multi-component evidence based practice improvement project was implemented at a private university in rural Ohio. As a result of the implementation of the flu vaccine initiative vaccination rate among intercollegiate athletes increased from 13.4% in 2018 -2019 to 25.6% in 2019-2020.

## Acknowledgments

There are many individuals who have provided support and encouragement along the journey towards completion of this project. Dr. Susan Batten, the chair of my committee has walked with me every step of the way and has contributed immensely to my growth as a writer and a nursing scholar. Dr. Batten has led influenza initiatives for many years and her knowledge and experience gave a significant boost to this scholarly project.

The key stakeholders on the EBPIP team, especially Connie Ford, Deb McDonald, Wes Stephens, Rhonda Smith, and the nurses at UMS made a significant contribution. My faculty colleagues at Cedarville University have cheered me on from the first day of my DNP journey until today. Dr. Chu Yu Huang has given much guidance in improving my writing and especially in statistical analysis. Above all, Dr. Kim Higginbotham has given countless hours of encouragement, advice, organization, and especially motivation to persevere in my quest. She has helped me see the true value of the DNP. Without her help and encouragement, I never would have finished. Kim, I'm glad you wouldn't let me quit.

To my children, Andrew, Ben and Maddie: you have cheered me on, encouraged me, gave up time with me, listened to countless "DNP life" complaints and stories and have stuck by me all the way. To the love of my life, Patti: it's easy to say "I couldn't have done it without you" but truer words have never been spoken. You have been my friend, confidant, encourager, supporter and number one cheerleader all along the way. Thanks for spurring me on, giving up your husband for many, many, many hours, listening to me complain and most of all for believing I could do it and not letting me quit. I love you so much.

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## **Introduction and Overview of the Problem**

Influenza is a highly contagious, viral respiratory illness associated with morbidity and mortality. The Centers for Disease Control (CDC) estimate that up to 42 million individuals contracted influenza between October 1, 2018 and May 4, 2019 (CDC, 2019). Consequently, it is estimated that during the 2018-2019 influenza season, there were more than 20 million medical visits, as many as 647,000 hospitalizations, and 61,200 deaths (CDC, 2019). In addition, the estimated average annual total economic burden of influenza to the healthcare system and society in the 2017-2018 season was \$11.2 billion (Putri, Muscatello, Stockwell & Newall, 2018).

Influenza spreads easily with rapid transmission especially in crowded areas (World Health Organization, 2019). The CDC suggests that influenza is spread primarily through droplets when people cough, sneeze or talk (CDC, 2019). In addition, influenza may be spread by touching a surface or object with the flu virus and then touching one's own eye, nose, mouth (CDC, 2018). University campuses present unique conditions that enhance the rapid spread of influenza virus with students living in close proximity in residence halls with shared common spaces like restrooms, cafeterias, dining halls, computer facilities, and social areas (Franks & Jandu, 2017, Ramsey & Marczinski, 2011). Dorms are often crowded with poor ventilation, fostering the sharing of common air (Franks & Jandu, 2017). In addition, crowded academic buildings feature many commonly shared objects such as door handles, elevator buttons, light switches, railings, and keyboards (Franks & Jandu, 2017). Furthermore, intercollegiate athletes have varied risk for the transmission of infectious organisms due to the environments in which athletes practice, compete, and travel (Turbeville, Cowan, & Greenfield, 2006). Exercise immunologists have found that intense episodes of exercise weaken the immune system temporarily increase the risk of upper respiratory infections (Nieman, 2000).

The CDC recommends the best prevention against influenza is the influenza vaccination (CDC, 2018). The CDC recommends annual influenza vaccination for all individuals greater than six months who do not have contraindications (Grohskopf et al, 2018). The Advisory Committee on Immunization Practices (ACIP) recommended “students or other persons in institutional settings (e.g., those who reside in dormitories) should be encouraged to receive [influenza] vaccine to minimize morbidity and the disruption of routine activities during epidemics” (Fiore et al., 2007). The American College Health Association’s (ACHA) recommends annual influenza vaccination for all members of the university community ages six months an older (ACHA, 2018). Despite strong recommendations by the ACIP, influenza vaccination rates remain low among college students with rates reported between eight (Nichol et al., 2010; Rogers, Bahr & Benjamin, 2018) and 30 percent (Rogers et al., 2018). Additional studies support low influenza vaccination rates in the college population. Merrill et al. (2010) found influenza rate in the college population to be 12%, Benjamin and Bahr (2016) reported a 20% flu immunization rate, and Franks & Jandu (2017) found a 23% rate.

### **Significance of clinical problem or issue**

On average, college students who become ill with influenza have symptoms for an average of eight days compared to five days for a common cold (Nichol, 2005). In addition, college students with influenza like illness have increased rates of school absence and impaired academic performance compared to those with the common cold (Nichol, 2005). Intercollegiate athletes sometimes rely on scholarships tied to athletic participation. These scholarships are affected if academic performance is not up to the standard, which can be impacted by absences from class due to illness.

Healthy People 2020 and the Office of Disease Prevention and Health Promotion (ODPHP) initiative, set a goal for flu vaccination among adults ages 18-64 at 80% (2018). The

ACHA Healthy Campus 2020 initiative set a target goal for students receiving the influenza vaccine at 44% which was an increase of ten percent from the initial benchmark (ACHA, 2012). There is strong support for the efficacy and safety of the influenza vaccine at reducing the morbidity and mortality associated with the influenza virus (CDC, 2018; ODPHP, 2018). Policies requiring influenza vaccination strongly increases influenza vaccination rate. The Community Preventive Services Task Force (CPSTF) recommends requiring influenza vaccination for educational institutions at all levels to decrease rates of vaccine-preventable illness (2016). While athletes are at increased risk for influenza infection, there is a normal response to the vaccine in building immunity that is not affected by intense periods of exercise (Nieman, 2000). Nieman (2000) further recommends that athletes competing during the winter months should be vaccinated against influenza.

Several authors have examined the reasons that university students often avoid the influenza vaccine. Franks and Jandu (2017) found the top reasons for not getting a flu vaccine “were not worried about getting flu” (43%), “forgot or too busy” (15%) and “not wanting to get the vaccine” (12%), “the vaccine is ineffective” (7%); “the vaccine makes you sick” (7%). Ramsey and Marczynski (2011) cited five reasons students gave for not getting the influenza vaccination: fear of side effects, doubting the effectiveness of the vaccine, fear of harm to the immune system, lack of concern about the severity of flu illness, and low self-perceived risk of acquiring the illness. Students are influenced by others in their decision whether to not to get the influenza immunization (Uddin et al, 2010). In addition, Uddin et al (2010) found that the education level of parents had a high correlation with vaccination uptake, with the children of highly educated parents being more likely to take the vaccine than those of lower education. Franks and Jandu (2017) found that 6% of student who chose not to vaccinate cited “parental

influence against vaccines.” Although there are specific issues related to college students, there are some additional barriers to vaccination among the sub-population of intercollegiate athletes. Due to increased demands on their time with competing priorities, athletes experience time constraints making it difficult to access preventative health services like influenza vaccination. Frequent travel takes them away from campus and consumes large amounts of time. Athletic teams have mandatory study halls, team meetings, weight lifting and conditioning done outside of practice, further consuming their available time. Sports involving vectors such as basketball increase transmission where players from both teams alternate touching the ball throughout practices and competition. In order to address the low vaccination rate among intercollegiate athletes with a unique environment conducive to influenza transmission, a multicomponent evidence-based practice improvement project (EBPIP) was implemented at a private university in rural Ohio.

### **Internal Organization Data**

The EBPIP project was conducted at a private university in Ohio with a total enrollment of 3,963 undergraduate and graduate students, with 2,726 living on campus in residence halls. University Medical Services (UMS), as it is known at the target university, is available to all students and provides episodic care management, allergy shots, treatment for illnesses or injuries, and travel consultations for overseas global outreach trips. UMS administered 629 vaccinations during the 2018-2019 academic year and more than half (340) of the vaccines administered were given to health science majors (nursing and pharmacy) who are required to receive the vaccination. The overall influenza vaccination rate at UMS is less than 25 percent. There is no mechanism currently in place to account for students who receive the influenza vaccine off campus, therefore the total vaccination rate is unknown. Based on available data of

the target institution, the flu vaccination rate is below the ACHA target of 44 percent (ACHA 2018) and the Healthy People 2020 target of 80 percent (ODPHP, 2018). Among students not required to receive the vaccination, the vaccination rate is less than 11 percent. The influenza vaccination rate among intercollegiate athletes is lower than the general student population. In 2018-2019 there were a total of 51 athletes vaccinated at UMS out of the total intercollegiate athlete population of 380. This represents an influenza vaccination rate among athletes of 13.4%. Of those intercollegiate athletes vaccinated, 44 were either nursing or pharmacy majors who were required to get the flu shot. The current overall vaccination rate among non-nursing and non-pharmacy intercollegiate athletes at this rural university is 1.8%. The opportunity for improvement in the vaccination rate among intercollegiate athletes at the target institution drove this EBPIP.

Prior to the EBPIP implementation, the influenza vaccination effort at the target institution consisted of two flu vaccination events open to the all students at UMS. In the fall semester of 2018, the influenza vaccination events consisted of a three hour morning clinic in late October and a three hour afternoon clinic in early November. Any student unable to receive the vaccine at one of the vaccination events was encouraged to make an appointment for influenza vaccine. All communication for these events was done by email.

The influenza vaccine is required for all nursing and pharmacy students. The faculty, staff, and students of the School of Nursing (SON) and School of Pharmacy (SOP) help UMS facilitate influenza vaccination clinics to facilitate the large number of health science students needing the vaccination. These flu vaccination clinics are exclusively available to nursing and pharmacy students. Nursing faculty supervise the nursing students, who perform all of the injections, and in the same way, the pharmacy faculty supervise the pharmacy students.

## **External evidence**

Influenza is caused by a virus that is subject to seasonal variations attributed to genetic changes in the outer surface antigens hemagglutinin and neuraminidase (Gamblin & Skehel, 2010). Seasonal variations are caused by minor point mutations of the genetic regions encoding for either the HA or NA antigens (Gamblin & Skehel, 2010). This concept is known as antigenic drift. Antigenic shifts are small changes in the influenza virus that do not usually affect the immune response individuals have against the newer virus because it is so similar to the previous virus, the body can still recognize and fight it (CDC, 2018). These shifts accumulate over time and eventually the individual's ability to mount an appropriate immune response is dulled to the point where the individual's immune system is no longer able to recognize it and the person becomes ill (CDC, 2018). The two main strains of influenza that affect humans are type A and type B. Type A influenza is the most capable of causing a pandemic event (CDC, 2018). Influenza viruses are detectable year round in the United States, but are most common in fall and winter season from October through March with peak activity from December through February (CDC, 2018). The illness can be particularly troubling for young children, the elderly, and individuals with co-morbidities like asthma, COPD and diabetes (CDC, 2018).

There are FDA approved vaccines available annually that are developed based on surveillance data gathered by the CDC. Epidemiologists collaborate to predict the most prevalent forms of influenza that will be present during the coming flu season and develop the vaccine based on previous years (CDC, 2018). While the process is highly scientific and based on large amounts of data, effectiveness varies from year to year. Vaccine effectiveness (VE) studies are done regularly in various populations to assess and confirm the value of influenza vaccination

(CDC, 2018). According to the CDC (2018), vaccine effectiveness has ranged from 37 to 60 percent over the past 10 years (CDC, 2018). Some experts think that vaccine effectiveness in a given year may have a negative effect on vaccination rate the following year (NFID, 2016). Franks and Jandu (2017) found that 7% of students chose not to vaccinate because of concerns about the prior year influenza vaccine being ineffective. As the influenza vaccine formulation is different every year, obtaining the vaccination each and every flu season decreases an individual's chance of becoming ill with influenza (CDC, 2018). In addition, the influenza vaccination offers protection in the general population due to what is known as community or herd immunity (CDC, 2018). According to the United States Department of Health and Human Services, community immunity is when the spread of a disease is limited due to a high number of individuals in a population being immune to the disease (2017). Influenza vaccine is available in two forms: inactivated form, available as an injection and a live attenuated virus available as an intranasal spray. The inactivated vaccine is recommended for individuals who are six months of age and older. The live attenuated virus is permitted for use in healthy individuals two years old to 49 years old, but is contraindicated in other age groups. The vaccine is available in a trivalent formulation which stimulates immunity to three different influenza strains (two influenza A and one influenza B strain). In addition, there is a quadrivalent vaccine that protects against four strains (two influenza A viruses and two influenza B viruses) which was used in this EBPIP.

### **Purpose and goals of project**

The primary purpose of this EBPIP project was to increase influenza vaccination rate among intercollegiate athletes at the target institution. The vaccination rate prior to the EBPIP among intercollegiate athletes was 13.4%. The desired outcome was to increase influenza vaccination rate to 50% among the total population of intercollegiate student athletes at target

institution. The goal of 50% vaccination rate is slightly above the Healthy Campus 2020 goal for influenza vaccine uptake among college students of 44% (ACHA, 2018) and below the CDC goal of 80% for adults 18-64 years of age (2018). Additional support for the goal of 50% is drawn from the ACHA National College Assessment Data Report showing the influenza vaccination rate at 134 self-selected institutions was approximately 50% (ACHA, 2019). The secondary purpose was to explore athlete's previous vaccination behaviors and explore the reasons they chose to be vaccinated to guide future influenza vaccination endeavors.

### **Guiding Models and Frameworks**

This EBPIP integrated several models to guide the planning and implementation phases. The evidence-based practice process was utilized to formulate the clinical question and to guide the literature review. The Model for Improvement (MFI) (Langley et al., 2009) guides the intervention process. The Health Belief Model (Rosenstock et al., 1988) provides a framework for understanding past and current immunization behaviors and gave structure to the questions in the survey given at the vaccination events.

### **PICOT Question**

The initial step of the evidence-based practice (EBP) process is to foster a spirit of inquiry within an evidence-based culture (Melnyk & Fineout-Overholt, 2015). The next step is to formulate a clinical question (Melnyk & Fineout-Overholt, 2015). The question is constructed in a format known as the PICOT format. Each letter of the acronym represents a portion of the clinical question as follows: P is for the population of interest, I is for the intervention or issue of interest, C is for comparison, O is for the desired outcome and T is for the time period. The PICOT question for this evidence-based practice improvement project is: In intercollegiate athletes, how does implementation of a multicomponent intervention designed to increase

influenza vaccination rate compare to the current influenza vaccination effort in regard to vaccination rate of the intercollegiate athlete population within the 2019 - 2020 influenza season?

The framework guiding the multicomponent EBPIP to improve vaccination rate among intercollegiate athletes is the Model for Improvement (MFI) (Langley et al., 2009). The MFI has been used to improve processes and outcomes within a variety of healthcare organizations. The MFI has two components which include three fundamental questions and the Plan, Do, Study, Act (PDSA) cycle (Langley et al., 2009). The model is characterized by three fundamental questions: What are we trying to accomplish? How will we know that a change is improvement? What change can we make that will result in improvement? To answer the first question, the team must develop an aim statement. The aim statement helps to sharpen the focus and determine the goal of the improvement project. The next step is to determine measures that will help to determine if improvement is actually occurring. The last step before starting the Plan, Do, Study, Act (PDSA) portion of the model, is to determine what intervention or interventions will lead to improvement. Once the three fundamental questions are answered, the PDSA cycle is begun. The design of the PDSA cycle is sequential and the intention is that there will be incremental improvement with each execution of the cycle and that, over time, through numerous small efforts, large improvements will occur (Provost & Murray, 2011). The first step is to make a “Plan” for how the project will be carried out. Once the plan is in place, it is carried out in the “Do” portion of the cycle. During this phase, the team is documenting problems and unexpected observations and beginning to analyze the data. The “Study” phase involves completion of data analysis and summarizing what has been learned. The last phase of the PDSA cycle is to “Act.” This means to decide what changes need to be made and what will the

next cycle look like. This model is frequently used in QI projects because it can be used in a variety of settings, it facilitates teamwork and provides a framework for the application of statistical tools (Provost & Murray, 2011). The MFI model facilitates the opportunity for ongoing iterations once the initial intervention has concluded. The MFI model will guide future cyclical and incremental improvements to the influenza vaccination offering on campus.

The framework used to guide the survey portion of this project is the Health Belief Model (HBM) originally developed by Rosenstock et al. (1988). The HBM has been used to determine the probability of an individual to adopt health behaviors (Rosenstock et al., 1988). The model has been adapted and expanded over the years to include six main constructs: Perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy. Studies have shown a considerable amount of misconceptions about the severity of the influenza disease (Ramsey & Marczinski, 2011, Yang, 2012). Blue and Valley (2002) utilized the concepts of the HBM to guide their survey to predict influenza vaccination uptake by adult workers. The HBM guides the assessment of the perceived susceptibility and severity of the disease among the target population (intercollegiate student athletes) for the survey portion of the EBPIP. The survey will guide future interventions by exploring what influenced the athlete's decision to vaccinate.

## **Review of the Literature**

### **Search strategies**

A search of the literature was conducted using the following databases Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Cochrane Library. The keywords utilized for the literature search were: flu vaccine, college students and improvement vaccination rate. The Boolean operator AND was used to combine flu vaccine, college students

and improvement vaccination rate. The search criteria included full text articles, in English, published in peer review journals since 2009. Each article's title was reviewed and if the title seemed relevant to the PICOT question the abstract was reviewed. Additional articles were found by manual search of the reference lists of the relevant articles (n=10) and by using the "find similar articles" feature in PubMed. Further search results were generated utilizing the "cited in" function of PubMed. Key articles were entered and all "cited in" references were reviewed looking for pertinent articles.

### **Exclusions**

The exclusion criteria of articles included those articles not specific to the PICOT question. Articles were excluded based on setting such as primary and secondary schools, acute care and long term care settings. In addition, articles not in the English language were excluded. Furthermore, articles were excluded that did not pertain to improving vaccination rates in ambulatory settings or articles focused on age groups not similar to the project population.

### **Inclusions**

The PICOT question guided the inclusion criteria. Articles published after 2009, published in the English language articles from various countries were included. Articles pertaining to improvement of vaccination rates were included, even if they were not specific to influenza. In addition, articles were included that were most similar to the setting of the EBPIP project such as community based and ambulatory settings. Inclusion criteria was young adult to middle age population. The synthesis table is in Appendix A and strength of recommendation table is in Appendix B.

### **Appraisal**

Each article was evaluated based on the rating system for the hierarchy of evidence.

Types of articles include Level I systematic reviews (1) and meta-analysis (2); Level II randomized controlled trials (1); Level VI quality improvement (5); Level VII report of expert committees (1). The level of hierarchy of evidence rating system is provided in Appendix C.

## **Synthesis**

The influenza vaccine has been established as a safe and effective way to reduce the morbidity and mortality associated with the influenza virus (CDC, 2018; ODPHP, 2018). Research in athletes shows that the antibody response to vaccination is unaffected by exercise (Nieman, 2000). Several authors recommend that athletes should be routinely vaccinated against influenza (Lautermilch & Doyle-Baker, 2014, Nieman, 2000, Ross, Swain & Thomas 2001, Trabacchi et al, 2017). Several themes emerged from the synthesis of the available evidence on the improvement of influenza vaccine rate. Evidence validated the use of multicomponent initiatives as the most effective at improving influenza vaccination rate (Lam, Chambers, MacDougall, & McCarthy, 2010; Lau et al, 2012; Monn, 2016; Montejo, Richesson, Padilla, Zychowicz & Hambley 2017; NFID, 2016; Nowalk et al., 2010). Strategies used to improve influenza vaccination rate include: provider recommendation (Monn, 2016), reminders and recall (Jacobson, 2018; Lau et al., 2012), education of families and providers, promotional materials (posters, text messages, emails) use of social media (Nowalk et al., 2010; Montejo et al., 2017; Sharbaugh, 2017), increasing access and convenience (Peterson, Rajeshkaran & Thomsen, 2018), dedicated vaccination clinics, choice of vaccine delivery - intranasal or intramuscular (Nowalk et al., 2010; Peterson et al., 2018), enhanced use of electronic health record (Sobota et al., 2015) incentives (Lau et al., 2012; Montejo et al., 2017), no cost vaccine (Peterson et al., 2018), creation of patient registry, use of a patient navigator (Sobota et al., 2015) and, a policy requiring vaccination (Community Preventative Services Task Force, 2016). A Cochrane

Systematic Review including 59,328 adults demonstrated the effectiveness of increasing vaccination rates by using reminder interventions such as phone calls, post cards, and text messages (Jacobson, 2018). Minimal changes in vaccination rates were identified with campaigns involving only education or advertising efforts (Lam et al., 2010).

A quality improvement (QI) project involving intercollegiate athletes in Iowa identified some time-based barriers to vaccination that were mitigated by bringing the vaccine to the football facility. The Iowa QI project demonstrated an improved vaccination rate in the first year of the initiative from 11.9% to 40% by offering the vaccine on site in the athletic facility and an improvement in the second year of 40% to 83% by offering it at the facility and offering a choice of vaccine administration route, injection or intranasal (Peterson et al., 2018).

There is evidence of the reasons for the avoidance of influenza vaccination in the college population. Three key reasons included: misconception that one could contract influenza from the influenza vaccine, fear of serious side effects and the belief that they were not at risk for contracting the illness (Benjamin & Bahr, 2016, Merrill et al., 2010, Rogers et al., 2018).

### **Recommended Practice Change**

There is strong consensus among experts regarding the influenza vaccine preventing morbidity and mortality and evidence demonstrating the effectiveness of a multicomponent intervention to increase influenza vaccination rates. Consequently, the EBPIP at the target institution implemented a multicomponent intervention to increase influenza vaccination rate among intercollegiate athletes. The components were based on evidence in the literature and were comprised of education, use of promotional materials, reminders, increasing access and convenience (dedicated flu shot clinic exclusively for intercollegiate athletes, at times conducive to their practice schedule), and provider recommendation. In addition, a survey based on known

barriers to choosing flu vaccination and incorporating the concepts of the HBM was introduced at the time of vaccine for intercollegiate athletes.

## **Methods**

### **Project Setting / Population**

The EBPIP project was conducted at a private university of arts, science, and professional programs in rural southwest Ohio. Total enrollment is 3,963 undergraduate and graduate students, with 2,726 living on campus in residence halls. There is a four-year residential undergraduate program and graduate program comprised mostly of online students or commuters. The target population was intercollegiate student athletes, numbering 359, who compete in NCAA Division II University athletics. This population represents 13 percent of the students who live on campus. Students come from 48 states and there are 62 international students. There is no public transportation available and many students do not have a car. University Medical Services (UMS) is centrally located on campus near the student center and inside the same building as the fitness center and the athletic facility. UMS had over 7,000 visits in the 2018-2019 school year. There are two nurse practitioners and the medical director is a physician who is employed part time (four hours per week) and maintains a family practice off-site. The director is a full time registered nurse (RN). There are three full time RN's and one part time RN employed at UMS.

To obtain the most consistent data, the numbers of intercollegiate athletes and the number of influenza vaccinations given to them at UMS were calculated the same way prior to the EBPIP and afterwards. First, a comprehensive list of intercollegiate athletes was obtained from the NCAA compliance coordinator for the 2018-2019 academic year and is an Excel spreadsheet with the following categories: student ID number, name, sport, academic year and major. At the

same time, a report was run in the UMS electronic health record of all the influenza vaccines given in the 2018-2019 academic year and the two lists were cross referenced to determine the actual number of athletes who received a flu shot at UMS. This method accounts for all flu shots administered in athletes, the ones given to athletes who are nursing and pharmacy majors (who received shots at their respective dedicated clinics) and any athlete who scheduled the flu shot at UMS on their own.

### **Implementation using the Model for Improvement**

The EBPIP implementation process was guided by the MFI (Langley et al., 2009). The goal of this EBPIP was to improve influenza vaccination rate among intercollegiate athletes at the target institution. The EBPIP team will know that change is an improvement if influenza vaccination rates increase. Lastly, the team needed to decide what change could be made that will result in improvement. The team decided the implementation of a multicomponent intervention including education, use of promotional materials, reminders, increasing access and convenience of influenza vaccine, and provider recommendation may result in improvement. The next step was to commence the Plan, Do, Study, Act (PDSA) portion of the model.

### **PDSA**

#### ***Plan***

The planning phase of the Plan, Do, Study, Act (PDSA) quality improvement process began in the spring semester of 2019. The project leader identified and assembled a team. In addition, the project leader met with all stakeholders to inform them about the problem, the proposed improvement project and to begin to establish support and buy in.

#### **Human Subject Protection.**

Since this project is an EBPIP, it was anticipated that Institutional Review Board (IRB)

approval may not be required. However, during the planning phase, an IRB application was submitted to the university serving as the project site and the institution housing the author's doctoral program. Approval was granted by the IRB at the target institution. The biomedical IRB at the institution housing the author's doctoral program determined the EBPIP was not a human subjects study and waived the need for approval.

### **Barriers to implementation.**

Potential barriers to the implementation of an influenza vaccination initiative were identified during the planning phase. Ramsey and Marczynski (2011) identified five barriers to receiving the influenza vaccine among college students: fear of side effects, doubting the effectiveness of the vaccine, fear of harm to the immune system, lack of concern about the severity of flu illness and low self-perceived risk of acquiring the illness. Knowing that these misconceptions among the coaches athlete could limit team participation, this EBPIP project addressed these issues in the educational component (see Appendix D). According to Franks and Jandu (2017) individuals often forget about getting a flu vaccine (Franks & Jandu, 2017). Furthermore, a Cochrane systematic review of 75 studies (n=59,328) Jacobson et al. (2018) reported that reminders increase vaccination rate by an average of 8%. Consequently, providing reminders was an important aspect of this EBPIP to overcome this barrier (see Appendix E and F for reminder examples). Increasing the access and convenience of obtaining the influenza vaccination was thought to mitigate this barrier. It was anticipated that buy in from coaches and athletes would be influenced by their own personal experiences and education about the influenza vaccination.

Some individuals have a fear of injections which serves as a barrier to uptake of the influenza vaccination. One option to address this barrier identified in the literature is offering a

choice of delivery of vaccination (Nowalk et al., 2010; Peterson et al., 2018). The key stakeholders performed a risk benefit analysis of offering the live attenuated vaccine (intranasal delivery). UMS is used as a site for infusion of medications like infliximab and others which are immunosuppressants. The stakeholders determined the risk was not worth the potential benefit analysis for use of the intranasal option in this EBPIP.

Navigating the process within the current system to implement change was a challenging process. Each stakeholder possessed individual needs, preferences, expectations, and responsibilities. In addition, each person had a different perspective which provided the project leader with insight and guidance in preparing a strategy that balanced each entity's needs and preferences. Identifying dates and times for dedicated influenza vaccination clinics was an effort that involved multiple communications, compromise, and concessions over a few weeks among the various stakeholders. While trying to keep in mind the dates and times that worked for athletics, the project leader needed to consider the availability of rooms in UMS to conduct the vaccination events, the availability of staff to assist, and the ongoing appointments, service and events inside UMS.

### **Facilitators to Implementation.**

There are several conditions at the target institution that facilitated the implementation of the EBPIP project. The head athletic trainer and student health staff were supportive of influenza vaccination and were early adopters of the project from the initial stage. Many of the coaches expressed their support for the vaccination events. Sign up for the dedicated flu shot clinics exclusively for intercollegiate athletes was online to facilitate convenience. The existing model in place for influenza vaccination events coordinated by the SON and hosted by UMS was a process that was readily translated to the new population (intercollegiate athletes). There was no

out of pocket, point of care vaccination cost for the intercollegiate athletes. The \$22 cost of the vaccine was billed to the intercollegiate athlete's health insurance. UMS had an established system of ordering, storing, and billing for vaccine which made this process smooth. The UMS director readily agreed to ordering and storing the additional vaccine needed to accommodate the expected increase. All supplies were ordered and stored by UMS.

As support for the project grew, the project leader developed a checklist, timeline and logistics for completion of the project. Regular communication with all key stakeholders was maintained throughout the planning phase. At the end of the spring semester 2019, the project team was well established and ready for the next phase of the PDSA cycle.

### *Do*

The Do phase took place in the summer of 2019, starting with development of the educational materials, ordering of supplies, development of documentation procedures, and preparation of the project team for the implementation of the intervention. The multicomponent intervention took place in the fall semester 2019. Components included education, use of promotional materials, reminders, increasing access and convenience (dedicated flu shot clinic exclusively for intercollegiate athletes at times conducive to their practice schedule), and provider recommendation. In addition, the educational material was printed and placed in each coach's physical mailbox in the athletic facility. Posters were developed based on key messages from the CDC website (CDC, 2018) and incorporated into stylish 11 inch by 17 inch color posters with brief, intentional phrasing appealing to the intercollegiate athlete in large letters followed by the CDC messaging in smaller typeset. Reprints of the posters are in Appendix G. These posters were printed in color and placed at strategic locations. Smaller color posters advertising the dates of the dedication vaccination clinics exclusively for intercollegiate athletes

were printed and placed in the coaches' mailboxes. Access and convenience of the flu vaccinations was accomplished by offering three dedicated flu shot clinics exclusively for intercollegiate athletes at times conducive to their practice schedule. Reminders were sent via email by the project lead and also the athletic trainer (Appendices E and F) The flu shot clinics were held at UMS and the vaccines were administered and documented by SON students who were supervised by SON faculty. At the time of the clinics, athletes were checked in by SON staff and given a copy of the Informed Consent Form for Influenza Vaccination (Appendix H) which also contains an 11 item questionnaire to identify any possible contraindications to influenza vaccination. They were also given a copy of the CDC Vaccine Information Statement (VIS) for Inactivated Influenza Vaccine (Appendix I) and a copy of the one page, five item anonymous voluntary survey (Appendix J). They were escorted back to a private exam room by SON staff and a SON student, supervised by a SON faculty member would review the 11 item questionnaire. Once cleared for the vaccination, the athletes were vaccinated intramuscularly using sterile technique with the Fluarix quadrivalent inactivated influenza vaccine. A band aid was placed on the injection site and they were given a "I got my flu shot" sticker (Appendix H). The anonymous surveys were collected as the participants exited the UMS facility after the vaccination. Prior to the third vaccination event, the project lead sent a personalized email reminder to each coach (a sample is in Appendix F).

### ***Study***

The Study phase commenced following the dedicated influenza vaccination clinics in the early spring semester 2020. During this phase the project leader analyzed the data, looked for evidence of barriers and facilitators to improving influenza vaccination rate. Demographic data, sport, gender, academic year and previous influenza vaccination uptake along with current

vaccination uptake status were reviewed and analyzed by the EBPIP project team. The team reflected on lessons learned. Once the supply of influenza vaccine was completely exhausted at UMS, a report was run in the electronic health record of all the influenza vaccines given in the 2019-2020 academic year. A list of athletes for the 2019-2020 academic year was obtained from the NCAA compliance coordinator and the two lists were cross referenced to determine the actual number of athletes who received a flu shot. This replicates the method used to develop the 2018-2019 numbers, and accounts for all flu shots in athletes, the ones given at the dedicated clinics exclusively for athletes, plus the athletes who are nursing and pharmacy majors who received shots at their respective dedicated clinics and any athlete who scheduled the flu shot at UMS on their own

### ***Act***

According to the MFI PDSA model, during the act phase, there are three options for the EBPIP team to consider (Langley et al., 2009). The team may decide to adapt the multicomponent intervention by making modifications to the intervention and completing the PDSA cycle again. A second option in the MFI model is to adopt the intervention meaning that the EBPIP team would keep the intervention in its original configuration and apply it on a larger scale. A choice to abandon the intervention could also be made if the EBPIP determined that the effort wasn't effective or possibly a new idea needs to be developed. Because the influenza vaccination initiative was effective at increasing vaccination rate, but didn't reach the desired outcome, the EBPIP team decided to adapt the intervention (make modifications) and complete the PDSA cycle again.

### **Outcomes of Project**

The goal of the EBPIP was to improve influenza vaccination rate among intercollegiate

athletes at the target institution. The secondary outcome of the project, derived from the survey results, was to gain insight on athlete's previous vaccination behaviors.

The vaccination rate among intercollegiate athletes rose from 13.4% of intercollegiate athletes (51 of a total of 380) in the 2018-2019 influenza season to 25.6% (92 of a total of 359) in the 2019-2020 influenza season. Although the goal of 50% was not achieved, the implementation of a multicomponent evidence-based practice improvement project nearly doubled the vaccination rate among intercollegiate athletes at the target institution.

During the implementation of a multicomponent EBPIP improvement project during October and November of 2019, 49 influenza vaccines were given to intercollegiate athletes during three dedicated flu shot clinics on 10/22/2019, 10/25/2019, and 11/7/2019. The total number of intercollegiate athletes who were vaccinated for influenza in 2019-2020 was 92. The total of 92 includes the 49 intercollegiate athletes receiving the vaccine at one of the three dedicated intercollegiate athlete flu vaccine clinics, 41 intercollegiate athletes who were nursing majors (vaccinated separately at a nursing major flu vaccine clinic) and two intercollegiate athletes who scheduled an influenza vaccination visit at University Medical Services (UMS). For comparison, in 2018-2019, 51 intercollegiate athletes were vaccinated for influenza at UMS, and of those 51, 44 were nursing or pharmacy majors. During the 2018-2019 academic year, of the 51 intercollegiate athletes vaccinated at UMS, only 7 were non-nursing, non-pharmacy majors representing a vaccination rate of 1.8%. Intercollegiate athletes who were nursing or pharmacy majors remained consistent between 2018-2019 (n=44) and 2019-2020 (n=41). The increase in vaccinations among intercollegiate athletes from 51 in 2018-2019 to 92 in 2019-2020 was facilitated by the multicomponent EBPIP.

The participants in the dedicated influenza vaccination clinics were comprised of 23 males (46.9%) and 26 females (53.1%). In addition, the participation based on class year was freshman 34.7% (n=17), sophomore 24.5 % (n=12), junior 26.5% (n=13), and senior 14.3% (n=7). The participation among athletic teams varied. The basketball teams represented the highest number of participants with 42.8% (n=21) and there were 3 teams with no athletes in attendance: men's and women's cross country and cheerleading. Other sports represented were soccer 22% (n=11), volleyball 12.2% (n=6), golf 6.1% (n=3), track 6.1%(n=3), baseball 4% (n=2), softball 4% (n=2), and tennis 2% (n=1). Please see Appendix L and M for additional information.

During the dedicated flu vaccination clinics, intercollegiate athletes were given a five item, anonymous, voluntary survey to complete. The purpose of the survey was to assess the perceived susceptibility and severity of influenza among the intercollegiate athletes. In addition, the survey explored the influences on the decision to vaccinate. The survey results are incorporated into the categories of the multicomponent intervention below. Please refer to Appendix N for full report on survey results. Among athletes who received vaccination at one of the dedicated flu shot clinics exclusively for athletes, 73% identified reminders as an influencer of getting the flu shot this year.

## **Discussion**

Nurse practitioners (NPs), through experience and education are equipped to lead EBPIPs to improve population outcomes. This EBPIP required the translation of evidence and the use of implementation science to improve vaccination rates among the sub-population of intercollegiate athletes. This multicomponent EBPIP nearly doubled the influenza vaccination rate among intercollegiate athletes at the target institution. Furthermore, this EBPIP demonstrated both

financial and system sustainability for future PDSA reiterations, as well as the capacity to expand to accommodate all intercollegiate athletes at the target institution.

The multicomponent EBPIP is sustainable from a financial perspective. There was no out of pocket, point of care vaccination cost for the intercollegiate athletes. The \$22 cost of the vaccine was billed to the intercollegiate athlete's health insurance. Of those vaccinated during the dedicated flu shot clinics, 77% were paid by health insurance, 16 % had to pay through their student account and 6% were paid for by athletic department. All vaccinations were paid for, making the project sustainable in the future. The flu shot clinics did not increase or exceed capacity at UMS related to scheduling, staff workload or facility space including room availability.

This EBPIP is sustainable from an organizational systems perspective. The key stakeholders were influential in the success of the project and additionally it provided a valuable collaboration opportunity. The EBPIP provided the athletic trainer a mechanism to improve health promotion and disease prevention in the intercollegiate athletic population. The SON students, faculty, and staff involvement in the flu shot clinics is a tested process and sustainable for future iterations. Furthermore, the SON students were eager to gain additional skills and confidence with administering influenza vaccinations. The UMS director and professional staff valued the expansion of preventative services with support from the SON for administration and documentation of vaccines.

The EBPIP has the capacity to expand to accommodate all intercollegiate athletes at the target institution. The project leader established rapport with key stakeholders and facilitated communication and collaboration across campus. Throughout the planning and implementation of the project, the project leader identified organizational barriers and developed strategies to

overcome them. Following the conclusion of the EBPIP, the project leader met with key stakeholders to analyze data, evaluate the barriers, facilitators and results, compare the data to predictions and summarize and reflect on lessons learned. Opportunities to expand capacity are based on established, mutually beneficial relationships with key stakeholders.

### **Practice implications**

The utilization of the flu shot clinics varied among intercollegiate sports teams. The women's and men's basketball coaches modeled commitment to the flu shot initiative through communication with players to schedule a time for the vaccination clinic and came with the team to be vaccinated. Uddin et al. (2010) reported that students are influenced by others in their decision whether to not to get the influenza immunization (Uddin et al, 2010). By setting this example, the coaches may have provided inducement for the athletes to get the flu shot. There was low participation among the track and cross-country athletes. The trend for attendance at the dedicated flu shot clinics was that the early appointments were always filled with a large gap in the middle time slots and then the later appointments were filled. The cross-country coach cited the low attendance from the team "because they were still in their competitive season." Although Nieman (2000) reports the body's antibody response to vaccination is not affected by bouts of exercise, Trabacchi et al, (2017) recommend vaccinating athletes during periods free from trainings and competitions due to the possibility that some side effects (mild local reactions, soreness, fever, headache) might reduce athletes' performances in terms of physical strength and efficiency. Competing with this preference is the recommendation by ACIP that the influenza vaccine be administered by early October (Grohskopf et al, 2018).

In a meta-analysis in 2016, Moran and Del Valle found that there was a gender difference between men and women with regard to protective behaviors in respiratory epidemics like

influenza. The authors suggest that men were approximately 12% more likely than women to practice pharmaceutical behaviors such as obtaining a vaccination or taking an anti-viral when diagnosed with influenza (Moran & Del Valle, 2016). This finding was not supported in this intercollegiate athlete population. The participation by women in influenza vaccination was consistently higher than men, both before and after the multicomponent initiative. However, greater improvement in influenza vaccination rates was seen in men with the intervention.

### **Future Recommendations and Conclusion**

The need for improving influenza vaccination rate at the target institution is evident. Although the EBPIP nearly doubled the vaccination rate, it is still below the goal of Healthy Campus 2020. The IHI MFI (Langley, 2009) and PDSA model were used as the framework to guide this EBPIP because it facilitates the opportunity for ongoing iterations once the initial intervention has concluded. The final stage of the PDSA cycle is to Act. This phase involves making modifications to the intervention, testing it on a larger scale, and preparing for the next PDSA cycle (Langley et al., 2009). In preparation for the next PDSA cycle there are areas that need modification. Surveys were given at the flu vaccine clinics and the results will inform the next cycle. In addition, the EBPIP multicomponent intervention included education, use of promotional materials, reminders, increasing access and convenience, and provider recommendation and this structure will inform the next cycle.

#### **Education**

The education portion of the intervention needs to be expanded. A focus group of athletes and coaches could be assembled to reflect on the initial EBPIP and give feedback for improvement. Athletic trainers and coaches need to take a more active role in influenza education dissemination. Based on survey results the morbidity and mortality of influenza needs

to be reinforced. The project leader and the athletic trainer need to collaborate together in the education of coaches and intercollegiate athletes.

### **Promotional Materials**

The promotional materials centered on visual posters in key locations within the intercollegiate athletic facility. The messaging was intentional, succinct, and tailored to the competitive mindset. Posters will be utilized again in the next iteration of the EBPIP.

### **Reminders**

The athletic trainer at the target institution was a true champion of the EBPIP. His commitment and support were critical to implementation. He sent numerous email reminders to athletes and coaches and gave in person reminders to coaches at regular meetings (see Appendix O). This reminder schedule will be a part of the EBPIP in the next cycle. Reminders were effective in this EBPIP, and will be utilized and expanded in the next iteration. The use of text message reminders should be utilized in the next cycle of the EBPIP.

### **Increasing Access and Convenience**

The survey results support the importance of access and convenience for the intercollegiate athletes seeking an influenza vaccine. The scheduling of the clinics needs to adhere more closely with the athlete's practice schedule and the timing within the competitive season. The use of intranasal vaccination (if available) should be considered for the 2020-20201 academic year. Peterson et al (2018) showed improvement in influenza vaccination rate by offering the intranasal option.

### **Provider Recommendation**

Monn (2016) emphasized the impact of the recommendation of a healthcare provider. In this EBPIP, the athletic trainer served in this role. The project lead had limited access to the

intercollegiate athletes and in the next iteration it will be helpful to increase direct access with intercollegiate athletes and coaches. The athletic trainer at the target institution identified that coaches have influence with the athletes on their team and incorporated them into this process. Future influenza vaccination initiatives will include stronger provider recommendation efforts.

### **Strengths and Limitations**

One of the strengths of the EBPIP was the team of key stakeholders. The buy in from the athletic trainer, the faculty, staff, and students of the SON, the UMS director and staff nurses were key facilitators in the planning and implementation of the multicomponent EBPIP intervention. Key stakeholders brought a unique skill sets and perspectives that contributed insight and guidance in preparing a strategy that balanced each entity's needs and preferences. The athletic trainer served as a critical communication link between the project team, coaches and athletes. Buy in from the UMS director simplified the purchase, storage of the influenza vaccine and supplies, and accommodated the use of the UMS ambulatory facility to host the dedicated intercollegiate athlete flu vaccination clinics. The faculty from the SON supplied training and supervision for the nursing students who performed the vaccinations at the flu shot clinics. A key staff member in the SON facilitated the recruitment of students, the sign-up process, the documentation, communication and administration of the flu shot clinics

One of the biggest limitations of this EBPIP project was the inability to determine the reasons for the varied utilization of the flu shot clinics by the different athletic teams. The survey offered some insight about reasons athletes chose not to vaccinate previously, but this came from a group of athletes who were already choosing to vaccinate. No data about reasons for not being vaccinated is available from the 74.3% of athletes who were unvaccinated in the 2019-2020 academic year. Reminders by email, poster and in person were utilized, but evidence shows that

text message reminders are more effective (CTIA, 2019). These limitations could be addressed in the next cycle of the EBPIP.

### **Next Steps**

The final stage of any EBPIP is the dissemination of results in the communication of outcomes to the healthcare community. This EBPIP will be disseminated in several ways. First, this paper and final defense will be submitted to the faculty at the College of Nursing at University of Toledo. Next, the results of this EBPIP will be presented to key stakeholders at the target university including a presentation of the EBPIP results to the staff at UMS and the intercollegiate coaches in August of 2020. Because one of the key stakeholders was the athletic trainer, and because the project leader has 25 years prior experience as an athletic trainer, a proposal will be submitted for consideration as a podium presenter at the Annual Meeting of the Great Lakes Athletic Trainers Association (GLATA) in March of 2021. The athletic trainer is a member of the GLATA and the university is in Ohio which is one of the states represented in the GLATA membership. Lastly, due to the population being comprised of college students, and the flu shot clinics being administered at the student health facility, a manuscript will be prepared for submission to the Journal of American College Health (JACH). The JACH is the only scholarly publication devoted entirely to college students' health and has a focus on preventive medicine, health promotion, environmental health and safety, nursing assessment, interventions, management, pharmacy, and sports medicine.

### **Conclusion**

College students have lowest vaccination rate of all adults with a range 8%-30% (Nichol et al., 2010; Rogers et al., 2018). At the target institution, in 2018-2019 intercollegiate athletes had a 13.2% influenza vaccination rate. Through the implementation of a multicomponent

EBPIP, vaccination rate among intercollegiate athletes rose from 13.4% to 25.6%. A repeat cycle of the EBPIP with modifications and replicating the use of the MFI PDSA for implementation is already in progress. This EBPIP was successful in improving vaccination rate in intercollegiate athlete and has laid a firm foundation for future practice improvement at the target institution. Increase in influenza vaccination rate was achieved through use of the EBPIP process, development of a strong, committed team, and the cooperation of all key stakeholders.

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Appendix A

Synthesis Table

<b>Study Author</b>	<b>Year</b>	<b>N =</b>	<b>Age group</b>	<b>Study design</b>	<b>Intervention</b>	<b>Major finding</b>
Jacobson	2018	59,328	Adults	Systematic review	Reminders	Systematic review of 75 studies show that reminders increase vaccination rate by an average of 8%
Lam	2010	12 studies	Adults	Systematic review	Studies included health care workers and non-health care workers	Campaigns involving only education or promotion resulted in minimal changes in vaccination rates.
Lau	2012	77 studies	Adults	Meta-analysis and systematic review	Evaluated research done to improve vaccination rates of influenza and pneumococcal vaccines in community dwelling adults	Interventions that appeared effective were patient financial incentives, audit and feedback clinician reminders, clinician financial incentives, team change, patient outreach, delivery site changes. Patient outreach was more effective if personal contact was involved. Team changes were more effective where nurses administered influenza vaccinations independently.
Monn	2016	299	College students	Quality improvement	Provider education; media (Facebook, college web portal, wellness newsletter, posters); immunization clinics; and provider recommendations	The number of students vaccinated at the college increased by 226%.

<b>Study Author</b>	<b>Year</b>	<b>N =</b>	<b>Age group</b>	<b>Study design</b>	<b>Intervention</b>	<b>Major finding</b>
Montejo	2017	246	>18	Quality improvement	Strategy to improve vaccination rate in retail employees involved multiple components: No cost immunization, on-site influenza immunization, a choice of vaccine delivery (injectable or intranasal), a gift incentive for immunization uptake, promotional materials (i.e., posters and flyers), and nurse practitioners provided flu shot education to employees. Stickers indicating receipt of immunization.	Two similar retail sites were studied. The initiative was done at one site and the other served as control. On site immunization rate at initiative facility was 45% vs 32% at the comparison site, only 32%
NFID	2016	n/a	College students	Expert opinion	National Foundation for Infectious Diseases (NFID) convened a College Influenza Stakeholder Summit that included subject matter experts from academia, student organizations, professional medical associations, patient advocacy organizations, and industry. They developed recommendations.	Recommendations: Conduct research to better understand and quantify vaccination gaps, as well as student motivators and influencers. Build solidarity among college, professional, and student organizations to highlight the importance of flu prevention Facilitate best practice sharing and encourage uptake of existing flu education/vaccination resources Instill annual flu vaccination habit before the transition to college. Make flu vaccination accessible for college health services and students

<b>Study Author</b>	<b>Year</b>	<b>N =</b>	<b>Age group</b>	<b>Study design</b>	<b>Intervention</b>	<b>Major finding</b>
Nowalk	2010	12,222	Adults	Randomized trial	Control sites advertised and offered vaccine clinics as previously done. Choice sites offered LAIV or TIV and maintained their previous advertising level but promoted the choice of vaccines. Choice Plus sites increased advertising and promoted and offered a choice of vaccines and a nominal incentive.	Factors significantly associated with increased vaccination were older age, female gender, previous company vaccination rate, and the Choice Plus intervention (increased advertising and promoted and offered a choice of vaccines and a nominal incentive)
Peterson	2018			Retrospective cohort, quality improvement	Improve vaccine availability by making it available in the athletic facility, offer alternative methods of vaccine delivery (LAIV and TIV)	Both vaccine availability in the athletic facility and the availability of an intranasal vaccine option improved vaccination rates 700%. When the intranasal vaccine was unavailable in the second year, vaccination rate fell by 21% compared to year one despite the ongoing availability of the injectable vaccine in the football complex
Sharbaugh	2017	129	College students	Quality improvement	Text messaging combined with online education resources	84% of participants in the intervention group received influenza vaccination at student health site on campus
Sobota	2015	164	6 mos to 21 years	Quality improvement	Pediatric sickle cell disease clinic developed initiative to increase the influenza	80% of patients were vaccinated first year and 90 % the second year. Concluded that use of quality

					vaccination rate using parent and provider education, enhancement of our electronic health record (EHR), use of a patient registry and reminder and recall done by a patient navigator.	improvement methods can increase rates of influenza vaccination for pediatric sickle cell population
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Appendix B

**Strength of Recommendation Table**

<b>Recommendation</b>	<b>Strength of Evidence for Recommendation</b>	<b>References in Support of Recommendation</b>
<p>Multicomponent initiatives are the most effective at improving Influenza vaccination rate.</p>	<p>Moderate</p>	<p>Lam et al (2010)                      Lau et al (2012)                      Monn (2016)                      Montejo (2017)                      NFID (2016)                      Nowalk (2010)</p>
<p>Strategies used to improve influenza vaccination rate include:</p> <ul style="list-style-type: none"> <li>- reminders and recall</li> <li>- education of families and providers</li> <li>- promotional materials( posters, text messages, emails)</li> <li>- increasing access and convenience</li> <li>- choice of vaccine delivery(intranasal or intramuscular)</li> <li>- enhanced use of electronic health record</li> <li>- incentives</li> <li>- no cost vaccine</li> <li>- creation of a patient registry</li> <li>- use of a patient navigator</li> <li>- policy requiring vaccination</li> <li>- provider recommendation</li> <li>- use of social media</li> <li>-dedicated vaccination clinics</li> </ul>	<p>Moderate</p>	<p>Jacobson (2018)                      Lau (2010)                      Monn (2016)                      Montejo (2017)                      NFID (2016)                      Nowalk (2010)                      Peterson (2018)                      Sharbaugh (2017)                      Sobota (2015)</p>

<b>Recommendation</b>	<b>Strength of Evidence for Recommendation</b>	<b>References in Support of Recommendation</b>
Reminding people by phone calls, post cards, text messages has been shown to be effective at increasing vaccination rate in all age groups. A combination of reminders is also effective.	Strong (Cochrane systematic review)	Jacobson (2018) Lau (2010)
Campaigns involving only education or promotion resulted in minimal changes in vaccination rates.	Strong - systematic review of 99 studies	Lam (2010)

## Appendix C

### Rating System for the Hierarchy of Evidence

Level 1	Systematic review or meta-analysis of relevant RCTs
Level 2	Well-designed RCTs
Level 3	Well-designed non-randomized control trials
Level 4	Well-designed case-control and cohort studies
Level 5	Systematic reviews of descriptive and qualitative studies
Level 6	Single descriptive or qualitative studies
Level 7	Opinion of authorities or reports of expert committees

Adopted & Modified from Guyatt, G., & Rennie, D. (2002). *Users' guides to the medical literature*. Chicago, IL: American Medical Association; Harris, R., Hefland, M., Woolf, S., Lohr, K., Mulrow, C., Teutsch, S., et al. (2001). Current methods of the U.S. Preventive Services Task Force: A review of the process. *American Journal of Preventive Medicine*, 20, 21-35.; Melynck, B., & Fineout-Overholt, E. (2015). *Evidence based practice in nursing and healthcare* (3rd ed.). Baltimore, MD: Wolters Kluwer, 11.

## Appendix D

### Educational document for coaches



#### CU Yellow Jackets Flu Shot Initiative

**Problem:** Influenza is an acute, contagious respiratory illness that resulted in 960,000 hospitalizations and 79,000 deaths in 2017-2018. Influenza affects 1 in 5 college students yearly. The flu typically results in 8 days of missed activities (classes, practice and athletic participation) (CDC, 2018)

#### Facts:

- Influenza spreads rapidly in close knit communities - like college campuses
- Getting a flu shot reduces the incidence of flu
- College students have lowest vaccination rate of all adult groups
- Traditionally, the rate of CU athletes getting flu shots is very low
- The flu shot is safe - you can't get the flu from the flu shot
- Increasing availability and convenience of flu shots results in increases flu shot uptake and decreased incidence of flu among athletes
- Potential side effects don't happen to everyone and when they do, they are mild and short-lasting: soreness, redness, or swelling where the shot was given, low grade fever, mild body aches. Taking Tylenol helps. Unlikely anyone will miss class or practice.

#### Goal:

Increase the number of CU athletes who receive the flu shot this year

Increasing the number of flu protected athletes should result in lower incidence of flu among athletes, less missed class time, missed practices and missed athletic events

#### Proposal:

Offer a flu shot initiative tailored to the CU athletes that is easy and convenient for them at minimal cost and implement it in the Fall of 2019

- Flu shot clinic held in UMS at a time that is quick and convenient for athletes
- Flu shot clinic will be exclusively for athletes during that designated time

#### Cost:

Cost is \$22 and can be handled in one of three ways

- billed to insurance (most pay for this without any issues)
- billed to student account (if insurance doesn't pay)
- pay with credit card, debit card or Health Savings Account card

#### Questions?

Ask Wes Stephens (wrstephens@cedarville.edu) or Cliff Fawcett (cwfawcett@cedarville.edu)

**PREVENT THE FLU - PREVENT LOST TIME**

## Appendix E

### Reminders from Athletic Trainer

#### Email announcing project

Coaches and athletes,

UMS is partnering with athletic training to offer a flu shot clinic. Please sign up for a time slot. I encourage you to do this as a team and come together. This is something you can do to protect the health of yourself and your teammates and also the investment you will make preparing for your season.

Flu Shot Clinic Dates and Times:

Tuesday October 22 4:00 pm -6:00 pm

Friday October 25 1:00 pm -3:00 pm

Thursday November 7 3:00 pm -5:00 pm

I'm planning to get in on one of those days and make sure that I get my shot as well. Probably the Friday 1pm time slot. If you need someone to hold your hand cause you're scared of needles join me :o)

Wes

## Appendix E (cont'd)

### Email reminder day before first flu shot clinic

Day before reminder to all athletes – email

Student Athletes,

Please remember to sign up for the Flu shot on the 3 dates we are making available to you. We hope by making this convenient (less than 5 minutes of your time) we can improve the use of the flu shot to prevent its impact on our athletic teams.

The links are attached below for October 22nd (tomorrow), October 25th, and November 7th. Each sign up form is specific to an available date. Please make sure that you use the time that you sign up for.

In most cases your insurance should cover the entire cost of the shot. If it does not, the cost is \$22, which will be billed to your student account unless other arrangements have been made. If you are unsure if your insurance will cover the shot, please give the number for customer service a call on your insurance card and ask.

Remember:

- 1) "You can't get the flu from the flu shot, not possible"
- 2) "The side effects of the flu shot are mild and short-lasting - and include sore arm, redness or swelling where the shot was given, low grade fever or body aches"
- 3) "Influenza is a potentially serious disease that can lead to hospitalization and sometimes even death"  
- Protect yourself and your team from missing practices and playing time from the flu!

Let's have a healthy flu season! :o)

Wes

[Preview attachment October 22, 2019 Athletic Flu Clinic](#)

[October 22, 2019 Athletic Flu Clinic](#)  
[Shared in Drive](#)

[Preview attachment October 25, 2019 Athletic Flu Clinic](#)

[October 25, 2019 Athletic Flu Clinic](#)  
[Shared in Drive](#)

[Preview attachment November 7, 2019 Athletic Flu Clinic](#)

[November 7, 2019 Athletic Flu Clinic](#)

## Appendix F

### Reminder email to coaches from project leader

Dear Coach

Tomorrow afternoon 3-5 is the last opportunity for your players to get a flu shot at an event specifically and exclusively for athletes.

I have only seen a few of the <<fill in blank>> players so far

The Flu shot is the best way to reduce practices and games missed due to influenza

**Reasons players avoid it and the facts:**

Fear of side effects

**Side effects are mild and only last a short time**

Doubting the effectiveness of the vaccine

**The vaccine works**

Fear of harm to the immune system

**There is no harm to the immune system**

Lack of concern about the severity of flu illness

**Flu is serious. It killed over 61,200 people last year and hospitalized 647,000**

Low self-perceived risk of acquiring the illness

**Athletes are at greater risk for getting the flu**

Sincerely,

Appendix G  
Reprints of Posters

YOUR BEST  
**DEFENSE**  
IS THE **FLU**  
**SHOT**

\*\*\*Influenza is a potentially serious disease that can lead to hospitalization and sometimes even death\*\*\*

 [\\*\\*www.cdc.gov/flu/prevent/keyfacts.htm](http://www.cdc.gov/flu/prevent/keyfacts.htm)

**MAKE PLAYS NOT EXCUSES**

\*\*\*"The side effects of the flu shot are mild and short-lasting and not everyone gets them. If you do get them they are a sore arm, low grade fever or body aches and last about a day"

 [\\*\\*www.cdc.gov/flu/prevent/keyfacts.htm](http://www.cdc.gov/flu/prevent/keyfacts.htm)



**Intercollegiate Athletes Only**



**Don't miss  
practice  
because of the  
Flu**

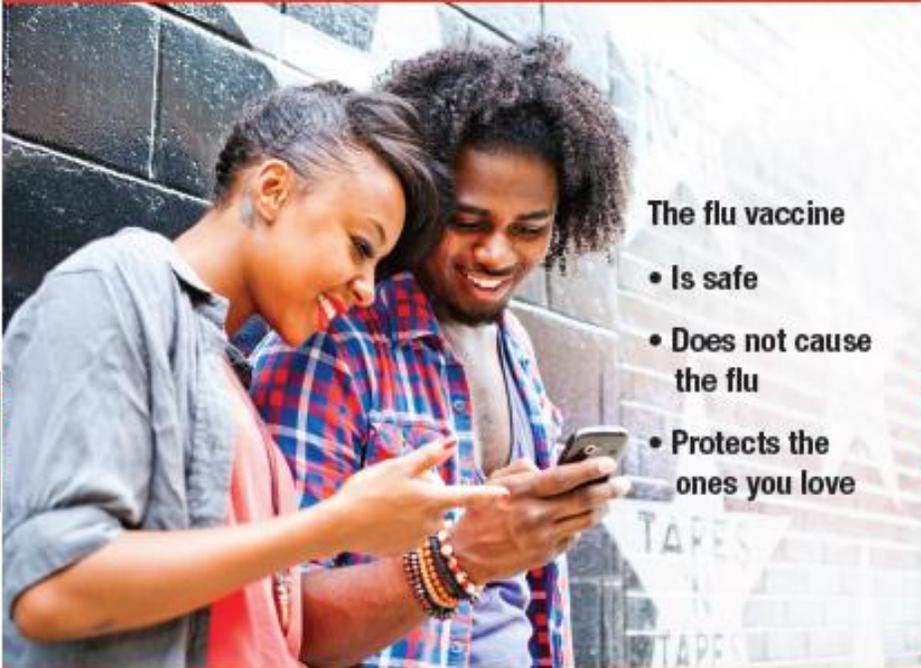
## **CU Yellow Jackets Flu Shot Clinic**

Tuesday October 22	4:00 pm - 6:00 pm
Friday October 25	1:00 pm - 3:00 pm
Thursday November 7	3:00 pm - 5:00 pm

**Even healthy people can get the flu, and it can be serious  
The average time out of activity with the flu is 8 days**

**Protect yourself  
and  
your teammates  
from getting sick from the flu.**

**#FightFlu**



The flu vaccine

- Is safe
- Does not cause the flu
- Protects the ones you love

**Spread the word and  
Get VACCINATED!**



For more flu facts go to  
[www.cdc.gov/flu](http://www.cdc.gov/flu)  
800.232.4636



## Appendix H

### UMS informed consent form for inactivated influenza vaccine



Patient Name \_\_\_\_\_ ID# \_\_\_\_\_

Date of Birth \_\_\_\_\_ Cell Phone # \_\_\_\_\_

2019-20 UMS Screening Questionnaire for the Seasonal Influenza Vaccination	Yes	No	Don't Know
1. Are you sick today?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are you allergic to medications, food, a vaccine component, or latex?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Have you ever had a serious reaction after receiving a vaccine?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Do you have a long term health problem with heart disease, lung disease, asthma, kidney disease, metabolic disease (diabetes), anemia, or other blood disorder?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Do you have cancer, leukemia, HIV/AIDS, or any other immune system problem?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. In the past 3 months, have you taken medications that affect your immune system such as prednisone, other steroids, or anticancer drugs; drugs for treatment of rheumatoid arthritis, Crohn's disease, or psoriasis; or have you had radiation treatments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Have you had a seizure or a brain or other nervous system problem?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. During the past year, have you received a transfusion of blood or blood products, or been given immune (gamma) globulin or an antiviral drug?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Females only: Are you pregnant or is there a chance you could become pregnant during the next month?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Have you received any vaccinations in the past 4 weeks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Have you already received a flu vaccination in the past few months? <i>If yes, when and where?</i> _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A current copy of UMS "NOTICE OF PRIVACY PRACTICES" is available on the UMS website under the Patient Rights section (<http://www.cedarville.edu/departments/ums/forms/umsnoticeofprivacypractices.pdf>) or you may request a copy from the receptionist.

I have read the Vaccine Information Statement provided with this form, and I have had a chance to ask questions. I understand the benefits and risks of the vaccination and request that the vaccine be given to me or to the person named above for whom I am authorized to sign.

\_\_\_\_\_  
Signature (Person receiving vaccine or Parent/Guardian) \_\_\_\_\_  
Date

For UMS Staff Only						
Date of Service	Immunization ICD-10 Z23 CPT 90686	Dose	Route & Location	Manufacturer/ Lot Number	VIS Date	Signature & Title of Healthcare Staff CPT 90471
	Fluarix Quadrivalent	0.5ml	I.M. R/L Deltoid	GlaxoSmithKline Lot #	08/07/2015	

Vaccination NOT given \_\_\_\_\_ (See medical record) OFFICE USE ONLY: Student Acct \_\_\_\_\_ Private Insurance \_\_\_\_\_  
Healthcare Staff Initials

## Appendix I

### CDC Vaccination Information Statement

#### VACCINE INFORMATION STATEMENT

## Influenza (Flu) Vaccine (Inactivated or Recombinant): *What you need to know*

Many Vaccine Information Statements are available in Spanish and other languages. See [www.immunize.org/vis](http://www.immunize.org/vis)

Hojas de información sobre vacunas están disponibles en español y en muchos otros idiomas. Visite [www.immunize.org/vis](http://www.immunize.org/vis)

### 1 Why get vaccinated?

Influenza vaccine can prevent influenza (flu).

Flu is a contagious disease that spreads around the United States every year, usually between October and May. Anyone can get the flu, but it is more dangerous for some people. Infants and young children, people 65 years of age and older, pregnant women, and people with certain health conditions or a weakened immune system are at greatest risk of flu complications.

Pneumonia, bronchitis, sinus infections and ear infections are examples of flu-related complications. If you have a medical condition, such as heart disease, cancer or diabetes, flu can make it worse.

Flu can cause fever and chills, sore throat, muscle aches, fatigue, cough, headache, and runny or stuffy nose. Some people may have vomiting and diarrhea, though this is more common in children than adults.

Each year **thousands of people in the United States die from flu**, and many more are hospitalized. Flu vaccine prevents millions of illnesses and flu-related visits to the doctor each year.

### 2 Influenza vaccine

CDC recommends everyone 6 months of age and older get vaccinated every flu season. **Children 6 months through 8 years of age** may need 2 doses during a single flu season. **Everyone else** needs only 1 dose each flu season.

It takes about 2 weeks for protection to develop after vaccination.

There are many flu viruses, and they are always changing. Each year a new flu vaccine is made to protect against three or four viruses that are likely to cause disease in the upcoming flu season. Even when the vaccine doesn't exactly match these viruses, it may still provide some protection.

Influenza vaccine **does not cause flu**.

Influenza vaccine may be given at the same time as other vaccines.

### 3 Talk with your health care provider

Tell your vaccine provider if the person getting the vaccine:

- Has had an **allergic reaction after a previous dose of influenza vaccine**, or has any **severe, life-threatening allergies**.
- Has ever had **Guillain-Barré Syndrome** (also called GBS).

In some cases, your health care provider may decide to postpone influenza vaccination to a future visit.

People with minor illnesses, such as a cold, may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting influenza vaccine.

Your health care provider can give you more information.



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

## Appendix F (cont'd)

### 4 Risks of a vaccine reaction

- Soreness, redness, and swelling where shot is given, fever, muscle aches, and headache can happen after influenza vaccine.
- There may be a very small increased risk of Guillain-Barré Syndrome (GBS) after inactivated influenza vaccine (the flu shot).

Young children who get the flu shot along with pneumococcal vaccine (PCV13), and/or DTaP vaccine at the same time might be slightly more likely to have a seizure caused by fever. Tell your health care provider if a child who is getting flu vaccine has ever had a seizure.

People sometimes faint after medical procedures, including vaccination. Tell your provider if you feel dizzy or have vision changes or ringing in the ears.

As with any medicine, there is a very remote chance of a vaccine causing a severe allergic reaction, other serious injury, or death.

### 5 What if there is a serious problem?

An allergic reaction could occur after the vaccinated person leaves the clinic. If you see signs of a severe allergic reaction (hives, swelling of the face and throat, difficulty breathing, a fast heartbeat, dizziness, or weakness), call 9-1-1 and get the person to the nearest hospital.

For other signs that concern you, call your health care provider.

Adverse reactions should be reported to the Vaccine Adverse Event Reporting System (VAERS). Your health care provider will usually file this report, or you can do it yourself. Visit the VAERS website at [www.vaers.hhs.gov](http://www.vaers.hhs.gov) or call 1-800-822-7967. *VAERS is only for reporting reactions, and VAERS staff do not give medical advice.*

### 6 The National Vaccine Injury Compensation Program

The National Vaccine Injury Compensation Program (VICP) is a federal program that was created to compensate people who may have been injured by certain vaccines. Visit the VICP website at [www.hrsa.gov/vaccinecompensation](http://www.hrsa.gov/vaccinecompensation) or call 1-800-338-2382 to learn about the program and about filing a claim. There is a time limit to file a claim for compensation.

### 7 How can I learn more?

- Ask your healthcare provider.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
  - Call 1-800-232-4636 (1-800-CDC-INFO) or
  - Visit CDC's [www.cdc.gov/flu](http://www.cdc.gov/flu)

Vaccine Information Statement (Interim)  
**Inactivated Influenza  
Vaccine**



Office use only

8/15/2019 | 42 U.S.C. § 300aa-26

Appendix J

Survey

Survey for Influenza Vaccination Clinic

Gender:     Male     Female

Sport: \_\_\_\_\_

Year in school: Freshman   Sophomore   Junior   Senior   Graduate Student

Did you receive a flu shot last year?   Yes   No

If so - where did you get it?

\_\_\_\_\_ University Medical Services

\_\_\_\_\_ Pharmacy

\_\_\_\_\_ Primary care office

\_\_\_\_\_ Other: \_\_\_\_\_

\_\_\_\_\_ Urgent care

If you did not get the flu shot last year, why? **Please check all that apply**

\_\_\_\_\_ Medical reasons

\_\_\_\_\_ I was afraid I might have side effects

\_\_\_\_\_ Religious reasons

\_\_\_\_\_ I couldn't afford it

\_\_\_\_\_ My family doesn't usually get flu shots

\_\_\_\_\_ It wasn't convenient for me

\_\_\_\_\_ Family member advice

\_\_\_\_\_ I have doubts about whether the flu shot is effective

\_\_\_\_\_ Peer/friend advice

\_\_\_\_\_ I'm not concerned about flu

\_\_\_\_\_ I'm afraid of shots

\_\_\_\_\_ I'm not at risk for flu

\_\_\_\_\_ I was afraid I could get the flu from the flu shot

\_\_\_\_\_ I think it is harmful to my own immunity

What influenced you to get the flu shot this year? **Please check all that apply**

\_\_\_\_\_ Health provider recommendation

\_\_\_\_\_ I have a chronic illness and I wish to avoid flu

\_\_\_\_\_ Family member recommendation

\_\_\_\_\_ Reminders from coach/athletic trainer

\_\_\_\_\_ Peer recommendation

\_\_\_\_\_ Posters in Athletic training room

\_\_\_\_\_ I heard the flu was bad last year

\_\_\_\_\_ Increased knowledge about flu vaccine benefit

\_\_\_\_\_ I've had the flu and I don't want to get it again

\_\_\_\_\_ Cost covered by insurance

Appendix K

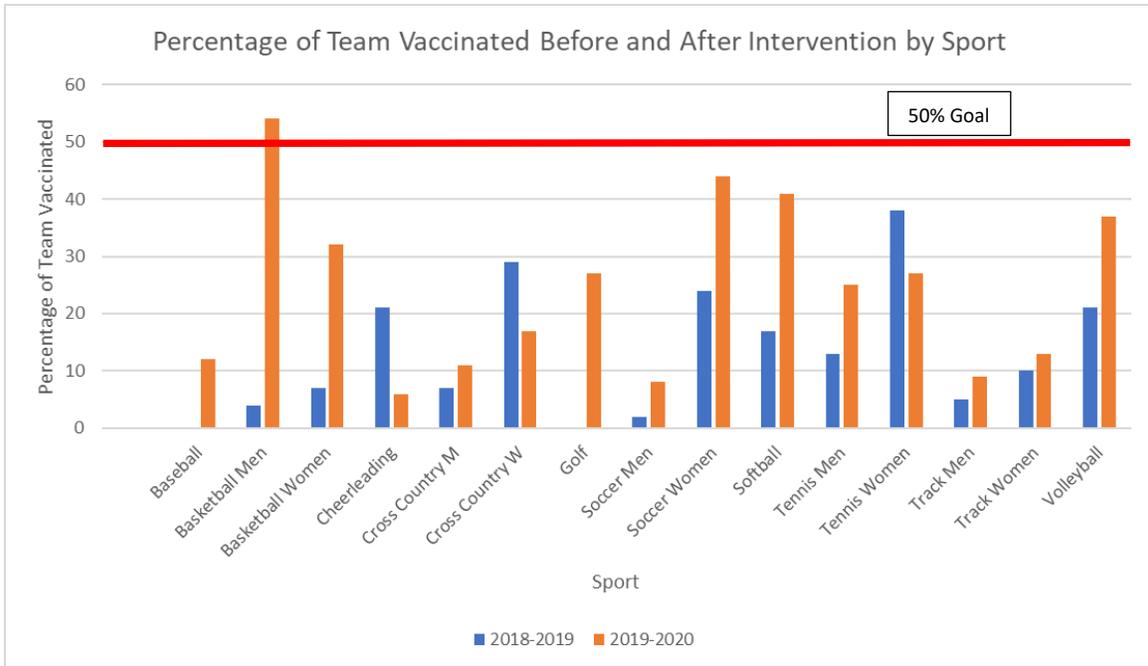
Flu shot stickers



## Appendix L

### Vaccination Data from EBPIP

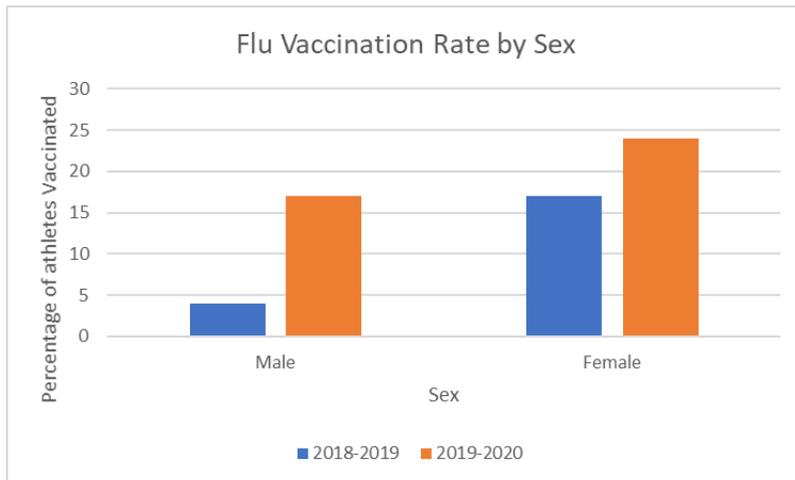
Sport	Percent vaccinated	
	2018-2019	2019-2020
Baseball	0	12%
Basketball Men	4%	54%
Basketball Women	7%	32%
Cheerleading	21%	6%
Cross Country M	7%	11%
Cross Country W	29%	17%
Golf	0%	27%
Soccer Men	2%	8%
Soccer Women	24%	44%
Softball	17%	41%
Tennis Men	13%	25%
Tennis Women	38%	27%
Track Men	5%	9%
Track Women	10%	13%
Volleyball	21%	37%



Appendix M

UMS Flu Vaccination Data

Category	2018 – 2019	2019-2020
Total intercollegiate athletes	380	359
Total intercollegiate athletes vaccinated	51	92
Athletes who were Nursing or Pharmacy majors vaccinated	44	41
Vaccinated Athletes who were non-nursing non-pharmacy	7	51
Athletes vaccinated at dedicated flu shot clinic exclusively for intercollegiate athletes	n/a	49
Male Intercollegiate athletes vaccinated	10	35
Female Intercollegiate athletes vaccinated	41	57



## Appendix N

### Survey results

#### **If you did not get the flu shot last year, why? Please check all that apply**

My family doesn't usually get flu shots (n=12)

It wasn't convenient for me (n=9)

I'm not concerned about flu (n=6)

I have doubts about whether the flu shot is effective (n=3)

I'm afraid of shots (n=3)

I was afraid I might have side effects (n=1)

I was afraid I could get the flu from the flu shot (n=1)

I think it is harmful to my own immunity (n=0)

#### **What influenced you to get the flu shot this year? Please check all that apply**

Reminders from coach/athletic trainer (n=36)

Family member recommendation (n=21)

Cost covered by insurance (n=15)

Peer recommendation (n=10)

Health provider recommendation (n=8)

I heard the flu was bad last year (n=5)

I've had the flu and I don't want to get it again (n=5)

Increased knowledge about flu vaccine benefit (n=5)

Posters in Athletic training room (n=4)

I have a chronic illness and I wish to avoid flu (n=0)

Appendix N (cont'd)

**Where did you get the flu shot last year?**

Primary care office (n=9)

Pharmacy (n=6)

University Medical Services (n=4)

Other: high school flu shot clinic (n=1)

Urgent care (n=0)

## Appendix O

### Reminder Schedule from Athletic Trainer

Used a combination of e-mails to head coaches and student athletes and announcements in department meetings with all staff.

#### **Schedule for reminders**

E-mail sent to all coaches to "Save the Date" as soon as dates were set

Announcement in Athletic Department staff meeting at 6 weeks out from flu shot clinics

Announcement in Athletic Department staff meeting at 2 weeks out from flu shot clinics

Email sent to all coaches at 2 weeks out from flu shot clinics asking coaches to send out the sign up sheet link and encourage their athletes to participate.

Email sent to all coaches and all student athletes at 1 week out from first flu shot clinic with links to online scheduling

Email reminder to each the student athletes signed up on the day of their appointment.

#### **Promotional Materials**

Hung posters up in the main locker rooms (inside the entrance, over urinals and in bathroom stalls) and on the exit and entrance of the athletic training room.

Appendix P  
Agency permission



for the **WORD OF GOD** and the  
**TESTIMONY** of **JESUS CHRIST**

251 N. Main St.  
Cedarville, OH 45314  
937-766-2211  
cedarville.edu

Debra McDonald, RN, BSN  
Director, University Medical Services  
251 N Main St  
Cedarville, OH 45314

September 13, 2019

Susan Batten, PhD, APRN-CNS  
University of Toledo - Health Science Campus  
3000 Arlington Ave.  
Toledo, OH 43614

Dear Dr. Batten:

I am writing on behalf of doctoral student, Cliff Fawcett. I am hereby give permission for Cliff to conduct his evidence based quality improvement project at University Medical Service at Cedarville University.

His project is entitled:  
Multi-component Intervention to Improve Influenza Vaccination Rate in Intercollegiate Athletes: An Evidenced Base Quality Improvement Project

I am supportive of his effort in this project. If you have any questions, please contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Debra McDonald".

Debra McDonald, RN, BSN  
Director, University Medical Services  
(937) 766-7862  
[mcdonald@cedarville.edu](mailto:mcdonald@cedarville.edu)