

**UMSAEP UM-UWC Academic Exchange Program Report
2022-2023 Project**

**Prediction of the Unplanned and Avoidable Trauma and Surgical Readmissions
in South Africa**

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Our Collaboration

Dr. Jennifer-Anne Chipps from UWC, Dr. Petra Brysiewicz from UKZN, and I, Dr. Umit Tokac, from UMSL have been collaborating for the last two years. We have been working on several different research projects, which include Twitter sentiment analysis, Artificial intelligence (AI) models for avoidable hospital readmission, and the usage of machine learning in telehealth. One of our collaboration project manuscripts was recently accepted for publication. The manuscript titled “Public Perceptions on Twitter of Nurses during the COVID-19 Pandemic” will be included in the Contemporary Nurse journal as a product of our Twitter sentiment analysis project. Another three manuscripts related to AI models for avoidable hospital readmission are in process. In this project, we are collaborating with Dr. Damian Clarke and Dr. John Bruce from Grey’s Hospital in Pietermaritzburg, South Africa.

Meeting for Current Project Discussion

In order to meet with my collaborators in South Africa, I flew to Cape Town first to visit the UWC campus and meet with Dr. Chipps on September 12. During my visit to Cape Town, the following organized activities have been completed.

- I met with Dr. Chipps and Dr. Brysiewicz to discuss the progress of the project we have.
 - We reviewed our progress in each project.
 - We monitored the obstacles we encountered during the process.
 - We planned a timeline for our current projects and discussed the potential future projects.





- I had an educational webinar presentation at UWC (UKZN & UMSL staff online attendance) to health science and informatics researchers on AI and clinical applications. A webinar was scheduled for Friday the 16th of September & UWC and UKZN Colleagues were invited. Moreover, this webinar has been recorded to share with other colleagues at UM, UWC, and UKZN in the future.
- I organized an educational presentation for postgraduate students on AI and clinical applications and using big data for research development.



- I organized workshops on how to integrate digital health in a case study of an AI application. My collaborators and I had a pre-planning meeting with UKZN on Thursday

the 15th of September. The actual workshop has been held at Grey's Hospital in Pietermaritzburg with the participation of UKZN faculty, Dr. Damian Clarke, and Dr. John Bruce.

- My collaborators and I met with Dr. Damian Clarke and Dr. John Bruce at Grey's Hospital in Pietermaritzburg to discuss our current AI models for the avoidable hospital readmission project after the workshop.
- Dr. Bruce gave me a tour to show how HEMR (Hybrid Electronic Medical Record) is situated in Pietermaritzburg Grey's hospital.





Process for the Project

In our meeting with Dr. Damian Clarke and Dr. John Bruce at Grey's Hospital in Pietermaritzburg, we made good progress with our AI models for the avoidable hospital readmission project. AI and its application to real-life clinical practice are relatively unexplored in Africa with few AI studies or AI practical applications. When my collaborators and I started this project, the project aimed to address four main needs:

1. There is a need to develop skills for the 4th industrial revolution and these skills are underdeveloped or non-existent in healthcare workers. There have been calls for reinventing tertiary education with a need to develop expertise and understanding of AI in clinicians and informatics staff in Africa. There is both a local need for where databases are held and secondly there is a need for clinical practice AI to be integrated into our educational programs (responsive curriculum).
2. There is a need to develop strong collaboration with AI experts and clinical experts of all disciplines to establish research, education, and clinical collaboration models for digital health. The employment of non-health faculty is not the norm in South Africa with few health science faculties employing AI experts. In addition, interdisciplinary collaboration in this field is essential as has been demonstrated in other digital projects requiring clinical and technical expertise to address healthcare needs.

3. There is a need for research projects in AI in Africa. Systematic reviews are identifying that more research is needed to evaluate the clinical practical applications of AI as very little is known about this in Africa.
4. There is a need to enhance the contemporary use of clinical data to answer global health questions through the integration and evaluation of AI in local electronic health systems.

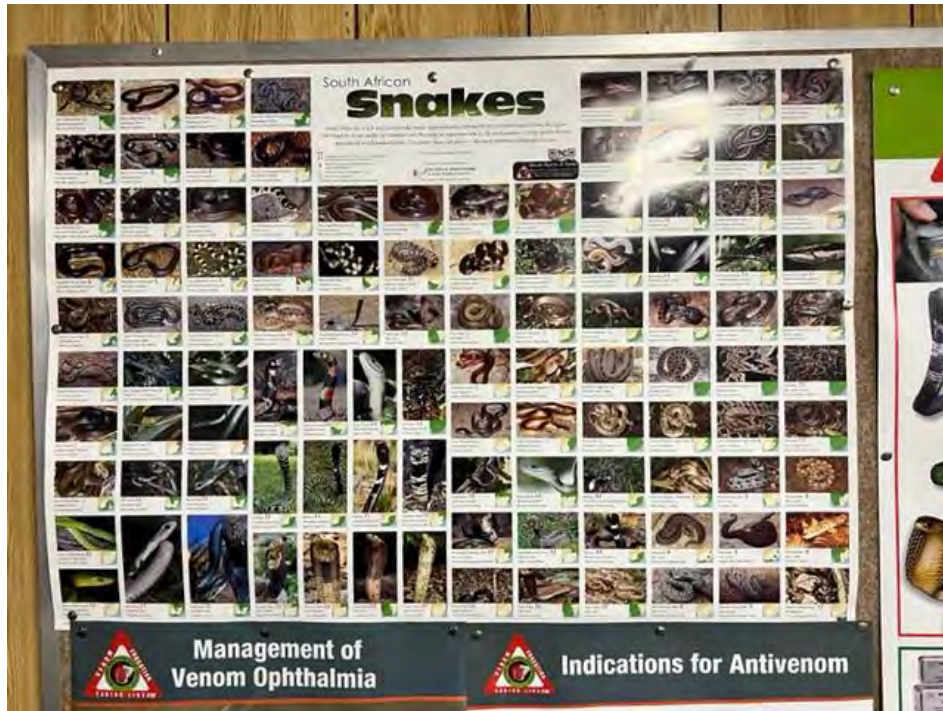
Progress of the Project

1. I visited Durban and Pietermaritzburg, South Africa to get familiar with the HEMR (Hybrid Electronic Medical Record) database. My visit allowed me to assess the HEMR database, meet the data custodians and evaluate the clinical data flow process.
2. In our meeting with Dr. Damian Clarke and Dr. John Bruce at Grey's Hospital in Pietermaritzburg, we discussed some of the clinical questions I encountered during data mining, AI method development, and analysis processes. Also, we discussed the methodology and content analysis of our potential manuscripts.
3. Additionally, we discussed in our meeting with Dr. Clarke and Dr. Bruce about applications for larger grants e.g., NIH.
4. I discuss a new potential AI deep learning project with Dr. Bruce to classify wounds caused by guns or rifles from South African patients' Xray.

Professional and Personal Development

During my visit to Cape Town, Durban, and Pietermaritzburg, my collaborators were very kind to show me around those cities. We visited museums, national parks, and university campuses. It helped me to learn more about South Africa's culture, geography, demography, educational structure, and political and non-political history. I gained a lot of insight into South Africa's fight for democracy and human rights. Before my visit to South Africa, I did not know that country has penguins. Additionally, I did not know South Africa is home to many kinds of snakes. Hopefully, my collaboration with my South African colleagues will bring me another chance to visit that beautiful country with wonderful people. I included some of the pictures from my visit below.





Budget

In order to make me visit UWC in Cape Town, UKNZ in Durban, and Grey's Hospital in Pietermaritzburg and also make Dr. Chipps visit UMSL, we requested funds from the University of Missouri South African Education Program (UMSAEP). By using the UMSAEP support, I

completed my 9 days visit to South Africa in September 2022, and Dr. Chipps is planning to complete her visit to UMSL in September 2023.

Appreciation

My collaborators (Dr. Chipps, Dr. Brysiewicz, Dr. Clarke, and Dr. Bruce), and I would like to express our thanks for the support offered by the UMSAEP. Thanks to UMSAEP support, very strong collaboration has been established among not only UMSL and UWC but also UKNZ and Grey's Hospital. We hope that this collaboration will bring us more research opportunities for our institutions to find scientific solutions to the problems in health sciences.