

Reference Guide
University of Texas
Health Sciences Center at Houston
Global Outreach Projects

Morocco



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Mission Statements



UT Health Mission Statement

Our mission is to continually add value to the performance of the University of Texas Health Science Center at Houston (UTHealth) in its mission to advance the health of the people of the State of Texas, the nation, and our global community through educating compassionate health professionals and innovative scientists and through discovering and translating advances in the social and biomedical sciences that treat, cure, and prevent disease now and in the future.



RAD-AID Mission Statement

To improve and optimize access to medical imaging and radiology in low resource regions of the world for increasing radiology's contribution to global public health initiatives and patient care.

Background: Morocco

Morocco is a North African country with 710, 850 km² of land in the North-West corner of the African continent. The capital is Rabat. The official languages of the 35,740,000 inhabitants are Arabic and Berber, but French is used for business and some government documents.

The World Bank classifies Morocco as a Low-Middle Income country. The national hospital system has about 2,000 beds, 1471 of which are non-profit facilities. The ratio of hospital beds per capita is 0.3 (USA: 3.3, Germany: 8.9, Japan: 14.3).

One hundred and seventy radiology clinics present in the country, with the large majority in the large cities of Rabat, Casablanca, Fes, Marrakech, Oujda and Agadir.

The Moroccan capital, Rabat, is also the administrative headquarters of the University Hospitals and their Schools of Medicine.



2019 Mission Trip

1. Overview:

Morocco is a low-middle income country in North Africa with a population of over 35 million. In November 2016, the UTHealth McGovern Rad-AID Chapter started Radiology-Readiness assessment to identify gaps and goals at selected Moroccan hospitals, which continued in May 2017 and May 2018. Based on these experiences, and after discussions with Moroccan stakeholders and within our team, we chose a multipronged approach to 2019's mission.

The three main objectives were:

- education for radiology professionals,
- workflow and PACS optimization,
- mobile health program to reach remote communities.

The Emergency Radiology and General Radiology Sections of the Ibn Sina Hospital in Rabat, Morocco were globally assessed by the entire team during the first two days of the mission. The two main areas of focus were workflow optimization and equipment assessment. After visiting the Emergency Section's areas and gathering all data, this portion of the first day was concluded with a lecture and workshop on workflow. A similar assessment was performed for the General Radiology section on the second day, this time concluding with a working lunch where we exchanged ideas on quality improvement and potential areas for collaboration.

The education portion of the mission consisted of didactic lectures and hands-on workshops. Lectures on the first day were given at Mohammed V University, where the main concentration was trauma, including spinal trauma, abdominal trauma, and basics of hemorrhage. The second day lecture was on acute presentations of oncologic disease. This was followed by a resident-run ultrasound workshop, where students and residents were able to use portable and wireless ultrasound equipment to practice proper technique in sonographic imaging and image-guided procedures.

We had a debriefing session on the third day. Here we discussed what went well, what areas of our involvement could stand some improvement, and what new ideas we had for future missions. We also had discussions with the Dean of Mohammed V School of Medicine regarding the establishment of a formal relationship between the School of Medicine and UTHealth.

The community outreach program followed. This was organized by the "Association Marocaine pour la Protection de la Santé." We rode by bus with a medical team from Rabat to Oulad Khallouf on the fourth day. The patient care program commenced at 9am the next morning and lasted until about 7pm that evening. Approximately 400 patients were seen during the course of the day. Our roles were varied, but we mainly observed the needs of the community, and aided in performing and interpreting radiologic exams. Ultrasounds were performed using portable and wireless units, and

reports were issued in conjunction with other doctors from the caravan. Radiographic interpretations were also provided. At the conclusion of the day, we left for Marrakech.

2. Team and Structure

The traveling team to Morocco was comprised of six radiology faculty members from UTH Houston's diagnostic and interventional imaging department, one faculty member from UTH Houston's family medicine department (Dr. Iyengar), one private practice radiologist (Dr. Vaccaro), three radiology residents from UTH Houston's diagnostic and interventional imaging department (Dr. Gao, Dr. Ucisik, and Dr. Stringam), and one physics resident from UTH Houston's diagnostic and interventional imaging department (Dr. Rubinstein). In addition, there were two radiology residents and one medical student who assisted state-side by helping prepare for the trip. Of the six radiology faculty members, two specializes in emergency radiology (Dr. Sanhaji and Dr. Jarolimek), two in interventional radiology (Dr. Pillai and Dr. Soni), and two in body imaging (Dr. Matta and Dr. Shiralkar). Of the three radiology residents, one is in the integrated diagnostic radiology/interventional radiology track (Dr. Stringam).

Dr. Sanhaji was in charge of overseeing the entire initiative. She was the point of contact for all the Moroccan faculty, hospitals, hotels, transportation, etc. Dr. Gao assisted with organizing where necessary.

The 2019 team:

Mamie Gao, MD
Deepa Iyengar, MD, MPH
Amanda M. Jarolimek, MD
Eduardo J. Matta, MD CMQ
Thien-Nga Tina Nguyen, BBA
Anil K. Pillai, MD FRCR
Ashley Rubinstein, PhD
Latifa Sanhaji, MD
Kaustubh G. Shiralkar, MD
Jayesh M. Soni, MBBS MD
Jeremiah B. Stringam, MD
F. Eymen Ucisik, MD
Jonathan P. Vaccaro, MD



3. Pre-trip Planning and Preparation Meetings

In preparation for our global health initiative to Morocco, group meetings started in September of 2018. On September 19, 2018, interested residents were invited to an introductory meeting to discuss the purpose of Rad-Aid and assess interest in the mission. A history of what has been done in the past was shown. Discussion was already taking place between a few members and Moroccan contacts regarding lectures

to deliver at the upcoming mission. The dean of Mohamed V School of Medicine was contacted and requested that we focus on medical education. He asked for an American format of education. Our plan was to narrow down the lecture topics and people who would be attending the mission. Officer positions were also delineated at this meeting and subsequently finalized.

Our next meeting was on October 31, 2018. At this point, we narrowed down the topics and attendees. We had created a donate link on our Rad-Aid international page. We also discussed partnerships including reaching out to Philips and Clarius. On December 13, 2018, we met again to discuss scheduling and divide specific lectures amongst various participating faculty. We started to look into fundraising opportunities including DoxFoundation as well as the ability for residents to obtain time off using educational days.

On January 30, 2019, we discussed logistics of the trip including list of travelers, possible flights, lodging options, transportation on site, and meals. Rad-Aid travel policies and volunteer checklists were provided to participants. A list of equipment needed for the caravan was also provided. Another group meeting was scheduled for March 5, 2019. In the interval, participants submitted travel grant requests to DoxFoundation and were denied. We had reached out to Clarius who agreed to provide two hand-held ultrasounds. Philips volunteered to provide one hand-held ultrasound. On February 26, 2019, a presentation was given at Houston's Radiological Society meeting to discuss our efforts with Rad-Aid in Morocco and provide opportunities for providing support to our cause.

During the March 5 meeting, a final schedule was discussed with the team. Cultural literacy was also provided using resources provided by Rad-Aid. A final meeting took place on April 8, 2019 when we tied up loose ends and answered any remaining questions. We received \$200 in donations and decided to use that money towards equipment for the caravan including stethoscopes, sphygmomanometers, and temperature probes. We also distributed t-shirts and hats generously provided by Rad-Aid International.



4. Scheduled activities in Morocco

On day 1 (Monday, April 15), the team visited the emergency radiology department of Ibn Sina hospital wherein a PACS assessment and general Rad-Aid assessment was performed. Evaluation of equipment and radiation safety was led by Dr. Rubinstein. PACS assessment was led by Dr. Vaccaro with contributions from Drs. Ucisik and Dr. Rubinstein. The general Rad-Aid assessment was divided amongst Drs. Jarolimek, Shiralkar, Matta, Gao, and Stringam. In the morning, after the tour, Drs. Ucisik and Gao led a discussion regarding workflow optimization, US protocols, and standard reporting. In the afternoon, Drs. Jarolimek and Vaccaro delivered lectures regarding imaging in the emergency department. Dr. Soni then provided a lecture regarding the use of interventional radiology in the emergency setting.

Le service de Radiologie des urgences du CHU Ibn Sina, en collaboration avec l'équipe du département de radiologie diagnostique et interventionnelle de l'université de Texas Health science center, Houston.

Organise le 15 Avril 2019

Les 2^{èmes} journées de printemps de la radiologie des urgences:

Location : Service de radiologie des urgences, Hopital Ibn Sina de Rabat.

Moderators: Pr Jroundi , Pr Laamrani , Dr Sanhaji

- 10 a-12 p : ER assessment
 - Visit of the ER and on-site readiness assessment, Facilitators: Dr. Vaccaro, Dr Ucisik, Dr Gao, Dr Sanhaji.
Target Audience: Faculty and section chief
 - Workflow Optimization Roundtable: How do you do it? Dr Ucisik and Dr Gao.
Target Audience: Faculty, Residents, Technologists.
 - Workflow Optimization Roundtable: How we do it: Dr Ucisik and Dr Gao.
Target Audience: Faculty, Residents, Technologists
 - Open Q&A

Location : Salle de Séminaires A, Faculté de médecine et de pharmacie de Rabat.

Moderators: Pr Jroundi , Pr Laamrani , Dr Sanhaji

- **2-5p: ER lectures, trivia and workshops.**
 - Target Audience : Residents
 - 2- 3 pm: Imaging in Emergency Medicine: Spine and Pelvic Trauma: Dr Vaccaro
 - 3-4 pm: Imaging in Emergency Medicine: Liver, Spleen and GI-GU Trauma: Dr Jarolimek
 - 4-4.30 pm: coffee break.
 - 4-5 pm: Workshop IR in Emergency Medicine: Basics and Abdominal Bleed.
Dr Pillai, Dr Soni, Dr Niekamp, Dr Stringham

On day 2 (Tuesday, April 16), the team visited the general radiology department of Ibn Sina hospital wherein we toured the facility and continued our evaluation of the equipment available. After the tour, Dr. Matta provided a lecture on oncologic emergencies. At lunch, the plan was to discuss QI projects with Moroccan faculty and residents. Summaries of current QI projects at UTH Houston and information regarding how to conduct QI projects were provided by Dr. Matta. In the afternoon, Dr. Pillai gave lectures overviewing what interventional radiology is and how it can be utilized in oncologic settings. Drs. Shiralkar and Stringam provided a lecture on the utility of interventional radiology in hepatobiliary pathologies. The day concluded with an interventional radiology workshop wherein residents were taught and practiced US-guided biopsies.



On day 3 (Wednesday, April 17), the team debriefed regarding the trip thus far. A debrief template was provided by Dr. Gao that helped facilitate discussion regarding projected needs, challenges, highlights, possible projects to work with Moroccan residents on, and possible future topics. Dr. Iyengar met with the dean of the University Mohamed V School of Medicine in the afternoon to discuss collaboration between the UTH Houston McGovern Medical School and the University Mohamed V School of Medicine.

On day 4 (Thursday, April 18), the team traveled with various health care workers from Ibn Sina hospital on a caravan to Oulad Khallouf. The purpose of this portion of the trip was to provide care to the underserved commune. A radiology mobile unit was available which held a radiography unit. A portable ultrasound was provided by Siemens. Handheld ultrasounds were provided by Clarius and Philips.



On day 5 (Friday, April 19), the team divided up and took various roles in providing care to the underserved population. Some members of the team helped with radiography, others with performing ultrasounds. Still others helped evaluating radiation safety. Altogether, in a 2-day period, 800 patients were seen and 62 ultrasounds were performed.



5. Logistics

The logistics of the trip were overall well-planned, enabling the group to function effectively.

The planned itinerary included a detailed transportation plan. We used train for commute to and from the airport, as well as between cities. For inner city transport, we used a private driver service, which provided us the comfort of relying on a local driver who can speak both the local language and English and is familiar with the city's safer and less-safe areas.

For accommodation, we chose a larger traditional house called "riad", which enabled us to easily get together in the morning or in the evening for short debriefs.

For the phone and internet services, we used our existing US plans, or temporarily upgraded to travel plans by US network operators. Wi-Fi was available at our riad, though with frequent interruptions. Some of us used the location monitoring services of their phones to make their location accessible to the other group members for ensuring safety.



Riad in Rabat



Townhouse in Marrakesh

6. Tentative Fundraising

A couple of fundraising opportunities were pursued. A donation link was set up through Rad-Aid. A tinyURL was created and distributed through social media and family and friends. A presentation was given at one of Houston Radiological Society's monthly meetings to discuss our efforts in Morocco. Many residents and faculty also sought to obtain funding from DoxFoundation, unfortunately to no avail. Ultimately, we received \$200 in total donations. We also were generously offered support from Rad-Aid in the form of t-shirts, hats, and reimbursements for participating residents.

We considered a GoFundMe page but ultimately decided that the Rad-Aid donation link and tinyURL would serve the same purpose. ProjectCURE and Medical Bridges were also options but the equipment they provide are more clinical than we needed including equipment for patient exams and procedures.



<https://portal.rad-aid.org/survey/view/190/1>

7. Professional Partners

We partnered with various companies during this global health initiative to Morocco. Siemens graciously provided a portable ultrasound for use during our caravan to Oulad Khallouf wherein many ultrasounds were performed. All different organ systems were evaluated. Hand-held ultrasounds were provided by Clarius and Philips which were used for our interventional radiology workshop with residents to practice US-guided biopsies and during the caravan to assess patients. Clarius provided a linear and curvilinear probe while Philips provided a lumify probe.



8. On-site Work

a. Educational activities

i. Target site: Mohamed V University

The educational portion of the trip commenced in Rabat, the capital city of Morocco, and home to the medical school: Mohamed V University. The teaching hospitals consist of a diverse complex of 10 facilities with a combined total of over 1250 beds. The radiology residency training program averages 40-45 residents over the four-year curriculum and residents rotate between the general hospital and the subspecialty hospitals. This trip focused on the main teaching hospital Centre Hospitalier Universitaire Ibn Sina which also serves as a regional trauma center. Hence, the didactic lectures focused on emergency medicine imaging.



Ibn Sina Hospital (above)
Mohamed V University Medical School (right)

ii. Lectures and Workshops

Attending physicians from the University of Texas Health Science Center in Houston presented talks on a wide range of topics including imaging of spinal trauma, abdominal trauma, emergent pelvic ultrasound, hepato-biliary emergencies, oncologic emergencies and emergency interventional procedures.



The residents from UT Health provided additional lectures on work-flow optimization of imaging in the emergency room as well as presented a hands on educational work shop on ultrasound guided biopsies. This interactive session was well received by residents and faculty alike.



iii. Residents Pre and Post Tests

Targeted educational lectures and were given to the Moroccan radiology residents upon initial visit to hospital in Rabat. The talks covered a wide variety of subjects including hepatobiliary system, body trauma, and interventional radiology. Pre and post test questions were compiled to assess impact of lectures and retention of material. Questions were handed out to students on paper before and after the lectures. Although not all of the Moroccan students participated or answered the questions, thus limiting evaluation, the pre-test questions helped them focus their attention on the important information to pick up, which can be challenging in a foreign language. However, this represents an area of suggested improvement for the next mission trip when more rigorous follow-up and data collection can be performed.

iv. Residents Final Survey

At the end of the lecture series and workshop, we performed a satisfaction survey among the participating residents. The survey consisted of 14 multiple choice questions and 4 free-text questions. There were 16 participants.

Eleven participants found the speed of the lecture “just right”, while 5 found it “too fast”. The amount of content was found “just right” by 8 participants, while 5 found it “too much”, and 2 “too little”.

Fourteen residents found the difficulty of content “just right”.

While 6 residents stated they could understand everything, 10 stated they could only understand “some of the lectures”.

For the future lectures, 7 residents preferred to have English as spoken language with French translation available, and 9 residents stated “English only” is fine. More than half of the residents (9 of 16), however, preferred the presentation slides to be both in English and French, rather than in English only.

Majority of the residents (13 of 15) found the lectures and workshops “very helpful”, while 2 found them “somewhat helpful”.

When asked about the structure of the lectures, 10 participants preferred the lectures to be a mix of various cases, 6 preferred to have topic-focused lectures, and 1 preferred modality-based lectures.

Fourteen of 16 residents wanted the future lectures to be more interactive.

Eight of 15 residents were interested in inviting other disciplines such as surgery, medicine, etc.

All residents wanted to receive the lectures via email, discuss and share interesting cases with our program in the future, collaborate with us in quality improvement and research projects and be paired with a US resident as a study/work buddy.

For the future, other topics the participants wanted to see included cardiothoracic imaging (requested by 4 of 16 residents as a free text answer), neuroimaging, emergency and interventional radiology, and artificial intelligence.

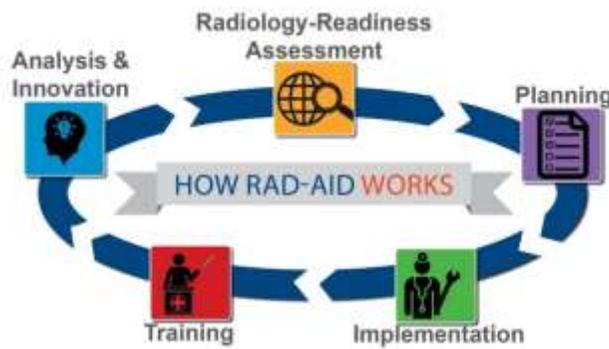
Possible areas of improvement suggested by the participants included more frequent visits, more workshops and interventional radiology cases, and more time dedicated to teaching.

Aspects of the experience that were particularly liked by the residents included the lecture quality and content, the interventional radiology workshop, and personability and approachability of the mission members.

Aspects of the experience that were not liked included the timing of the lectures (weekend preferred over the weekdays), and the speed of the lectures (found too high by some residents).

b. RAD AID Readiness Assessments

While the RAD AID team from UT Health visited CHU Ibn Sina, the Moroccan host faculty provided a detailed guided tour of their facilities to include the hospital's general radiology department as well as the imaging services dedicated to the emergency room. This enabled the RAD AID to perform formal Readiness Assessments of the general radiology department, the imaging services dedicated to the emergency room, the PACS system in the emergency room, radiation safety, and interventional radiology.



i. PACS

PACS is integral to all contemporary imaging departments. CHU Ibn Sina currently uses a Millensys Vision Tools PACS system for the department of radiology though there are some limitations to its current status. One major impediment is that the hospital lacks a robust electronic medical records system and patients do not have unique identification numbers. Moreover, the limited records system that the hospital does have is not linked to the PACS system. This requires manual entry of patient information into PACS by the technologists.

Also, all imaging modalities are not linked directly to PACS. At present, PACS in the emergency room can review radiographs and CT from the emergency room. Despite having two dedicated ultrasound rooms in the emergency room, these units are not connected to PACS. MRIs done in the main department can be reviewed on workstations in the emergency room.

There are currently four workstations in the emergency room reading area with limited additional viewing monitors throughout the emergency room and the rest of the hospital. Further, clinicians outside of the hospital are unable to review the images directly. Studies are therefore routinely printed on to film as well as burned on to CDs for patients to bring to their providers. Dictations are generated by the residents though they are not linked to the cases in PACS.

A formal RAD AID Readiness Assessment of the PACS in the Emergency Room was conducted by the UT Health Team in hopes of working with the Moroccan physicians to improve the quality of their system.



ii. Interventional Radiology

The team performed an initial site assessment where radiology residents in the Morocco program were asked what procedural skills they would like to develop. They determined that increased proficiency in ultrasound guided needle aspirations and core needle biopsies would be of greatest benefit, and so a plan to satisfy these needs with hands-on procedural skills workshops was developed.

Low-cost ultrasound phantoms were created for the workshops, needles were donated from the program at the University of Texas (Houston), and multiple portable ultrasound probes were utilized so that more residents could receive one-on-one instruction simultaneously during the labs.

The workshops were taught by a team composed of residents and attendings and administered in conjunction with a lecture component designed to convey the utility of these skills as they pertain to overall clinical management.

To assess the effectiveness of these workshops, before and after surveys were performed to determine how the residents felt about the lessons, and how the didactics impacted their skill levels. The workshops were very well received, and plans are underway to expand the lesson material in order to cover additional crucial procedural skills.



iii. Physics/Radiation Safety

The ER and main radiology departments of Ibn Sina Hospital underwent a medical physics assessment of image quality and radiation safety.

There are currently no diagnostic medical physicists practicing at Ibn Sina Hospital. Safe radiology practice in Ibn Sina currently relies on proper shielding design and equipment operation by equipment vendors, proper operation of the equipment by technologists, and proper oversight by radiologists. Radiation safety is taught in initial training programs, but there is no training beyond that. There is also no MRI safety training available.

Individuals are assigned radiation badges and badges are collected and read out monthly; however, no technologists nor radiologists were observed wearing their badges. Some technologists and radiologists voiced their concerns about their radiation exposure; however, they were not wearing their radiation badges and they did not know if/how they could access their dose reports. Radiation shielding design and installation was performed by equipment vendors, and no shielding verification was performed for any of the systems.

No records of exam exposures (CTDI, DLP, AKR, KAP, etc.) were maintained. The CTDI is misreported for at least the routine head protocol on the ER CT scanner (underestimated by ~57%). Lumbar imaging was reported to be too long and there was varied dose reporting for these scans (CTDI of ~8 mGy - ~40 mGy). If this institution were to begin maintaining records of CT or fluoroscopy exam exposures, the reported exposures should be verified by a physicist. There are no reports of radiation injuries or MRI injuries at Ibn Sina.

On radiography systems, no collimation was used in wall Bucky exposures. Chest x-rays would often be from the shoulders to the bottom of the pelvis. Additionally, there was a large misalignment of the light field and x-ray field observed on the wall Bucky systems. No table Bucky exposures were performed (only tabletop) and no grids were used for table exposures. The AEC was not calibrated for any of the radiographic systems. Only manual techniques were used, and the same radiographic techniques were used for each patient, regardless of patient size.

A PACS system was implemented in Ibn Sina a few years ago; however, patient information was almost always incomplete and there was no consistency in how or what information was entered into PACS.

It was reported that hospital engineers perform image quality control tests on imaging systems with phantoms once per month. Additionally, it was reported that l'Agence Marocaine de Sûreté et de Sécurité Nucléaires et Radiologiques (AMSSNuR) has begun performing routine dosimetry and image quality measurements.

In subsequent years, we recommend meeting with nuclear medicine physicists and radiation oncology physicists in Rabat to discuss radiation safety concerns. Additionally, we recommend meeting with the person/company that collects the personnel dosimeters. Typical occupational exposures and outliers should be analyzed. Lead shielding should be verified in the walls surrounding the imaging exam rooms. Finally, a quality assurance program for image quality and radiation safety should be established.



iv. Radiology Readiness

While touring the ER and Main Radiology sections, members of our team were in charge of collecting the missing information in the Radiology Readiness Assessment previously performed. The large document was divided in smaller sections between members. This made the gathering of the needed info easier and faster to obtain. We will refer to this completed document for the planning of future missions.



c. Quality improvement

At this same time, the interaction between the American and Moroccan faculty allowed collegial sharing of information relevant to improvement of workflow and productivity. Some notable areas warranting development include review and revision of imaging protocols in CT and ultrasound, implementation of templated reporting, improvement of contrast reaction policies, enforcement of radiation safety measures, and additional resident and technologist training. The intent is to further expand upon these and other topics on future missions to Morocco.

We had a limited amount of time to discuss quality improvement projects. The UTHealth radiology residency has a well-established QI curriculum, where residents are expected to complete at least one radiology QI project by the end of their residency. The list of completed and ongoing QI projects was shared with residents and faculty to generate some ideas. Also, ideas that arose during the assessment, education and community outreach portions of the mission were noted for future projects.

For example, there is no set of standard protocols for ultrasounds at the Ibn Sina Hospital in Rabat, Morocco. Protocols and worksheets from UTHealth were shared with the department. A QI project will look at the effect of these protocols on the ultrasound workflow, including effect on quality, timeliness, and radiologist satisfaction with the new workflow. Another project will look at how to maintain consistent patient information and identifiers on radiologic studies. We encouraged the department to reach out to us if they desired collaboration with any QI projects

d. Medical School Agreement

The schedule of activities included a series of meetings with Pr Adnaoui, the Dean of the Mohamed V University, School of Medicine, Pharmacy and Dentistry in Rabat, Pr Iyengar, Family Medicine Department Chair and Co-Chair of the Global Health Concentration at the McGovern Medical School, Houston, Texas, and Dr Sanhaji, UTHealth McGovern Medical School Rad-Aid Chapter leader, Wednesday, April 17.

The first meeting at the Medical School included:

- Pr Nouini, President of the “Partnership Coordination Committee” (Commission de la Cooperation et de Partenariat) and President of the Ibn Sina Hospital, affiliated to the Mohamed V University.
- Pr Dakka, Vice Dean
- Pr Lekehal, General Secretary
- Pr Karra, Head of the Department of Epidemiology and Public Health team
- Dr Guedira, member of the Public Health team



Presentation of the Moroccan School was given by the Dean and terms of the cooperation agreement were discussed, as well as mobility of students and post-doctoral research cooperation. It was highlighted that in 2018-2019, 36 out of 533 medical students in the University Mohamed V Medical School were foreign students, the large majority from Sub-Saharan Africa, to which the agreement of cooperation will also benefit. The Dean was also interested by the implementation of a Family Medicine Residency Program that his School does not offer.

The second meeting was held at the Mohamed V Rabat University and included Pr Ilham Berrada, Vice President of the University Academic Affairs and Pr Ismail Kassou, Vice President of Research and Cooperation at the University headquarters. A more global presentation of Moroccan higher education was given and discussion regarding possible cooperation were promising.



e. Mobile Outreach

We were invited by the Association Marocaine pour la Protection de la Santé (Moroccan Association for the Protection of Health: AMPS) to take part to their April scheduled mission. The AMPS is a Moroccan non-governmental, non-profit organization that leads medical outreach missions to the underserved areas of Morocco. Ten trips are organized every year since 2012. The president of the association, Pr El Hassani, is a NeuroRadiologist and leads a team of up to 40 physicians of all specialties as well as non-physician volunteers through these missions. The specialties represented during the trip in which we participated included general medicine, OB/Gyn, cardiology, surgery, ophthalmology, otorhinolaryngology, dentistry, from private practice and academia, as well as residents.

The AMPS is allowed to use an abandoned health center (unused due to lack of qualified personal) to set up consultation rooms. The association usually borrows 3 government-owned mobile medical units for their trip, when available. One is equipped for dental procedures and another for ophthalmology examinations. The third unit contains one x-ray and one ultrasound machines. The assessment of these devices is provided in the corresponding paragraph. The mission trips are usually 2 or 3 day long and about 400 patients are seen every day.



Our trip took us to Oulad Khallouf, Morocco, in the province of Marrakech. The local authorities of the region of interest provided lodging in a local school, where classrooms were turned into dorms. Amenities were minimal and we experienced a shortage in running water. Our meals were provided by residents of the neighboring village.

During the two-days mission, 600 patients were examined, 51 radiographs and 62 ultrasound studies were performed. Our Rad-Aid team was able to borrow two Clarius handheld and one Philips handheld probes as well as a Siemens Acuson NX3 ultrasound machine for the duration of the trip. These devices allowed our team of radiologists to help the clinicians with their imaging needs and improve the turnover of patients. Furthermore, by adjoining a radiologist in the consultation room, we reduced the traffic in the crowded location. Every organ system was assessed including ob/gyn ultrasounds for pregnancy, breast ultrasounds, echocardiograms, and thyroid exams for

goiters. Interesting cases were discussed, such as an ASD revealed by Ultrasound/Doppler.



The experience highlighted the importance of a mobile radiology unit in providing efficient and appropriate care to the underserved population. During our debrief following the mobile outreach, we concluded that additional handheld and/or portable US devices the consultation rooms would improve tremendously the efficiency and turnover, allowing to see more patients during the trip and providing additional opportunities for training to the residents. Also, the X- Ray table will need technical adjustments for improved quality and safety.



9. Debrief

The 2019 Mission was the fourth visit to Ibn Sina Hospital, Rabat, Morocco by RAD-AID Morocco Chapter. Our group consisted of 5 diagnostic radiologists, 2 interventional radiologists, 3 radiology residents, 1 physics resident, and 1 family medicine physician. Two residents who participated to the preparation of the trip were not able to travel at that time.

The didactic lectures and the workshop were very well-received by local residents, as shown by the responses to the final survey. Areas of improvement included language and format of the lectures since most residents requested bilingual (preferably presentation in English and slides in both English and French) and more interactive lectures; as well as the number of interventional radiology workshops, as most resident requested longer workshops with more cases.

A detailed PACS readiness assessment and workflow optimization seminar provided short and long-term goals for full implementation of PACS system in the hospital, as well as efficacy improvement. The Radiation Safety assessment found several areas of suboptimal procedures that needed attention.

Our group also joined a local non-profit organization mobile caravan in a medically underserved remote area, which gave us the opportunity to directly participate in patient care, as well as working together and exchanging experiences with a local Moroccan health care team.

The presence of a physicist group-member was very valuable, as this provided the opportunity for a detailed assessment of the equipment for imaging quality and radiation safety. For future mission trips, we are aiming to include imaging technologists to the group for evaluation of imaging quality and assist in more formal technical training. Similarly, nurses could also join the mission to deliver lectures regarding contrast monitoring, contrast material related adverse event management, and code training.

In brief, we believe that the Morocco 2019 Mission has made an important impact in improving multiple aspects of radiology, including resident education, quality improvement, and direct patient care. We are planning to further consolidate this impact by organizing at least annual trips to Morocco in the future. We also plan to share our experience in national and international conference to hopefully serve as an inspiration for similar missions

10. Social life

In addition to our educational and clinical activities, we enjoyed touring the cities of Rabat, Casablanca and Marrakesh. Different groups made plans to visit places of interests of their choice, but we had most dinners together in typical Moroccan restaurants, enjoying local food and the famous Moroccan mint tea that gets a special aroma from the technique of pouring it. We also attended a diner with local dancers, acrobats and fire jugglers. The visit to Marrakech was a very educational one. The contrast between the colorful agitation of Jamaa El Fna with its snake charmers, tarot readers, freshly squeezed orange juice stands and open sky shops selling about everything, and the calm and serenity of the beautiful lush vegetation of the Majorelle Gardens and the sumptuous display in the Yves Saint Laurent Museum. But the highlight was the camel ride in the Touareg costume with a stop for tea at a local's home.



11. Personal Benefits to the Volunteering Team

a. Ethical Question

The experience brings awareness to the ethical dilemma with regards to the standards of the practice of medicine in LMIC. The scarcity of the available resources changes the guidelines as we know them and there is a constant balance between the benefits of a suboptimal care versus the harm of no care at all. For example, a pregnant patient with a vaginal bleed may not receive a complete examination that would include an endovaginal approach but the abdominal approach may help rule out some of the etiologies. Un other example is patient privacy that is not as drastically respected.

b. Cultural Enrichment

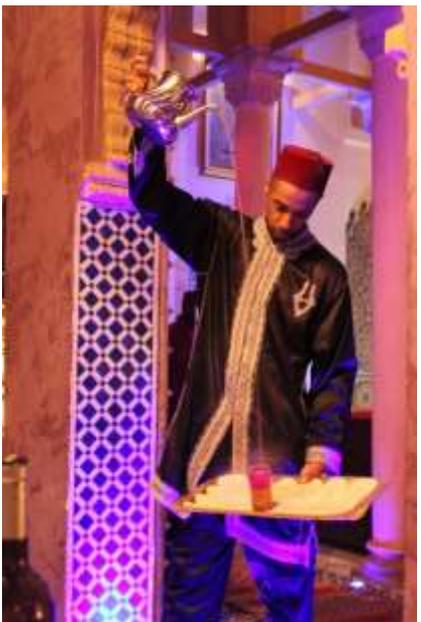
i. History

We learn about a very unique and eventful history in this part of the world. The origins of present-day Morocco began in 788 A.D. when Arab conquest of North Africa. The kingdom has been ruled by the Alaouite dynasty since the 17th century. In the late 19th century BC, Moroccan history was marked by the French and Spanish influences. Morocco recovered its independence from the French “protectorat” in 1956 and Spain

withdrew from the Western Sahara in 1976. Pro-democracy protests during the Arab Spring” led to a series of reforms implemented by the King Mohamed VI including a new constitution which gave more power to the parliament and prime minister, and a new “Family Code” addressing women’s rights.

ii. Lifestyle

Because of its geographical location and rich history, Morocco is the crossroad of many influences, Arab, Mediterranean, Berber, Southern European and African. The variety of the influences is reflected in the specificity of the culture including the architecture, music, dance, art, gastronomy, fashion and lifestyle. It is very enriching to get to experience such a cultural diversity.



iii. Socialization

One of the most rewarding part of the trip was to get to meet people of all walks of life, patients and physicians, establishing connections and making new friends. We experienced the generosity of the villagers in the remote area we visited when they shared with us their meals. We were invited to a local physician home for dinner, at offered onsite the famous couscous for lunch during one of our educational days and a coffee break with a plethora of local sweets and snacks. Residents got to socialize and mingle at the end of the workdays.



c. Wellbeing and engagement

In addition to making friends and enjoying new experiences, this trip included many benefits for the wellbeing and professional engagement of the participants.

i. Volunteering

The mere fact of volunteering is well known to trigger feelings of happiness. As a species, we are hardwired to help each other for survival and it is deeply rooted in us. Giving our time, experience, goods or a simple smile is a wonderful way to fight anxiety and depression. It has also been shown that it prevents or lessens physician burnout, promoting engagement of healthcare workers and reviving the sense of purpose of what we do.

ii. Gratitude

The sense of gratitude for what we are so lucky to enjoy and sometimes take for granted as physicians in a first world country is overwhelming when we see how difficult the work conditions are in the hospitals and the lack of the same resources we mindlessly use in our everyday practice. It certainly brings up awareness to the value of the resources we use and their judicious use. Medical devices as basic as stethoscopes and ophthalmoscopes were not available to the local mobile caravan and donation of few of them brought joy to the group.

iii. Teamwork and Camaraderie

Sharing lodging, meals, work, experiences and fun together created a special bond between the participants of the trip. Residents and faculty got to know each other better, leading to trust and improved relationships, making working as a team a pleasure and increasing efficiency.



12. Preparations and Plans for Next Year

The UTHealth McGovern Rad-AID Chapter intends to continue its commitment to the Moroccan community. As such, we have already started plans for our 2020 visit. During our immediate debriefing and subsequent conversations, we identified what worked well, and what may need modification.

A team of 10 is probably the maximum number of people that is realistically manageable, including faculty, residents, and support staff. The competing needs of bringing this experience to new residents, while maintaining some degree of consistency. As such, we are hoping to have 2-4 faculty that represent a core group of people that participates every year. To this we would add a rotating group of residents, some of which may be able to repeat the experience if desired. The team would also be

enhanced by the participation of ultrasound and CT technologists, hopefully complementing the role of a medical physicist.

Although lectures were well received, language and understanding remain a barrier. Options for next year include having shorter lectures, having didactic videos available prior to our visit, and increasing audience participation. Increasing the number of hands-on workshops is thought to be a great way to engage with residents and students.

The hand-on workshop and community outreach portion of the mission were greatly enhanced by the use of portable wireless ultrasound. As this technology becomes more readily available, we plan to bring more units during the next mission, and perhaps have a unit donated to an underserved area.

13. Pictures

Additional pictures are available online at:

<https://drive.google.com/drive/folders/1jldW3kJiNS1GqvJsps20s53IIAMi0lww>

14. Mission presented at the following educational events:

- Rad-Aid Webinar: 1/16/19
- HRS: 2/26/19
- Glocal: 3/8-9/19
- Rad-Aid Conference: 11/2/19
- Submitted: ASER 2019, Centile 2019

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Rad-Aid UTH Profiles



List of speakers and participants

1. *Dr. Latifa Sanhaji*
2. *Dr. Eymen Ucisik*
3. *Dr. Ashley Rubinstein*
4. *Dr. Mamie Gao*
5. *Dr. Jonathan Vaccaro*
6. *Dr. Amanda Jarolimek*
7. *Dr. Anil Pillai*
8. *Dr. Jayesh Soni*
9. *Dr. Jeremiah Stringam*
10. *Dr. Eduardo Matta*
11. *Dr. Kaustubh Shiralkar*
12. *Dr. Deepa Iyengar*

Dr. Latifa Sanhaji

Dr. Latifa Sanhaji is a radiologist at the Department of Diagnostic and Interventional at UTHealth McGovern Medical School in Houston, Texas since 2005. She is fellowship trained in musculoskeletal radiology and leads the Emergency Radiology Section of an affiliated Level 3 county hospital.

Besides her interest in Emergency Radiology and Education, she is also involved in Disaster and Mass Casualty Preparedness in Radiology (Member of the working group for Radiology in the World Association for Disaster and Emergency Medicine), Women in Medicine (Council for the Women Faculty Forum at UTHealth), Physician Wellness (Wellness Mentor for Medical Students, organizing and facilitating Workshops for UTHealth Residents and Faculty) and Global Health.

She implemented a UTHealth Rad-Aid Chapter in August 2016. Since then, she concentrated her efforts on building a team of residents and faculty in order to provide educational, academic, clinical and technological radiology services in Morocco, Francophone North African country classified as a low-middle income country by the World Bank. Yearly trips allowed the team under her lead to assess the local needs and build partnership with the Emergency Radiology and General Radiology Departments in the Hospital Ibn Sina in Rabat, Morocco, as well as providing lectures and training to Moroccan Radiology Residents in collaboration with the University Mohamed V Radiology Residency Program Director.

The future mission will additionally include an assessment of mobile radiology services in remote areas of Morocco. As a Rad-Aid Morocco program manager, her vision is to provide and improve life-saving radiology services to the underserved Moroccan population through education, clinical assistance and capacity building.

For more information about Rad-Aid Morocco, please contact Dr Sanhaji at Lsanhaji@rad-aid.org.

Dr. Eymen Ucisik

Dr. Eymen Ucisik is a second year radiology resident at UT Health. She was born and raised, and also went to medical school in the beautiful city of Istanbul, Turkey. Between med school

and residency, she did radiology research at MD Anderson Cancer Center at Houston for about two years. When she is not dictating or studying, she spends time singing, playing her "klasik kemence" (a traditional eastern Mediterranean musical instrument), exploring Houston, taking care of her plants, and cooking. She also loves traveling and tries to never miss an opportunity to explore a new place. She is looking forward to meeting the Ibn Sina Hospital radiology team and exchange experiences.

Dr. Ashley Rubinstein

Ashley is a second year medical physics resident at the UTHealth McGovern Medical School. She graduated from the UT MD Anderson Cancer Center UTHealth Graduate School of Biomedical Sciences where she conducted her dissertation research investigating magnetic-field-induced radiation dose effects arising from thoracic irradiations with MRI-guided radiation therapy systems. As a resident, she has focused on assessing trends and anomalies in quality assurance data and developing low-cost methods to perform quality assurance tasks in low- and middle- income countries. Additionally, she has collaborated with physicists in Puebla, Mexico to implement quality assurance programs in Mexican radiology departments. In her free time, she enjoys hiking, camping, fishing, and birding.

Dr. Mamie Gao

Dr. Mamie Gao is a first year radiology resident at UT Houston. She was born in China, grew up in Canada, and moved to Texas before 8th grade. She went to Texas Tech University for college and Texas Tech University Health Sciences Center for medical school. During medical school, she participated in a global health trip to Nicaragua where she helped provide care at various clinics in and around Jinotega. When she is not working, you can find her working out in a gym or eating all the food in Houston. She is excited to meet everyone at Ibn Sina Hospital and better understand the medical education/training system in Morocco.

Dr. Jonathan Vaccaro

Originally from Southern California, Jonathan Vaccaro MD has lived and studied in places throughout the United States and abroad. This is his first trip to Morocco and is excited to learn about and experience your culture.

After completing his undergraduate degree at Dartmouth College in the State of New Hampshire, Jon went on to obtain his Medical Degree from Brown University in Providence, Rhode Island. His radiology residency was conducted at the Dotter Institute/OHSU in Portland, Oregon with additional fellowship training in Cross Sectional Imaging at the University of San Francisco in California and Interventional Radiology at Rhode Island Hospital. Jon enjoyed many years in academics at Brown University before transitioning to private practice in a small community hospital in New Hampshire.

Jon is active with RAD-AID and is currently the co-director of the residency program in Guyana. On a personal note, Jon comes from a large family of Italian and French heritage. His father built sailboats and the family was always at sea. When not relaxing at his lake house in rural Maine, he is tending to his avocado grove in Southern California.

Dr. Amanda Jarolimek

Dr. Amanda Jarolimek is an Assistant Professor in the Department of Diagnostic and Interventional Radiology at McGovern Medical School at UTHealth. She received her microbiology/chemistry degree at the University of Alabama and a B.S. in Microbiology at Louisiana State University. She was a PhD candidate in molecular hematology at the University of Texas Graduate School of Biomedical Sciences and received her Doctor of Medicine degree from the University of Texas Medical School at Houston. She completed a transitional year at St. Joseph Hospital in Houston and her diagnostic radiology residency and fellowship in emergency and trauma radiology at the University of Texas Health Science Center at Houston. Her research interests include cervical spine trauma, abdominal trauma, bowel and mesenteric injuries, GU trauma, traumatic injuries in pregnancy, false negative mammogram, CT findings in talus and calcaneal injuries, and radiology preparedness plans in mass casualty incidents.

Dr. Anil Pillai

Dr Anil Kumar Pillai is an Associate Professor and section chief in the Department of Diagnostic Radiology and Interventional Radiology at University of Texas Health Science Center, Houston, Texas. He received an M.B.B.S. degree from Kerala University, in Trivandrum, India, in 1994. He was awarded the M.D. degree in Radiology in 1998 after completing a residency in Diagnostic Radiology at Sardar Patel Medical College, University of Rajasthan, India. He worked as an Assistant Professor at Amirta Institute of Medical Sciences in India for 4 years. He then worked as a consultant Radiologist in the Middle East for a year and moved to England. While in England, Dr Pillai passed board examinations in Radiology and was awarded the title "Fellow of the Royal College of Radiologist (FRCR)". He worked in England as a consultant radiologist at Burnley General Hospital in East Lancashire before he moved to the United States to do a fellowship in Interventional Radiology in 2005. After completing a 2 year fellowship in Interventional Radiology at Rush University Medical Center in Chicago, Dr Pillai worked as a faculty member at Rush from 2007 to 2012. Dr Pillai was the Medical Director at Parkland Memorial Hospital Dallas from 2013-2016.

Dr Pillai is a board certified physician by American Board of Radiology and has the certificate of added qualification (CAQ) in interventional radiology. His clinical interests include interventional oncology, women's health, peripheral vascular, disease, dialysis access interventions, venous interventions, and other non-vascular interventions. He has been awarded various merit and research awards and grants over the years from societies including Society of Interventional Radiology (SIR) and Radiological Society of North America (RSNA).

Dr. Pillai is of Indian heritage and speaks multiple Indian languages. He is an avid traveler and runner. He has completed several half and Full marathons. He is married and has two children.

Dr. Jayesh Soni

Dr. Jayesh Soni M.D. is Interventional Radiology with 10 years' academic experience in IR. He is working as an Assistant professor in an Interventional radiology at the Department of Diagnostic and Interventional at UTHHealth McGovern Medical School in Houston, Texas since 2017. Dr. Soni was working as a full-time interventional Radiologist at RUSH university medical center, Chicago from 2011 to 2017. His training involved 2 years fellowship in Interventional radiology. Dr. Soni areas of interest include venous and dialysis interventions, and interventional oncology, with a large focus on interventional oncology and transplant interventions, including numerous TACE, Y90, and TIPS procedures. Additionally, He worked closely with the urologists, providing a full range of complex urologic interventions.

Dr. Soni is actively involved in consult service for inpatients and a busy clinical service for the outpatients IR clinic. In addition to the clinical work, he also involved in teaching fellows, residents and medical students.

He is interested in voluntary work at UTHHealth Rad-Aid Chapter. Last year, he remotely presented role of Intervention Radiology in Emergency room for UT Rad Aid in the Morocco. He is planning to visit Morocco these year in April for the voluntary work, especially in Interventional radiology for Radiology and Emergency Departments in the Public Hospital Ibn Sina in Rabat, Morocco, as well as providing lectures and training to Moroccan radiology residents in collaboration with the University Mohamed V Radiology Residency Program Director.

Dr. Jeremiah Stringam

Jeremiah is an integrated interventional and diagnostic radiology resident at MD Anderson / University of Texas, Houston. He was born in Canada, obtained his bachelor's degree from the University of Montana, and received a doctor of medicine from The University of Washington, Seattle.

His experience in global health includes organizing satellite clinics in rural Nepal, and providing translation and pre/post operative support services for the International Children's Heart Foundation in Kharkiv, Ukraine. His main focus in global health is creating sustainable advances on-site through capacity building and educational outreach. When he isn't working,

Jeremiah enjoys cooking, playing fiddle, singing, camping, and traveling the world with his beautiful wife Tara.

Dr. Eduardo Matta

Eduardo Matta MD, CMQ is originally from Puerto Rico. He has a Bachelor of Science in biochemistry and physics from Tulane University in New Orleans, Louisiana, and a Medical Degree from the Tulane's School of Medicine. He completed his Radiology Residency at the Ochsner Clinic Foundation, and his fellowship in Abdominal Imaging at University of Washington in Seattle. Dr. Matta is currently an Associate Professor of Radiology and Oncology with a passion for radiology education and quality improvement. He is also Director of the Abdominal Section and Vice Chair of Quality in Radiology. His expertise lies in cross-sectional diagnostic imaging of adult patients (ultrasound, CT, and MRI), but he is also active in radiography and fluoroscopy. Clinical interests include general, vascular and obstetric ultrasound, as well as development of clinical applications for 3D/4D ultrasound, cardiac imaging (including CT coronary angiography and cardiac MRI), dynamic and diffusion MRI for oncologic applications, and obstetric MRI for maternal and fetal indications. He has been recognized for his teaching with Teacher of the Year (2013, 2010) and Dean's Teaching Excellence Awards (2013, 2012, 2009), among others.

Dr. Kaustubh Shiralkar

Kaustubh Shiralkar MD, is originally from Houston, Texas. He has a Bachelor of Science in neurobiology from the University of Texas at Austin. He has a medical degree from Texas Tech University and completed his radiology residency at the Ochsner Clinic Foundation in New Orleans. He finished his Abdominal Imaging fellowship at the University of Texas at Houston.

Dr. Shiralkar is currently an Assistant Professor of Radiology at UT Houston medical center and has a passion for radiology education and oncologic imaging. He is also the director of PET-CT imaging at Smith Clinic center. His expertise lies in cross-sectional diagnostic imaging of adult patients (ultrasound, CT, PET, and MRI), but he is also active in radiography and fluoroscopy. Clinical interests include multiphasic liver imaging, general and vascular ultrasound, as well as development of clinical applications for virtual colonoscopy, dynamic and diffusion MRI, and PET-CT for oncologic indications.

Dr. Deepa Iyengar

Dr. Deepa Iyengar is a practicing family doc and Professor with the department of Family and community medicine at UT Health-McGovern Medical School. She graduated from Osmania Medical College in South India, and went on to do Family practice residency at UT-Houston and also obtained her Master's in Public health degree at UT-SPH.

She has been in practice for the last 25 years and sees patients in the outpatient and inpatient settings. She practices the full scope of family medicine with an area of expertise in obesity and its management. Her specific research interests are in Obesity and its impact in the development of metabolic syndrome and diabetes among Asians. She also is interested in Global Health and co-directs the global health initiatives at McGovern Medical School. In her free time she likes to volunteer, read, write and explore nature!!