

22 APRILE, VENERDÌ

14:00 - 15:30

SALA A

CENTRO CONGRESSI PARTENOPE

MED-2

HEALTH COOPERATION – NEW CHALLENGES IN HEALTH TRAINING AND RESEARCH COOPERATION

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CONTRIBUTI

The University for its territory: The inter-university Cooperation between the University of Brescia, Italy and Save University of Changoene, Mozambique

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Experiencing PICU in Africa

G. Debertolis, Università degli Studi di Padova; F. Houndjahoue, Doctors with Africa CUAMM; J. C. Gody, University of Bangui; G. Putoto, Doctors with Africa CUAMM; D. Trevisanuto, Università degli Studi di Padova; L. Da Dalt, Università degli Studi di Padova

Italian Academic Cooperation support to the rebirth of the Somali National University (SNU) - Mogadishu

G.B. Parigi, Università degli Studi di Pavia; F. Castelli, Università degli Studi di Brescia; V. Colizzi, Università degli Studi di Roma "Tor Vergata"; M.A. Jimale, Somali National University

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G.B. Parigi, M. A. Bellinzona, A. Poilova, A. Forte, Università degli Studi di Pavia

Plasmodium vivax in Cameroonian Duffy negative individuals

G. Russo, Dipartimento di Sanità Pubblica e Malattie Infettive, Università degli Studi di Roma "La Sapienza"; G.B. Djeunang Dongho, Laboratory of Malaria & Vector Research, NIAID; M. Sanou Sobze, Department of Public Health, University of Dschang

Cooperation between University of Florence, University of Siena (Italy) and Facultad Integral del Chaco, Universidad Autónoma Gabriel René Moreno, Escuela Técnica de Salud Boliviano Japonesa de Cooperación Andina(Bolivia). Antimicrobial resistance: surveillance and control intervention

M. Spinicci, M. Strohmeier, A. Bartoloni, G.M. Rossolini, Dipartimento di Medicina Sperimentale e Clinica, Università degli Studi di Firenze; T. Di Maggio, L. Pallecchi, Dipartimento Biotecnologie Mediche, Università di Siena; H. Gamboa, Facultad Integral del Chaco, Universidad Autónoma Gabriel René Moreno; F. Cosmi, Escuela de Salud del Chaco Tekove Katu; E. Caero, Escuela Técnica de Salud Boliviano Japonesa de Cooperación Andina; A.L. Villagrán, Hospital Básico Villa Montes; E. Damiani, Instituto Nacional de Laboratorios de Salud (INLASA), Ministerio de Salud, La Paz

POSTER

Inter-institutional agreement 2020-2023 between the University of Brescia and Kwame Nkrumah University of Science and Technology, Ghana

T. Agbenyega, Kwame Nkrumah University of Science and Technology (KNUST); B. Opong, HopeXchange Medical Centre; V. Quaresima, University Department of Infectious and Tropical Diseases, Università degli Studi di Brescia, ASST Spedali Civili di Brescia, UNESCO Chair 'Training and Empowering Human Resources for Health Development in Resource-Limited Countries', Università degli Studi di Brescia; A. Terao, International Students Mobility Unit, Università degli Studi di Brescia; B. Formenti, F. Castelli, University Department of Infectious and Tropical Diseases, Università degli Studi di Brescia, ASST Spedali Civili di Brescia, UNESCO Chair 'Training and Empowering Human Resources for Health Development in Resource-Limited Countries', Università degli Studi di Brescia

Introduction of a Parenteral Nutrition Protocol in neonatal and pediatric age at the NPH Saint Damien Pediatric Hospital in Pot-au-Prince (Haiti): results from an international multidisciplinary working team

F. Baratta, Dipartimento di Scienza e Tecnologia del Farmaco, Università degli Studi di Torino; E. Ambreck, V. Tomaselli, Francesca Rava Foundation-NPH Italia onlus; R. Cajuste, P.H.Saint-Jean, L. Dorcelus, J.Alix, O. Louisma, NPH Saint Damien Pediatric Hospital; P. Roggero, Dipartimento di Scienze Cliniche e di Comunità, Università degli Studi di Milano, Unità di Terapia intensiva Neonatale, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico; V. Puricelli, O. Amato, Unità di Terapia intensiva Neonatale, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico; R. Dall'Amico, Santa Maria degli Angeli Hospital; P. Brusa, Dipartimento di Scienza e Tecnologia del Farmaco, Università degli Studi di Torino

Epidemic risk in urban areas: a concept map and risk assessment tool.

G. Cainelli, I. Amoruso, Università degli Studi di Padova, DCTV - Igiene e Sanità Pubblica; M. Maharjan, Tribhuvan University, Central Dept. of Zoology; M. Fonzo, C. Bertoncetto, T. Baldovin, Università degli Studi di Padova, DCTV - Igiene e Sanità Pubblica

A sustainable solution to address the unmet need of Specialist and General Surgical Services for Children living in two Sudanese States: The Hub and Spoke Model

A. Calisti, Unità Chirurgia Pediatrica - Ospedale San Camillo Forlanini; F.M. Nugud, The Gezira National Centre for Pediatric Surgery; A. Aloï, Expert in International Development Cooperation; P. Giambelli, Agenzia Italiana per la Cooperazione allo Sviluppo (AICS); G. Lisi, P. Lelli Chiesa, Unità Chirurgia Pediatrica, Università degli Studi "Gabriele d'Annunzio" di Chieti-Pescara

The water we would like

L.Foti, Dottorato in "Applied Biology and Environmental Safeguard", Università degli Studi della Basilicata; F. Lelario, Università degli Studi della Basilicata; M. Qurie, Al Quds University; R. Karaman, Al Quds University; S.A. Bufo, L. Scrano, Università degli Studi della Basilicata

Training and retention of health personnel in Sudan: challenges and opportunities posed by the changed political context

V. Romano, Agenzia Italiana per la Cooperazione allo Sviluppo (AICS) - Ufficio di Khartoum

ABSTRACTS

THE UNIVERSITY FOR ITS TERRITORY: THE INTER-UNIVERSITY COOPERATION BETWEEN THE UNIVERSITY OF BRESCIA, ITALY AND SAVE UNIVERSITY OF CHANGOENE, MOZAMBIQUE

L.R. Tomasoni, Department of Infectious and Tropical Diseases, ASST Spedali Civili of Brescia, Università degli Studi di Brescia, UNESCO Chair in "Training and empowering human resources for health development in resource-limited countries", Università degli Studi di Brescia, Medicus Mundi Italy; A. Madeira, SAVE University of Changoene; P. Magro, N. Gregori, C. Cerini, Department of Infectious and Tropical Diseases, ASST Spedali Civili of Brescia, Università degli Studi di Brescia, Medicus Mundi Italy; B. Comini, Medicus Mundi Italy, SAVE University of Changoene; R. Lombardi, Fondazione Museke ONLUS; B. Formenti, UNESCO Chair in "Training and empowering human resources for health development in resource-limited countries", Università degli Studi di Brescia; F. Castelli, Department of Infectious and Tropical Diseases, ASST Spedali Civili of Brescia, Università degli Studi di Brescia, UNESCO Chair in "Training and empowering human resources for health development in resource-limited countries", Università degli Studi di Brescia, Medicus Mundi Italy.

The province of Brescia and the province of Inhambane, Southern Mozambique, are deeply linked by a common history, which sees different actors and realities cooperating for decades. Among these, the non-governmental organization Medicus Mundi Italia since 2008 has been working in the country together with the Department of

Infectious and Tropical Diseases of the University of Brescia on projects to strengthen health services, in particular for HIV, tuberculosis and malaria, of rural communities in the Inhambane Province. For over ten years, the presence of the territory has allowed a close integration in the social fabric, cooperating with local realities, such as the Ministry of Health of Mozambique, the Health Centers and the National University UNISAVE. The initiative aims to ensure access to quality basic health services for the most disadvantaged communities in rural districts in the Province, with a focus on the health of women and children, prevention, diagnosis and treatment of HIV and tuberculosis, through training activities for local health personnel. In particular, a health outreach system has been developed through mobile units, the Brigadas Move is, in order to reach the communities furthest away from the Health Centers, the same ones that, due to logistical difficulties and socio-economic vulnerabilities, would have limited access to health services. Since one of the main activities supported by MMI and UNIBS, through the UNESCO Chair in "Training and empowering human resources for health development in resource-limited countries", is support and training of local health resources, the relationship with UNISAVE is a core component. The declination of this commitment and vision has been expressed in the signature of the international cooperation agreement between the UNISAVE University and University of Brescia In June 2021. Currently, following the consolidation of the inter-university relationship, the UNESCO Chair together with UNISAVE, MMI and the Fondazione MUSEKE Onlus of Brescia are collaborating in the design of a training initiative for students in the health faculties of Faculty of Health Sciences and Sports of UNISAVE, which includes the fields of Sports Science, Nutrition and Nursing. The objective of the project is to foster the development of an integrated and multidisciplinary approach, aimed at understanding the principles of public health, primary health and social determinants of health of rural communities in the province of Inhambane. This with a purpose to create a generation of health professionals aware of the needs and characteristics of the community in which they play their role in order to facilitate access to and use of health services by local communities. Such a training approach is particularly relevant in a population with significant differences in access to health services due to factors such as income, housing, education and working conditions. In this perspective, it seems appropriate to achieve a growing understanding by local students of the health professions of the problems related to the social determinants of health and disease. Moreover, the implementation of the project would allow to obtain an accurate evaluation of the epidemiological and socio-economic indicators of the community. The University of Brescia will send scholar doctors in Infectious and Tropical Diseases to the Province of Inhambane with a double objective: on the one hand to support operational research activities, to mentor UNISAVE students in the new community health training internship, to support UNISAVE teaching staff for specific skills, and finally to develop a global approach to public health. The project aims to create a new alliance between communities, third sector organizations, universities and health services, with work that will benefit not only in the short term, but also in the medium and long term to all parties involved.

EXPERIENCING PICU IN AFRICA

G. Debertolis, Università degli Studi di Padova; F. Houndjahoue, Doctors with Africa CUAMM; J. C. Gody, University of Bangui; G. Putoto, Doctors with Africa CUAMM; D. Trevisanuto, Università degli Studi di Padova; L. Da Dalt, Università degli Studi di Padova

BéAfrika is the word in Sango for the Central African Republic and it literally means «the heart of Africa». The CAR really is the heart of the vast black continent: its geographical heart, and the social, genuine, problematic, but also resilient and brave heart. The country is twice as large as Italy (622,980km²) while the population is relatively low at about 6 million, one third of which is younger than 15 years. In 2018 Emergency left the burden of supporting the only pediatric hospital in the capital to CUAMM, the first healthcare ONG to be acknowledged in Italy. A hospital-the Complexe Hospitalo-Universitaire de Bangui, CHUPB-complex, in fact, as the name implies, with its 287 beds, and over 70,000 children consulted in the ER section, 18,000 hospitalizations, 20 doctors in specialist training in Pediatrics and 3 in Pediatric Surgery. In addition to local residents, since 2019 at CHUPB Italian doctors can have their training through the JPO ("Junior Project Officer") project, promoted by CUAMM. Since 2002 the JPO project offered 257 doctors from 30 Italian Universities the possibility of a rotation in one hospital in Africa where CUAMM operates. It mainly involves residents in Infectious Diseases, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Public Health and Surgery. Between 2006 and 2022, the Pediatric Residency Program (PRP) of the University of Padua (Italy) joined the JPO project, supporting 33 residents to attend a 6-month elective in Africa. The ICH elective is counted as any other rotation that is mandatory for residents during their training. In 2021 the first president of the PRP of the University of Padua attended her ICH elective at the CHUPB. An interesting opportunity, a tropical medicine gymnasium but also emergency medicine, given the exposure guaranteed by the large case history of the hospital, which treats neonatal and pediatric patients suffering from surgical, orthopedic and internal pathologies. At the CHUPB a Surgical Intermediate Care and a Pediatric Intensive Care Unit are also present. In fact, many are the children who suffer from pediatric diseases which need advanced treatments, such as: cerebral malaria, tetanus, heart failure, end-stage renal failure, necrotizing pneumonia, stroke in untreated sickle cell disease, acute liver disease. However, health services at the Complex Hospitalo-Universitaire still lack some advanced techniques such as ventilators, central vascular accesses, dialysis, imaging. Through the cooperation between local doctors and international doctors, CUAMM is implementing the offer of quality care to children of the Central African Republic. This collaboration has already made it possible, in part thanks to the help of the trainees, to design treatment protocols for the main pediatric and neonatal emergencies adapted to the context, to compensate for the lack of advanced diagnostic tools through the use of ultrasound, to introduce novelties such as adequate medications for pain management and antibiotic stewardship. With the JPO project, the partnership between CUAMM and Universities offers to Italian young doctors the opportunity to test oneself with emergencies, learning from their African colleagues to make the best medicine possible despite limited resources. In the pediatric intensive care of the Bangui hospital, one learns how to manage severe diabetic ketoacidosis by relying on the clinic and the electrocardiogram, in the absence of blood gas analysis; to diagnose and urgently drain a hypertensive pneumothorax and to evaluate the effectiveness of the intervention by means of bedside thoracic ultrasound if a chest x-ray cannot be performed. You also learn to suspect intracranial bleeding and establish the most appropriate treatment based on the history and clinical data, because a CT scan is not available; to lay an intraosseous access by makeshift means, when a patient is in shock. Above all, working in Africa teaches an important lesson: good practice matters more than the means available. The JPO project is contributing-together with the other Doctors with Africa CUAMM projects-to the improvement the healthcare offer of African

countries, and offering Italian residents a training opportunity in addition to those already available. A partnership from which both parties come out as winners.

ITALIAN ACADEMIC COOPERATION SUPPORT TO THE REBIRTH OF THE SOMALI NATIONAL UNIVERSITY (SNU)- MOGADISHU

G.B. Parigi, Università degli Studi di Pavia; F. Castelli, Università degli Studi di Brescia; V. Colizzi, Università degli Studi di Roma "Tor Vergata"; M.A. Jimale, Somali National University

The Italian intervention in favor of higher education in Somalia has a long tradition, dating back to 1950 when the AFIS (Amministrazione Fiduciaria Italiana della Somalia) founded the "Scuola Superiore di Diritto Politico- Amministrativo", intended to prepare the administrative and the political staff of the future Somali republic, followed by the creation of the Institute of Legal, Economic and Social Disciplines in 1954. In 1969 the Somali government, in collaboration with the University of Padova, established the faculties of Law and Economics; in 1971, the Italian Cooperation established the Somali National University (SNU)-with the primary objective to support the development and strengthening of managerial, academic and research skills of SNU staff-with the faculties of Agriculture and Chemical Industry, followed by the faculties of Medicine, Veterinary, Engineering; in 1973 Geology; in 1979 Language, Journalism, Islamic studies. Since 1973, 200 Italian Professors taught in Mogadishu; at the same time, many Italian Universities hosted Somali students in Masters and PhD programs, aiming to prepare the future academic staff of SNU. In these years the Italian cooperation with SNU was the largest ever undertaken with a foreign country. In 1985 the university largest campus, that hosted 7 faculties and the headquarter of the SNU, was inaugurated, an imposing semicircular structure of seven buildings. Unfortunately, after less than six years the new university was closed due to the outbreak of the civil war, and would remain closed for the following 24 years, during which Somalia gained the awfully unpleasant first position in the Failed States Index list. In August 2012, at the conclusion of the work of the Contact Group between Somalia and Italy, the Minister of Education, Culture and University of the Federal Transitional Government of Somalia expressed his appreciation for the intention of the MAECI to support the rebirth of the SNU, officially reopened the 16th August 2014. Italian support started with the "on site" training of the deans of the newly reinstated faculties, working with their counterparts in the Universities of Padova, Roma Tre, Trieste and Firenze. Italian academic support with the SNU was then formalized in a series of projects, named UNS-1 to UNS-5, financed by the AICS within a strategic plan aimed to enhance the Italian presence in the general Somali scenario. Italian Universities that contributed these projects included Roma Sapienza, Roma Tre, Firenze, Torino, Trieste, Bari, Bologna, Napoli Federico II and Pavia, each one twinned with a Faculty of the reborn SNU. Specific objectives of the consecutive projects were the improvement of the scientific level of Somali teachers and students with targeted fellowships and scholarships, as well as the radical refurbishment of the semi-destroyed University campus and the supply of badly needed equipment for research and training laboratories. While this process was fully ongoing the pandemic burst on the world scene, but found a group of partner Universities already well accustomed to work together online. Thus, it was a rather simple task for the UNESCO Chairs of the universities of Brescia, Napoli, Rome Tor Vergata, and the Medical Schools of the universities of Pavia, Milan Statale and Roma Sapienzato organize a two-week-long Online Covid19 Course for

medical doctors. The course, attended by some 50 Somali colleagues gathered in a Mogadishu hotel, covered all the aspects of the SARS-CoV2, from the epidemiology to the immunopathology, from the advanced diagnostics to the protocols for clinical management and therapy; overall evaluation of the Course by the attendees was more than gratifying. As an almost immediate spin-off of this successful experience, the Universities of Brescia, Palermo, Pavia and Roma Tor Vergata were warmly requested to organize jointly the “2020 online course in medicine and surgery for the last year medical students of the SNU”, in order to fill the gap left by the pandemic and subsequent lockdown in the academic preparation of last year medical students. The course, organized in 4 weeks in the months of July, 2020, each week organized in 5 days (Monday-Friday) for two hours (15-17 Italian time corresponding to 16-18 Somali time, covered the fields of Internal Medicine, Pediatrics and Pediatric surgery, Obstetrics and Gynaecology, General Surgery. The joint pilot education online program was followed by all the 43 Somali medical students at the last years of the SNU Faculty of Medicine; academic authorities recognized due credits for the work done online, and made available to teachers and students the needed online didactical facilities and tutorial services. Every Italian teacher was “twinned” with a Somali colleague, acting as a mediator between students and long-distance teacher, thus fully responding to the mission of the UNESCO UniTwin project under which aegis the course itself was organised. And now, 60 scholarships for master, PhD and specialisation courses in Italian Universities have been provided to young SNU assistant lecturers: the backbone of a stronger and well-founded Somali National University.

IMPROVEMENT OF CHILDREN CARE POSTGRADUATE TEACHING AS A TEMPLATE FOR UPGRADING MEDICAL EDUCATION IN CENTRAL ASIA: THE CHILDCA PROJECT

G.B. Parigi, M. A. Bellinzona, A. Poilova, A. Forte, Università degli Studi di Pavia

Children Central Asia (ChildCA) project has been designed strictly following the Erasmus+ capacity building projects guidelines, aiming to: “...help higher education institutions from partner countries to develop, modernise and disseminate new curricula, teaching methods, and to boost quality assurance and governance of higher education institutions...” A project aiming to improve medical teaching as a whole is doomed to failure, due to the extent of the involved topics. On the other hand, a project taking into account a single specialty could be too narrow to act as a template for the whole medical field. The choice of Pediatrics and allied disciplines—namely Pediatric Surgery and Pediatric Neuropsychiatry—as a main topic of the project responds actually to the requisite of being wide enough to cover almost all medical specialties, but also to be delimited enough to be manageable. To this scope 11 Universities from Italy, Germany, Poland, Kazakhstan, Tajikistan and Uzbekistan gathered into an ongoing CBHE project, that EACEA financed with 997.000 €.

Aims:

- 1) To support the modernization, professionalization and internationalization of postgraduate training in the field of children care in CA Countries;
- 2) To support CA Countries to improve quality, relevance, planning, and delivery of postgraduate training in Children Care Management;

- 3) To promote a similar improvement of postgraduate training in other fields of medical care;
- 4) To emphasise the importance of children's care in the ongoing process of the Health Care Reform in CA countries;
- 5) To enhance the relevance of CA countries scientific research in the international literature scenario.

Methodology:

1) Structured level: definition of a work plan, which comprises nine groups of activities, logically sequenced and interrelated, through the development and implementation of new curricula in children care management resorting on the long-standing experience gained in the EU partner Universities.

2) Informal level: creation and invigoration of a network among the relevant staff in European and CA partner institutions which, by means of the development of cooperation and identification actions, mutual exchange of successful experiences, good practices and lessons learnt from their own past activities, will contribute to the sustainable development of a modern approach to postgraduate training in all the various fields of children care.

Results

New curricula drafting and implementation

A thorough analysis of the local situation was performed through:

- a) an articulated questionnaire with 750 respondents from the partner countries;
- b) online and in presence meetings among partners;
- c) direct evaluation of selected students' performances done by experts of the Union of European Medical Specialists. It was thus possible to draft a Baseline Document offering a detailed SWOT analysis of the situation, and the proposed solutions for an updated postgraduate training in Pediatrics, Pediatric Surgery and Pediatric Neuropsychiatry. New specialisation curricula were then prepared and submitted to the relevant academic and governmental authorities for the needed endorsement: having the CA Ministries of Education and Health as Associated Partners in the project represented an extremely valuable asset, and actually the positive reception of the project by local authorities highlighted the willingness to facilitate the gradual implementation of structural reforms proposed by the ChildCA partners.

Online courses in Genetics, Bioethics and Informatics

ChildCA launched three online courses in Genetics, Bioethics, Teaching Skills and Technologies. These Courses are open to all the partner universities staff and students interested in upskilling their preparation. The Genetics course is structured at two levels, from a first basic-level set of contents to a second specialized training. The training course in Bioethics intends to provide a useful tool for discussion and confrontation over sensitive topics that medical doctors face in their professional path. It foresees to provide attendees with the tools necessary to assess difficult situations with greater consciousness and open-minded attitude and criticism. The training program on New technologies for higher education, online training and e-learning stems from the close collaboration between the ICT center of the University of Pavia, EDEN (European Distance and E-Learning Network), and EduOpen. In terms of this highly international initiative, several webinars were organized with the possibility to receive an open badge upon successful completion.

Next steps

CA partners are working at the integration of the online courses in their institutions' curricula; on top of that, on obtaining official approvals of newly developed curricula in pediatric specialties, including the mentioned courses already delivered. ChildCA partners are also actively working on the implementation of the most

impactful work package, aimed at training the academic staff involved in the actualization of the new integrated curricula in pediatric care management and in new teaching techniques through short-term in presence training for teachers and long-term internships for young researchers in the EU partner Universities. We are confident that ChildCA project can represent the first step in a much needed and no longer postponable process of modernization of postgraduate medical training in CA Countries.

PLASMODIUM VIVAX IN CAMEROONIAN DUFFY NEGATIVE INDIVIDUALS

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Background

Plasmodium vivax (*P. vivax*) is considered as absent in West/Central Africa because of the very high prevalence of Duffy antigen negativity (> 95%) in the local human population. Duffy antigen on red blood cells is the only well-known receptor allowing the entry of *P. vivax*. However, in recent years, several studies reported cases of *P. vivax* infections in sub-Saharan Africa among Duffy negative individuals. Dschang is a town in the western region of Cameroon, located at an altitude of 1,400 m above the sea level; the local population is essentially composed by Bamileké, a group belonging to Bantu ethnic group. According to local entomological data, the human biting rate of circulating *Anopheles* spp. species in Dschang ranged from 2 to 18 bites per night during the main dry season and the small dry season respectively. According to the Cameroonian Ministry of Health, malaria in that area has a seasonal pattern and it is due only to *P. falciparum* circulation. Thanks to the collaboration between Sapienza University of Rome and the University of Dschang, some stages for students from the School of Specialization in Infectious Diseases of Sapienza University of Rome were realized. During these clinical stages an excess of malaria cases was observed. Thus, after having activated a joint PhD with Sapienza University, in order to identify the circulating species of *Plasmodium* in that area, some studies involving outpatients seeking care because of fever were carried out.

Materials and methods

Samples collection was performed among outpatients seeking medical care because of fever using dried blood spots. Samples were collected in Dschang during different seasons: the first collection round was performed during the main dry season (December-February), the second round during a period representative of small rainy season, small dry season, and main dry season (May-August). Other smaller samples collection was also performed during the rainy season in Santchou (western region, 700 m above the sea level) and Kyé-ossi (southern region, 550 m above the sea level). All populations in the three study sites belong to the Bantu ethnic group. All samples were analyzed by molecular conventional methods (PCR) and the Duffy genotyping was assessed for all *P. vivax* positive samples.

Results

Overall, 984 samples were collected from Dschang (484 and 500 during the first and second collection round respectively), 400 from Santchou and 101 from Kyé-ossi. In Dschang Plasmodium spp was detected in 34.4% (n=339/984) of patients, being 14.5% (n=70/484) during the first round, and 53.8% (n=269/500) during the second round of samples collection. Plasmodium spp mono-infection were more frequent during the first round (n=68/70, 97.1%) than during the second round (n=230/269, 85.5%) of samples collection; in particular they were due, in order of frequency, to *P. vivax* (n=164/298, 55%), *P. falciparum* (n=130/298, 43.6%), and *P. malariae* (n=4/298, 1.4%). Overall in Dschang, including also plasmodium co-infections, *P. vivax* was detected in 38.5% (n=27/70) and 66% (n=177/500) of malaria cases on samples collected during the first and the second round respectively, whereas *P. falciparum* was detected in 62.8% (n=44/70) and 46% (n=125/500) of malaria cases respectively. Concerning the other two study sites, during the rainy season Plasmodium spp was detected in 44.3% (n=177/400) and 35.6% (n=36/101) of malaria cases from Santchou and Kyé-ossi respectively, being identified as *P. vivax* in only 2 cases from each study site. Globally, *P. vivax* was responsible of 60.2% (n=204/339) of malaria cases detected in Dschang, of 1.1% (n=2/177) and 5.6% (n=2/36) of those detected in Santchou and Kyé-ossi respectively. Remarkably, all the *P. vivax* positive cases detected showed Duffy-negative genotype (-33CC).

Discussion

The molecular data obtained from the different study sites in Cameroon showed a significant circulation of *P. vivax* only in Dschang, being marginal in Santchou and Kyé-ossi. Our data show the circulation of *P. vivax* in the West Region of Cameroon (mainly in Dschang) among Duffy-negative autochthonous individuals, with a prevalence possibly depending from altitude and seasonality. Further data are necessary in order to assess the real *P. vivax* local circulation, to identify local vector as well as to identify Duffy-independent *P. vivax* erythrocyte invasion pathway: in this optic a post-doc fellowship at NIAID has been assigned to Cameroonian young researcher (already obtaining the joint PhD with Sapienza University). Furthermore, in a public health point of view, it is necessary to improve the local microscopic diagnostic capacity in order to ensure a more effective and safer therapeutic management of *vivax* malaria attacks and relapses.

COOPERATION BETWEEN UNIVERSITY OF FLORENCE, UNIVERSITY OF SIENA (ITALY) AND FACULTAD INTEGRAL DEL CHACO, UNIVERSIDAD AUTÓNOMA GABRIEL RENÉ MORENO, ESCUELA TÉCNICA DE SALUD BOLIVIANO JAPONESA DE COOPERACIÓN ANDINA (BOLIVIA).

ANTIMICROBIAL RESISTANCE: SURVEILLANCE AND CONTROL INTERVENTION

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The global increase of Antimicrobial Resistance (AMR) is a major threat to human and animal health. In low-resource countries where legislation, regulatory surveillance and monitoring systems on the use of antimicrobials, and the prevention and control of AMR are weak or inadequate, the problem is of particular concern.

Since the late 1980s, long-standing cooperation and research activities addressing the phenomenon of AMR were carried out in the Bolivian Chaco region, within a collaboration agreement between the Ministry of Health of the Plurinational State of Bolivia and the University of Florence, Italy, and with the support of several local and international partners, including: University of Siena, Siena, Italy, Facultad Integral del Chaco, Universidad Autónoma Gabriel René Moreno, Camiri, Bolivia, Escuela de Salud del Chaco Tekove Katu, Gutierrez, Bolivia, Escuela Técnica de Salud Boliviano Japonesa de Cooperación Andina, Cochabamba, Bolivia, .

Studies conducted on commensal *Escherichia coli*, showed a remarkable resistance rates to the old antibiotics (i.e., ampicillin, trimethoprim–sulphamethoxazole, tetracycline) since early 1990s, and the emergence of resistance to newer drugs (fluoroquinolones and expanded-spectrum cephalosporins) in the 2000s. In 2011 a dramatic increase of resistance to fluoroquinolones and expanded-spectrum cephalosporins was documented. Of note, CTX-M-type extended-spectrum betalactamase (ESBL) determinants were first detected in the early 2000s and thereafter underwent rapid dissemination. A study conducted on bacterial pathogens responsible for urinary tract infections collected in the period 2010–2014, showed very high resistance rates. The lowest susceptibility was observed for trimethoprim–sulphamethoxazole, tetracycline, nalidixic acid, amoxicillin–clavulanic acid, ciprofloxacin, and gentamicin. Among *E. coli* and *K. pneumoniae*, 11.6% were ESBL producers. Resistance to nitrofurantoin, amikacin, and fosfomycin remained low, and susceptibility to carbapenems was fully preserved. Remarkable rates of acquired resistance was also documented in commensal *E. coli* from home-raised chickens. In recent years (2016-2019), an alarming and unexpected high resistance rate to last resource drugs, such as colistin and oxazolidinones, was documented in intestinal commensal bacteria from healthy school children. Possible causes may include unrestricted use of antibiotics (e.g. colistin and phenicols) in veterinary medicine and animal breeding, and importation of resistant strains via food and animals. Of note, in order to tackle AMR, Bolivian authorities banned the use of colistin as an animal feed additive in 2019.

Based on these data, contextualized, information, education and communication campaign aimed at raising awareness on AMR and related threats has been implemented. In order to improve compliance to hand hygiene of health care workers, a multimodal strategy, in accordance to WHO guidelines, has been implemented at Camiri Municipal Hospital. Within the perspective of a multisectoral and multidimensional “One Health” approach, activities involving veterinary, food and agricultural sectors, have been planned.

INTER-INSTITUTIONAL AGREEMENT 2020-2023 BETWEEN THE UNIVERSITY OF BRESCIA AND KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, GHANA

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The University of Brescia (UNIBS), Italy, and the Kwame N'Krumah University of Sciences and Technology (KNUST), Kumasi, Ghana, have been collaborating for several years on the implementation of joint research activities. This shared commitment, led to the signing of a collaboration agreement between the two Universities and Hope X change Medical Centre (Kumasi, Ghana) in 2018. The joint research activities have been realized in the identification of the social and gender-based determinants of malaria, as part of the activities of the UNESCO Chair in "Training and empowering human resources for health development in resource-limited Countries" and the PhD in Appropriate Methodologies and Techniques in International Cooperation at the University of Brescia. The study on gender-based malaria was not only an important consolidation of the importance of Community health, but also an opportunity to conduct training activities on research methodology addressed to health professionals of KNUST and HopeXchange Medical Centre. The study also offered operational results that were shared to local health authorities for possible future strategic interventions. Thanks to the joint activities, the University of Brescia also functioned as a "bridge", bringing KNUST closer to the Interuniversity Centre for Malaria Research (CIRM), contributing to a greater science diplomacy and collaboration between different global realities. Following on this mutual commitment, in 2020, UNIBS and KNUST signed the 2020-2023 Interinstitutional Agreement on the Erasmus + Project, funded by INDIRE, which provides for the mutual mobility of students and teachers in the health sector. The Erasmus + International Credit Mobility (ICM) Program is the European program that allows mobilities to non-European partner universities. The mutual transnational exchange of students and teachers between higher education institutions will contribute to the cultural enrichment and enhancement of specific skills and awareness to different contexts. In addition, this experience can certainly be a starting point for many young professionals who choose to pursue their careers in the field of international health and cooperation. The inter institutional agreement will strengthen the already existing relations between the two Universities, which can continue to work together for future programs. Unfortunately, due to the restrictions imposed by the pandemic by COVID-19, the international exchange has not yet begun, and it is planned to start in the academic year 2022/23. In these two years, the two Universities have maintained constant relations to safely plan the start of activities.

INTRODUCTION OF A PARENTERAL NUTRITION PROTOCOL IN NEONATAL AND PEDIATRIC AGE AT THE NPH SAINT DAMIEN PEDIATRIC HOSPITAL IN POT-AU-PRINCE (HAITI): RESULTS FROM AN INTERNATIONAL MULTIDISCIPLINARY WORKING TEAM

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Aid Progress Pharmacist Agreement (A.P.P.A.®) is a non-profit association whose main activity is the A.P.P.A.® Project. The Project began in 2004 and is the result of the cooperation between the Department of Drug Science and Technology (DSTF) of the University of Turin and Italian Community Pharmacists. The Project focuses on Galenic Laboratories (GLs) established in medical structures located in Developing Countries (DCs). The Project is structured in different steps permitting that an effective and functional lab can be set up. These six steps are always preceded by a feasibility study that is essential to evaluate the needs of the new lab. The Produced Medicinal products, taking into account the local industrial medicinal products more often falsified, are chosen by physicians according to the needs of the population and local technicians are trained by A.P.P.A.® volunteers to produce high quality medicines. Several Projects are going on: two in Madagascar, two in Angola, two in Chad and two in Haiti. Regarding Haiti, in 2011, the collaboration request of the Francesca Rava Foundation-NPH Italia onlus, led the execution of a feasibility study site assess whether the application of the A.P.P.A. Project was appropriate at the NPH Saint Damien Pediatric Hospital in Port-au-Prince (Haiti). In 2012, in agreement with the hospital management, the GL was opened. The work began with the production of a minimum number of preparations specific for pediatric use and stable in tropical conditions. In 10 years of work, numerous preparations have been added and significant production volumes have been obtained, such as, for example, 2500 liters of liquid preparations per year. In addition, the hospital pharmacy has been equipped with two laboratories for the production of sterile preparations, including oncologicals, 24 hours a day. In the last five years, following the on-site implementation of a pediatric surgery program, there has been the need to be able to set up bags for parenteral nutrition. The first step in the development of the new project was to write a protocol to be applied in the different departments. In particular, thanks to the work of a multidisciplinary group, born from the collaboration between the Saint Damien Hospital, the Francesca Rava Foundation, the DSTF and the Maggiore Policlinico Hospital in Milan, a protocol called "Protocol de Nutrition Parentérale en âge néonatal et pédiatrique" was developed. The Document contains all the useful notions relating to prescription and preparation of parenteral nutrition bags. Parenteral nutrition, from a technological point of view, is not easy to achieve, especially in a context such as that of Haiti, also knowing the spread of nosocomial infections at the Saint Damien hospital. In This context, it was therefore necessary to develop an easily understandable and applicable preparation procedure, that at the same time allowed to minimize the possibility of preparation contamination. The procedures currently in use in some Italian hospitals were then analyzed and compared, the parts of interest were selected and then integrated according to the local needs. The prescriptive flow was organized as follows: the preparation request is sent to the Hospital Pharmacy via a specially prepared file in which only some fields can be modified in order to minimize the possibility of incorrect compilations. Pharmacists verify the feasibility of the preparation and predispose the preparation sheet and the label. Once the preparation has been completed by the technical staff, the pharmacist carries out the quality checks and, if the formulation is suitable, it is sent to the requesting Department. The mixture for parenteral nutrition is a system in

which the high number of components makes it essential to evaluate the compatibility between the elements, the stability and quality of the preparation. Given this, an important part of the work carried out during the on-site missions was the training of the medical staff and of the pharmacists. In addition, it was necessary to train the technical and nursing staff who practically had to proceed with the preparation and administration of the bags, alternating theory with practical exercises. In conclusion, the procedure for the prescription and preparation of bags for parenteral nutrition was developed and successfully introduced on site. All personnel who participated in the training were found to be suitable. To date, the pharmacy is able to meet the demands of the Departments, with the possibility of setting up magisterial bags seven days a week. This project for the development of the parenteral nutrition procedure in Haiti started in 2017: it was an ambitious project that saw the involvement of various professionals and a great team work which, however, allowed to obtain a very important result. Currently, for reasons related to the pandemic, the project continues in remote mode thanks to the organization of training meetings which, at least once a month, jointly involve the Haitian and Italian staff.

EPIDEMIC RISK IN URBAN AREAS: A CONCEPT MAP AND RISK ASSES

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The “One Health” approach assesses the emergence of novel pathogens by prioritizing the dynamics occurring at the human / wildlife interface, on the background of the biophysical environment. Under the perspective of the ongoing SARS-CoV-2 pandemic, it seems necessary to increase the resolution of this approach, investigating emergence mechanisms also at urban ecosystems level, where the ecological complexity (i.e. the trinomial human-synanthropic fauna-urban substrate) suggests a potential combination of predisposing factors for the triggering of local outbreaks and, eventually, for the risk of international spreading of the pathogen. To this purpose, an evidence-based concept map was developed to be used as an experimental tool for assessing epidemic risk in urban areas. A critical literature review on the Scopus, PubMed, Google Scholar, JoVE and EBSCO Global Health database led to the identification of the specific risk factors. After their ranking by relevance, a spider-type hierarchical concept map was created with the CmapTools software: graphically summarizes the (re)emergence and spillover factors. The literature review led to the identification of 8 specific mechanisms of (re)emergence and spillover of pathogens in the context of urban ecosystems. The resulting concept map comprises n=1 focus question and 4 levels of concept terms. Areas at greatest risk resulted the vast urban and suburban areas of metropolises in low-income countries. Accordingly, the risk assessment tool was experimentally applied to two real urban ecosystems, i.e. Padua (Italy) and Kathmandu (Nepal). The application of the risk assessment tool to the urban ecosystems of Padua and Kathmandu allowed a preliminary assessment of possible urban spillover mechanisms and emergence of new pathogens, putting particular emphasis on the role of synanthropic fauna and reverse zoonosis. This survey supports the need for new multidisciplinary approaches to investigate, as a preventive measure, the emergence and spread of infectious diseases in urban ecosystems. These approaches should further shift the investigation focus from the pathogen to the

understanding of the processes underlying the dynamics of emergence and spreading. The development of new theoretical and field investigation guidelines ought to play a key role in the development of an updated infectious diseases surveillance network at global level.

A SUSTAINABLE SOLUTION TO ADDRESS THE UNMET NEED OF SPECIALIST AND GENERAL SURGICAL SERVICES FOR CHILDREN LIVING IN TWO SUDANESE STATES: THE HUB AND SPOKE MODEL

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Background.

The shortage of surgical facilities severely affects low-income countries (LIC). Two billion people have no access to surgical care, although 11% of the disease's Global Burden are of surgical interest. Sub-Saharan Africa (SSA) is experiencing a fast "epidemiological transition" toward a higher incidence rate of Non-Communicable Diseases. Trauma, Metabolic, Neoplastic, Cardiovascular, and Congenital diseases have reached a 50% incidence on the total burden of diseases concerning traditional Communicable pathologies. Many of them require surgery; thus, Surgical Care has become a priority in the Global Health Agenda for Africa. LIC suffer from an extreme shortage of health professionals, particularly surgeons and accessible modern facilities. As far as pediatric surgical services are concerned, high-income countries (HIC) have one Pediatric Surgeon for every 100,000 children aged 0–15 years whereas, in SSA, the proportion is 1 to 6,000,000. This area of the LIC has a significant unmet need for Pediatric Surgical Services. Therefore, it is necessary to provide investments in human, technical and infrastructural resources for a clinical and organizational change of healthcare provision for children. Unfortunately, healthcare providers migration toward HIC for better salaries and professional opportunities and weak retention policies keep the specialist workforce's consistency far below expected. Lack of transportation associated with diffuse poverty hampers access to specialist health care facilities for children living in far and vast extra-urban and rural Areas. Many patients with life-threatening conditions and neonates with correctable congenital disabilities may die before being seen and recorded. General Surgeons usually provide surgery for children in SSA, out of the very few tertiary centers, in District and Rural Hospitals. They may partially cover the demand of so-called General Pediatric Surgery but cannot guarantee appropriate management for complex conditions (neonatal congenital abnormalities, tumors, severe injuries). The question of how to better address the unmet need for Pediatric Surgical services in SSA emerged from recently concluded partnership program between the Gezira National Centre of Wad Medani (Sudan) and the Pediatric Surgery Unit of the Chieti-Pescara University (Italy), supported by the Italian Agency for Development Cooperation (AICS), aiming to upgrade the standard of care of this Sudanese tertiary specialist

hospital. A new initiative has recently been planned and funded by the AICS and will be started and implemented for the next three years.

"Hub and Spoke" model, a new project for Sudan:

A so-called "Hub and Spoke" model (H&SM) of care has been already developed in many HIC. Properly trained General surgeons may treat at a local level (Spoke) patients affected by minor surgical conditions with great benefit for families. Care of Specialist Pediatric Surgical cases may so far be reserved to a few better equipped tertiary centers (Hub), attracting enough workload to be reliable and sustainable. This model has been highly recommended for Africa by the WHO but implemented only in a few countries. The role of project managed by the University of Chieti Pescara in Sudan is to assist tertiary Health Facilities of the Sudanese States of Gezira and Kassala, which have a catchment area including about ten million people (45% < 15 yrs.), to develop a dependent H&S pediatric surgical network. Only four Specialist Pediatric Surgeons are available at the Gezira State, none at the Kassala State, where the Tertiary Mater and Child Health facility is in progress. Medical teams from Italy will work with the Medical School of the Universities of Gezira and Kassala to reduce the shortage of Specialist surgeons. Their main task will be to train a reliable surgical, anesthesiologic and nursing workforce for the Spoke centers in three years. They will be closely linked with the Specialist Pediatric Hubs established in Wad Medani (Gezira) and the Kassala Health Citadel. Standards of service for a Pediatric Surgical H&S networking a LIC. The workforce should include:

At the Hub level: Pediatric Specialist Surgeons with a higher approved surgical training by a Tertiary Healthcare Teaching Institution, with regional appointment and periodic Outreach commitments at the Spoke level. At the Spoke level: General Pediatric Surgeons or General Surgeons with interest in Children's Surgery with at least six months training in General Pediatric Surgery provided in a Specialist Pediatric Surgical Unit during years 4, 5 or 6 of Higher Surgical Training to be completed under the tutorship of an experienced general pediatric surgeon in a District General Hospital. Goals of the Pediatric Surgical H&S network: They will include a) Spoke General Surgeons, anesthetists and nurses committed in good quality Emergency service, b) elective service provided by a Spoke General Surgeons with the appropriate training or by a Visiting Specialist Surgeon (Outreach surgery) from Hub Center. A Spoke clinical lead for Pediatric cases will be identified, and pathways for early treatment and safe referral of major conditions from Spoke to Hub will be shared. Multidisciplinary Clinical meetings and Audits will grant CME on outcomes.

THE WATER WE WOULD LIKE

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Water is needed for our health: it maintains the health and integrity of every cell in the body, keeps the bloodstream liquid enough to flow through blood vessels, helps eliminate the by-products of the body's metabolism, aids digestion, and other exceptional properties. High-quality water is needed to preserve health. Unfortunately, the environment and all its sectors are differently contaminated. This dangerous state is closely linked to increased anthropic activities (industrial and agricultural) and the use of harmful substances

released without control. Old contaminants (pesticides and substances deriving from industrial activities) and new contaminants, called "emerging" (drugs, phytotoxins, body care products), can arrive in rivers, in surface and deep water, and the sea if they are not removed from the wastewater. These substances are harmful to human health because they enter the environment in quantities exceeding the natural self-purification capacity of the ecosystems. We can be exposed to water-derived contaminants in different ways. For example, people can ingest small amounts of pollutants by drinking water; they can absorb pollutants through the skin while bathing or showering and during recreational activities, such as swimming, windsurfing, and waterskiing; they can inhale droplets suspended in the air or vapors while taking a shower. They can also ingest foods that have been contaminated with water-borne pollutants. Wastewater treatment plants (WWTPs) cannot altogether remove most of these substances, which can easily reach the drinking water supplies, causing health problems for adults and children. Although drinking water quality is regulated and monitored in many countries, today's increased knowledge suggests reviewing standards and guidelines on a near-permanent basis for both newly identified contaminants and adopting technologies as tertiary treatment processes, which could promote the easy degradation of recalcitrant compounds. It will be necessary to verify that the degradation products are less dangerous than the original molecules and that no dangerous aggregation products are formed. This communication reports some of the degradation studies carried out by our Research Teams in collaboration with foreign researchers using Advanced Oxidation Processes (AOPs) on pesticides and pharmaceuticals present in actual water samples. Photolysis and Heterogeneous photocatalysis under simulated solar irradiation using two forms of TiO₂ (suspended or immobilized on the surface of thin glass plates) have been investigated to assess the suitability of different oxidation processes to promote mineralization of recalcitrant substances. Transformation products (TPs) have been identified by nLC system coupled to a hybrid LTQ-FT ICR(7-T) mass spectrometer (MS). To evaluate the treatment methods' effectiveness, the treated solutions' measurements have been performed using the "Microtox® Toxicity Test" that reports the luminescence inhibition of the marine bacteria *Vibrio fischeri*. During the degradation process, the temporary formation of toxic fragments was observed, which rapidly degraded to complete mineralization. Samples collected during the degradation process showed the temporary toxicity of the water. The rate of decomposition was highly dependent on the method used. Advanced oxidation processes such as TiO₂/Xe-arc system, lead to a rapid decrease of the bio-recalcitrant chemical concentrations in aqueous solutions, while photolysis and TiO₂-coated glass are less effective. These promising results push us to continue and improve experimental trials. What is the future prospect? The creation of prototypes to be used by farmers and artisans to start with the virtuous path of water recycle.

TRAINING AND RETENTION OF HEALTH PERSONNEL IN SUDAN: CHALLENGES AND OPPORTUNITIES POSED BY THE CHANGED POLITICAL CONTEXT

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Sudan is currently experiencing a period of political, social and economic turmoil followed by the October 2021 military coup. The latter pushed the country in a worsen economic situation as well as into a protracted health emergency, increasing the number of people who cannot access basic health services and decreasing the health system capacity to deliver the required Primary Health Care (PHC). During 2021, the cost of medicines has increased by approximately 1,000% due to the ongoing inflation and reduced number of local pharmaceutical manufacturers, resulting in continuous shortages in essential medical supplies and medicines. The number of people residing in areas deprived of health services has doubled, reaching 1.7 million people compared to 800,000 in 2020. Low rate of COVID-19 vaccination amongst the population is hindering effective coverage to lessen the resulting morbidity and mortality among the elderly and vulnerable groups. The ongoing situation in the health sector is mainly due to the reduced number and inadequate training of health staff, the lack of funding (to be mainly used for infrastructures and salary staff), and increased economic hardship. In addition, the brain drain and migration of skilled health workers affect the health system's capacity to work effectively and efficiently. The shortages and inequitable and uneven distribution of the human resources for health (HRH) is prominent in Sudan. Most of the health personnel work in urban settings serving a small amount of the country's population, mainly concentrated in remote and rural areas (including IDP camps). Although the production of medical graduates is substantial, the health system is unable to employ the required numbers and deploy them successfully throughout the country. In the past years, Sudan has developed national HRH strategic plan 2012-2016 under the leadership of the Federal Ministry of Health. The plan has defined the priorities for HRH issues and strategic goals and objectives to revive and improve HRH planning, production, distribution and HRH management systems. It also aimed at producing the required result outcomes through improved performance, and scaling up training of the different cadres of the health workforce. Moreover, the strategic plan provided the basis for resource mobilization on key priority issues. Since then, Sudan has struggled to come up with a new and updated strategy and policy paper without any concrete result. Discussions about the approval of a strategic document in the health sector have been going on over the past few years, but were brutally stopped by the October 2021 military coup. This paper will analyse the following themes:

-How to develop common concepts, strategies, and mechanisms to strengthen the coordination among the different stakeholders for the HRH.

-How to build health workforce management systems to strengthen the HRH planning processes and management capacity.

-How to decentralize the health care system within the country:

- Developing a core training package on HRM to strengthen the health workforce management at the decentralized levels;
- Strengthening the HRD departments at the decentralized levels;
- Establishing a supervision system to monitor the health workforce management at the decentralized levels to inform the improvement.

-How to generate evidence on the health workforce training needs, turnover factors and characteristics of the working conditions to inform the capacity building schemes.

-How to strengthen and reform the Continuous Professional Development (CPD) Directorate And the Academy of Health Sciences (AHS) to be responsive to the health needs. Finally, a specific focus will be given to the role of

Universities at sub-national, national and international levels, in the elaboration of training and retention policies in the country.