Study report of a perception survey among trained medical staff in Uzbekistan

GIZ project "Advanced training of medical and technical professionals to work with modern high technology equipment in Uzbekistan

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List of abbreviations

ALOS	Average Length of Stay
BIRADS	Breast Imaging-Reporting and Data System
CD	Compact Disk
CT	Computerized Tomography
CVDs	Cardio Vascular Diseases
EBM	Evidence Based Medicine
FAPs	Feldsher midwife points
FGDs	Focus Group Discussions
GIZ	Gesellschaft für Internationale Zusammenarbeit
HIV	Human Immunodeficiency Virus
HU	Heidelberg University
LMICs	Low and Middle Income Countries
MCH	Mother and Child Health
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
MS	Microsoft
MSCT	Multi-slice computer tomography
NCDs	non-communicable diseases
PHC	Primary Health Care
Rayons/ Tumans	District
RMO	Rayon Medical Organization
RRCEM	Republican Research Center of Emergency Medicine
SUBs	Rural community hospitals
SVAs	Rural ambulatory facilities
SVPs	Rural physician points
TIAME	Tashkent Institute of Postgraduate Medical Education
TOT	Training of Trainers
USB	Universal Serial Bus
Viyolats	Region
WHO	World Health Organization
ZRB	Central rayon hospitals

Executive summary

Background

Uzbekistan's health care system was highly impacted after its independence in 1991. A dramatic rise in the prevalence and incidence of Non-Communicable Diseases (NCDs), including Cardio Vascular Diseases (CVDs), cancers, diabetes, and traumatology cases in the recent years has brought several major health care reforms in the country, aiming to decentralize and improve efficiency of the health care services. The availability of modern health care technology is one example, where the government has invested in to address the demand of rising patients in the last 15 years. Despite the availability of high-tech medical equipment, shortage of skilled health workforce resulted in insufficient and compromised service delivery. To address this issue, the German Development Agency (GIZ for its acronyms in German) and the Ministry of Health (MoH) in Uzbekistan initiated a project "Use of modern advanced medical technology in Uzbekistan" in 2001. The main objective of the project was to train medical and technical professionals to use advanced, modern health technology efficiently.

Kirkpatrick's training evaluation model evaluates training in four dimensions which includes reaction (measures reaction to the training, experience), learning (measures increase in knowledge, skills, confidence as a result of the training), behavior (measures application of the information), and results (analyses the outcome of training). The last level was already measured by the project which showed a positive result with a reduction in average length of stay (ALOS), early diagnosis of diseases and an increased proportion of diagnosis and surgeries in selected health facilities. But the first three phases had not been evaluated so far and this study is an attempt to evaluate first three phases. This study aimed to explore reaction, learning and behavior of training participants from their perception, under broad categories of training influence on their knowledge, improved skills, personal competency, satisfaction and accountability towards their job. The study also explores experiences and further areas of improvement for the advanced medical equipment training program and proposes recommendations based on trainees' expectations.

Methods

This study used a mixed methods approach with qualitative and quantitative tools. It gathered information to reach wider participants through quantitative methods and deeper descriptive information via qualitative methods.

The self- administered questionnaire used rating scales and semi-structured questions, whereas a guided framework was used for Focus Group Discussions (FGDs) and interviews. Total respondents for self-administered questionnaires were 240 out of 489 initially expected participants trained by the project, and 12 FGDs and 12 interviews were conducted by visiting the selected health facilities of Uzbekistan.

Findings

All the participants appreciated the training and perceived that their knowledge, skills, confidence in using the equipment has improved and proficiency in handling complicated emergency cases has enhanced.

Some of the positive aspects explored included early diagnosis in relation to decreased post surgeries complications, increased use of modern surgical methods, doctors and nurses being able to synchronize during surgeries, improved public awareness of the available services, raised interest and willingness to learn more on the equipment by the medical staff, and perceived increase in the quality of care.

Meanwhile, the study was also able to gather some experiences that were hindering implementation of the learning. The common experiences included lack of consumables, shortage of spare parts, no equipment at some work stations, non-functioning equipment due to lack of maintenance services.

One of the surprising findings was that all the participants seem to be satisfied and proud of work in spite of substantial increase in workload, feeling of stress at work and limited work autonomy for nurses.

Recommendations and support requested from the participants mainly included regular refresher trainings, trainings from international experts, use of the local language for training, provision of up-to-date training materials, regular preventive maintenance of the equipment, provision of additional laparoscopic units both at training center and work stations, adequate supply of the spares and consumables, establishment of a knowledge and skills sharing platform, and future training topics as per participants interest.

Conclusion

The project overall illustrates noticeable positive effects. Training is extremely appreciated and perceived to enhance knowledge, skills, confidence and competency by the majority participants. The study revealed that, though the participants perceived an increased workload, complained about the same, but they seem to be satisfied with the recent improvement in the healthcare system. Participants expected continuous support both for the training and to implement learnings at work.

The study concludes that several actors (government, donors, health care staff, financing, training center, supply chain management) need to work together to keep the spirit high of currently satisfied and motivated health workforce, by addressing the obstacles faced by the participants in work.

Recommendation

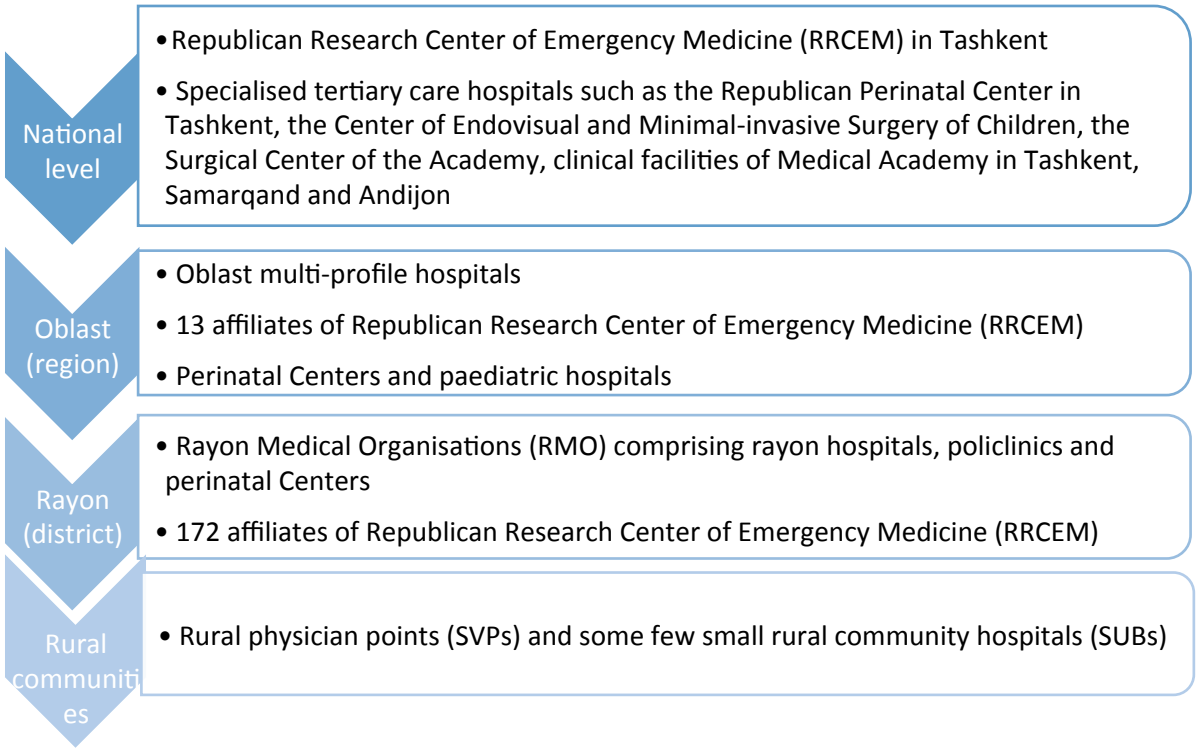
The needs mentioned by health care staff are diverse, thus it needs prioritization and input from multiple actors. The study recommends further studies to assess the practicability and requirements of new training topics, refresher trainings, and new training equipment. The major recommendation includes, addressing the preferred language of delivery for training, timely supply of equipment and consumables, strengthening supply management, even distribution of workload from central to peripheral facilities by reinforcing the peripheral facilities, and creating a conducive platform for knowledge and experience sharing.

Introduction

1.1. Health system in Uzbekistan

After Uzbekistan became independent in 1991, the health care system was dramatically impacted (Ahmedov M, Azimov R et al. 2014). Several major health care reforms were undertaken in the country aiming to decentralize and improve efficiency of the health care services. At present, the health system is organized on three hierarchical levels: national (republican); viyolat (regional); and tuman (district or city) (Ahmedov M, Azimov R et al. 2014).

Figure 1: The healthcare structure in Uzbekistan



Source: Hanser 2015, Baseline study report 'Advanced training for medical doctors and health workers for the use of modern health technology in Uzbekistan'

Health care in Uzbekistan is primarily public sector driven with the private sector mainly comprising of pharmacies, small institutions involved in service delivery or pharmaceutical manufacturing (Petrosyan and Rai 2015). The basic benefit package provided by the Government includes free of charge services in the field of emergency care, communicable diseases, mental health care and oncology (Petrosyan and Rai 2015).

1.2. Health status

Uzbekistan population has been growing continuously in recent decades, reaching 30.75 million in 2014 (The World Bank 2014) of which 51% are female (Petrosyan and Rai 2015). Although the population is still young, with 28.2% of the population aged 0-14 years in 2013, this proportion

has been decreasing since 1980 (Ahmedov M, Azimov R et al. 2014). The majority of the population lives in the rural area (64%) (Petrosyan and Rai 2015).

The life expectancy at birth for male is 70.7 years and female is 75.5 years (State Committee On Statistics 2013). The maternal mortality rate in Uzbekistan has been declining to an official rate of 20.2 maternal deaths per 100 000 live births in 2012. However, a maternal death is considered to have arisen from a criminal offence and is subject to criminal investigations by the prosecutor's office, creating an incentive for under-reporting in official statistics (Ahmedov M, Azimov R et al. 2014). WHO estimated maternal mortality ratio at 36 per 100 000 live births in 2015. Rechal and Richardso et al says that Infant and child mortality rates recorded in official statistics are under estimated than actual mortality and the average life expectancy rate is consequently higher than actual life expectancy (Rechel, Richardson et al. 2014).

Diseases of the circulatory system (in particular ischemic heart disease and cerebrovascular disease) are the most common causes of death in Uzbekistan. The mortality rate from diseases of the circulatory system has increased in Uzbekistan since the 1980s (Ahmedov M, Azimov R et al. 2014). The age-standardized death rate from non-communicable diseases in 2012 amounted to 810.9 per 100 000 population, with a large proportion of deaths (48.34% among males and 37.56% for females) occurring under the age of 70 years (World Health Organization 2014). Out of all deaths due to non-communicable diseases in 2014, about 54% were attributed to cardiovascular diseases, 8% to cancers, and 3% to respiratory diseases (World Health Organization 2014). At the same time, mortality from digestive diseases has increased notably in the country, much of which is due to chronic liver disease and cirrhosis (Ahmedov M, Azimov R et al. 2014).

This NCDs reflects challenges to the public health system with limited resources. However, the Uzbek health system has undergone numerous comprehensive reforms with a system approach in response to improve the primary health care (PHC) system at all levels.

Modern health care technologies have changed the face of healthcare delivery around the world. Today's health care delivery systems have been influenced by and are dependent on state of the arts technologies. In this regard, the health care system of Uzbekistan is not an exception. The general government expenditure on health as a percentage of total expenditure on health has increased considerably from around 40% in 2007 to more than 50% in 2013 (World Health Organization 2016). Approximately 60 million USD were invested in new medical equipment at both secondary and tertiary health care levels in past 15 years (Khodjibaev, Anvarov et al. 2014). The above-mentioned fund was mostly allocated on the investments in diagnostic and therapeutic technologies in order to address the demand of patients in Uzbekistan. A considerable amount of modern high-tech medical equipment has been purchased through donor-funded programs since 2001 (Hanser 2015). The new equipment includes some of the latest high-tech medical devices for imaging, laboratory diagnostics, anesthetics, intensive care and endoscopy (Hanser 2015). That fund allocation shows that health service delivery is in a transition phase in this country. However, due to the shortage of qualified technical personnel, there has been an obstruction to efficient and effective use,

management, and maintenance of the existing equipment (Hanser 2015). Anecdotal lack of skillful staff members results in insufficient and compromised health service delivery, despite the availability of high-tech medical equipment (Hanser 2015).

1.3. Background of the project

Taking above issues into account, GIZ Uzbekistan and the Ministry of Health (MoH) initiated a project in 2001, "Use of modern advanced medical technology in Uzbekistan". The activities to reach the project objectives include:

1) Capacity building of medical and technical professionals for the use of Advanced, Modern Health Technology;
2) Quality assurance and management improvement within procurement, logistic and maintenance in the selected clinical areas;
3) Improvement of procurement and financing planning in selected clinical areas,
4) Public Private Partnerships in centers specialized in advanced training for health professionals and technicians

"Advanced training for medical doctors and health workers for the use of modern technology in Uzbekistan", is one of the component of the project. The project is implemented in cooperation with other related structures like the Institute of Postgraduate Education of Doctors, the Republican Research Centre of Emergency Medicine (RRCEM) and the privately organized "Uztibtechnika" in charge for maintenance (Horneber 2012). The selected clinical areas are: (i) imaging systems / CT and MRI Equipment and (ii) Endoscopy equipment / less-invasive Surgery (Horneber 2012).

The project also supported continuous professional education. The requirements for physicians are as follows:

- Within 5 years, any physician - whether working in a healthcare organization, a healthcare administration or ministerial structure - has to undergo 288 hours of continuous education, which is typically organized in two slots of one month.
- Physicians who work in the Ministry of Health (MoH) healthcare system have to undergo a regular check and determination of their 'category'.
- Physicians who work in the private sector have to get a license from the MoH to practice (this is not the case for the above mentioned physicians who work in the MoH structure). The license needs to be renewed after 5 years.

Nurses with a higher education have to undergo 144 hours of continuous professional education during 3 years of time.

The Tashkent Institute of Postgraduate Medical Education (TIAME) holds the exclusive responsibility for the postgraduate education, specialization and retraining of medical personnel (Ahmedov M, Azimov R et al. 2014). Besides the head office in Tashkent, there are two regional branches, one located in Samarqand, the other in the project pilot region Andijon (Hanser 2015). According to TIAME, there are approximately 75,000 physicians trained during one year, out of which about 15,000 physicians are trained every year by TIAME (Hanser 2015).

Training for MoH physicians to maintain or improve their professional category is provided free of charge (Hanser 2015).

The GIZ project cooperation and support is appreciated by TIAME for continuous training, organizing technical consultations with international and regional experts, and promoting international partnership (Khodjibaev, Anvarov et al. 2014). Study tours were organized for TIAME's educational staff to cooperating partners of international clinics, information visits to medical manufacturers in countries such as Austria, Belarus, Germany and Russia (Khodjibaev, Anvarov et al. 2014). Moreover, international experts and professors have come to TIAME from abroad (mainly St. Petersburg and Belarus) to teach and train TIAME's educational staff (Hanser 2015).

The training that the surgeons undergo in laparoscopy does not constitute only a new medical specialty, but with the training certificate, these surgeons get the official permission to conduct surgical operations with laparoscopes (Hanser 2015). The training aimed to increase technical capacity of health professionals in the effective and efficient use of advanced technologies in selected clinical areas. A total of 489 medical staff (which included 207 surgeons, 156 radiology specialists, and 106 theater nurses) received specialized training (Hanser 2015). The ultimate beneficiaries are the people of Uzbekistan as well as health professionals using the advanced modern technologies as specified (Horneber 2012).

1.4. Current state of the overall GIZ project

The project has so far shown positive outcomes with a reduction in average length of stay (ALOS), early diagnosis of diseases like brain tumors, trauma, ischemic stroke and hemorrhagic stroke (GIZ 2014). There is also an increased proportion of diagnosis and surgeries in selected health facilities (GIZ 2014). According to the project baseline study report by Hanser A.C, the project expected that the doctors' trained in laparoscopy accomplish 90% of gynecological standard interventions by minimal-invasive interventions.

1.5. Research question

This study was advanced to answer the following question: What is the perception of trainees (doctors and medical staff) of the training on the use of modern, advanced medical technology, implemented in selected health facilities from 13 regions and Tashkent City of Uzbekistan? It attempts to investigate any change in the perceptions of knowledge and skills, and to personal competency and professional accountability after the training.

1.6. General objective

To assess the perception of surgeons and other medical staff who attended the training program.

1.7. Specific objectives

- To assess the perception on change of knowledge, skills and competencies
- To assess the perception on change of professional accountability and satisfaction
- To explore further areas of improvement for the training program and propose recommendations based on trainees' expectations

- To assess potential risks of increased workload following the training

1.8. Concepts of training evaluation

Kirkpatrick's four level training evaluation model analyzes the effectiveness and impact of the training, to improve training in the future (Kirkpatrick 1994). The four levels are described as:

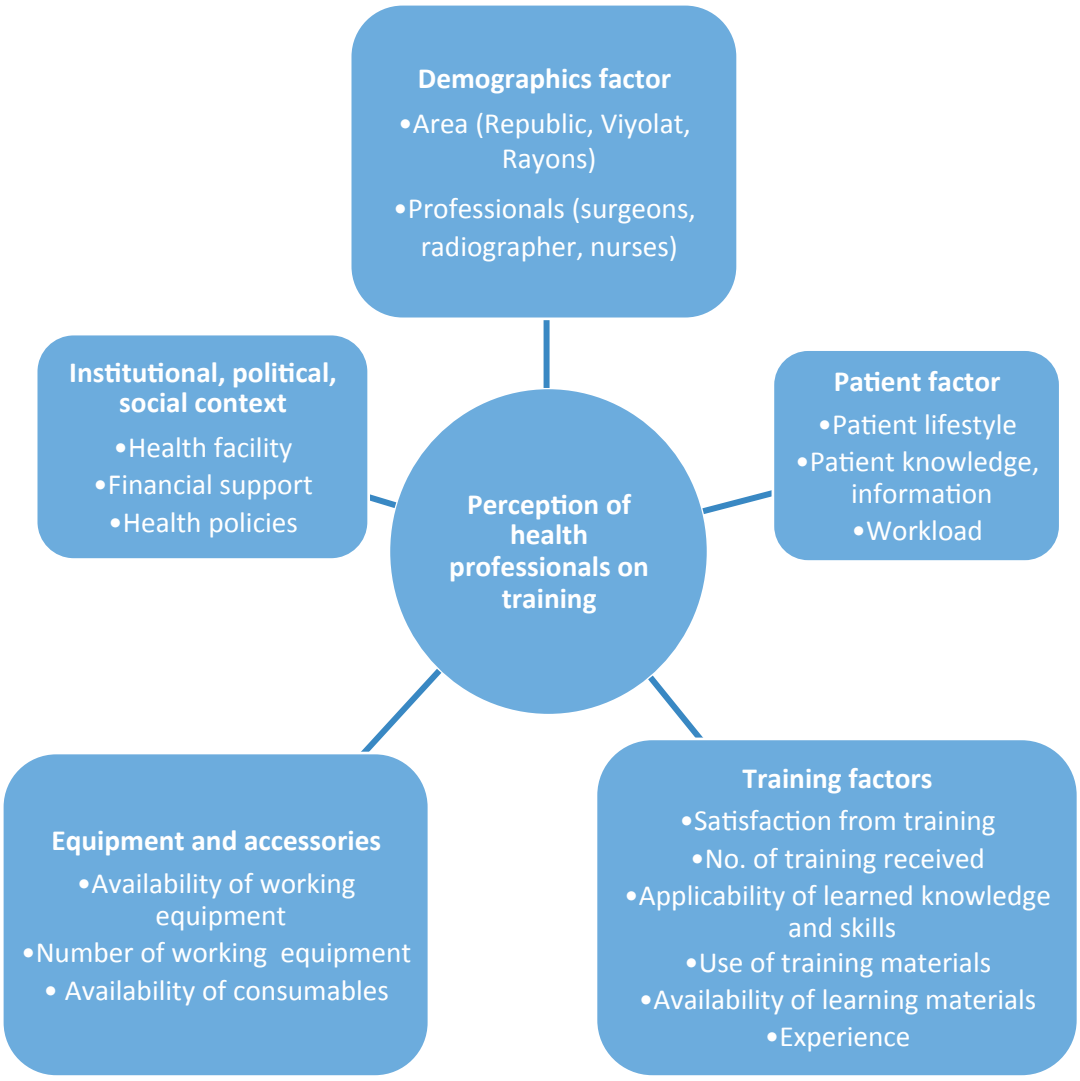
- Reaction: This level measures trainees' reaction to the training, their experience, what they like and did not like instructor, topics, material, its' presentation.
- Learning: this level measures what trainees have learned. Increase in knowledge, skills, confidence as a result of the training.
- Behavior: How trainees apply the information is measured in this level.
- Results: this level analyses the outcome of training. If implementation of training has good results

This model is referred to as the standard to evaluate training, this study has also adapted its four level.

1.9. Conceptual framework

The conceptual framework was sketched to conceptualize, how the perception on training might get influenced by various factors such as, demographic factor of participants, training factors, institutional factors, patient factors and availability of equipment. The figure below shows different aspect under each factor.

Figure 1: Conceptual framework of the study


Demographics factor
•Area (Republic, Viyolat, Rayons)
•Professionals (surgeons, radiographer, nurses)
Institutional, political, social context
•Health facility
•Financial support
•Health policies
Perception of health professionals on training
Patient factor
•Patient lifestyle
•Patient knowledge, information
•Workload
Equipment and accessories
•Availability of working equipment
•Number of working equipment
• Availability of consumables
Training factors
•Satisfaction from training
•No. of training received
•Applicability of learned knowledge and skills
•Use of training materials
•Availability of learning materials
•Experience

1.10. Rationale for the study

The perception and attitude of employees towards their job and training received may have a great impact on the success of such training (Truitt 2011). This study, therefore, aimed to explore the perception of health professionals on the training and its influence on their knowledge, skills improvement, personal competency and accountability towards their job. The study also explored the training satisfaction, attitude towards their job in relation to increased diagnosis-surgeries and possible areas for improvement.

This study might also help the project to adapt to the comments, current needs and possible areas of improvements proposed by the staff. On a national level, this study would contribute to fill the gap by including the views of medical staff in the training and their post-training experiences in Uzbekistan.

Methods

This chapter presents the study design, study area and the study population. It illustrates the data collection methods, data analysis and management, and the ethical approval.

2.1. Study design

This study adopted mixed methods approach with qualitative and quantitative tools. The quantitative approach was chosen to reach wider participants who have received training and are spread around the country, where as qualitative approach was opted for descriptive and interpretive information.

The self- administered questionnaire on the perception of trainees was used to quantify the perception of trainees and understand the current situation using rating scales and semi structured questions. The study collected descriptive information via in-depth interviews and focus group discussions (FGDs) to ensure exploration of the presumed theory under a framework, but at the same time providing flexibility and adaptation to unforeseen information that might emerge in the process of the actual research.

The researcher looked at a broader range of perceptions, experiences and further expectation on the training related to advanced medical equipment from a small number of people under time and resource-limited conditions. The field visit was designed to be accompanied by the local staff from GIZ, also for translation purposes.

2.2. Study area

The study area was Tashkent city and 13 regions of Uzbekistan. Four core hospitals were selected to gather qualitative data, Republican Research Centers for Emergency Medicine (RRCEM) in Tashkent and its three pilot oblasts, Andijon, Navoiy and Samarqand. The rationale for the selection was that these hospitals possess and utilize types of advanced medical equipment that the project is addressing. Also, these hospitals have the advantage that they conduct similar types of medical interventions. In addition, data from two other hospitals from Tashkent were collected: the Republican Perinatal Center and the Center of Endo-visual and Minimal-invasive Surgery of Children. Both hospitals are cooperation partners of the project. However, these two hospitals differ from the RRCEMs in the profile of medical interventions.

2.3. Study population

The study population was total trained personnel (489) by the project in Uzbekistan health system.

Surgeons: 227

Radiologists: 156

Theatre nurses: 106

2.4. Data collection tools

Data were collected using both quantitative (Self-administered questionnaire) and qualitative methods (FGDs and interviews).

2.4.1. Self-administered questionnaires

The questionnaire was developed under the consultation with Heidelberg University team and project staff. 38 item questionnaires included basic data; satisfaction and perception rating Likert scales, structured as well as open-ended questions. Information related to the training programs, its influence in knowledge, skills improvement, personal competency and accountability were gathered.

Online survey forms were developed via "Google forms" in English. The English version of the online questionnaire was first tested among a population of Master course participants at Heidelberg University. The questionnaire was translated to the Russian and Uzbek version with help of GIZ. All the translation to local language (Uzbek or Russian) was validated by GIZ-Uzbekistan.

The online links were distributed via email. For those trained staff who did not have email or an access to email, printed versions of the survey forms were distributed. All printed versions were entered online by the researcher.

2.4.2. Focus group discussion and in-depth interviews

The design of the focus group discussion and interview guides was carried out in such a way that, particular issues could be well explored. The guide with semi-structured open-ended questions was developed, on the four thematic sections (expectation from training, contribution of training, practical application including hindrances and follow-up support-recommendation for future) with more specific subthemes in each section.

The homogeneity of focus groups was guaranteed as each group was selected by the type of training (surgeons, radiologists and theater nurses) and each group was composed of participants who have received a mix of training at different times between 2011 and 2016, and working in different levels. A total of 12 FGDs was undertaken in Tashkent city and other three regions (Andijon, Navoiy and Samarqand) where facilities had training centers. All the FGDs were conducted in the local language with assistance from local moderators of GIZ- Uzbekistan, who were experienced in facilitating FGDs.

Interviews were conducted among 12 trainees to explore various perceptions about the training program. The selection of interviewees was based on purposive sampling. Inclusion criteria included any health professionals who had received at least one training under the framework of the GIZ project and exclusion criteria was not having participated n FGDs.

A moderator- translator and researcher visited each study location according to scheduled appointments in order to conduct the FGDs. They were trained on the aim of the study, objectives and areas to be explored. The purpose of visit and the aim were explained (to explore the change in experiences and perceptions after advance skill enhancement training on modern medical equipment and recommendation for future direction) and then the floor was opened for free discussions within the framework of predefined areas. All discussions and interviews were audio recorded with permission. All the information was translated and transcribed during the stay in Uzbekistan.

2.5. Data analysis

Mixed methods of data analysis was employed in this study. Quantitative data was analyzed using quantitative methods and the qualitative data was analyzed using qualitative methods (Creswell 2007), and finally supporting one method by other through triangulation, to provide better explanation.

The online platform was closed once all the expected data were collected. The data were extracted from "Google spreadsheet" and exported to "MS-Excel". As the data were in dual language, the data were cleaned and only the English version was kept. These data were further analyzed using "MS-Excel 2013" and "Tableau Public 9.3". The data were analyzed and presented as frequency by relevant sub-groups (sex, profession, types of training).

A systematic process for qualitative data analysis was generated to identify basic concepts emerging from the interviews and FGDs. The analysis proceeded in five stages: familiarization, identifying thematic framework, coding, charting, and mapping and interpretation (Pope, Ziebland et al. 2000). In the familiarization stage, transcripts of each focus group were created with voice number, profession and hospital to identity the participant and site. In the second stage, a thematic framework was reviewed under four priori domains: Expectation, contribution, practical application and follow-up support/ recommendation. The preliminary codes were defined based on interview/ FGD guide questions and probes. Textual data from field notes and transcription were explored using variants of priori domain. The information were examined, reviewed for consistency and constant comparisons were made with rest of the data under analytical categories.

The immense data generated from qualitative methods, transcriptions and notes were managed using software package "NVIVO- pro trial". Analysis was done by generating codes, charting and mapping from transcription of FGDs and interviews. Key findings under each main theme or category were presented, using appropriate verbatim quotes to illustrate those findings (Burnard, Gill et al. 2008).

A powerful triangulation technique was applied using the same software to facilitate validation of data through cross verification. Two types of triangulation were applied: method triangulation (self-administered questionnaire, interviews and FGDs) and data source triangulation (individual and group perspective). The triangulation of results was developed under the defined categories and actual "quotes" were not used for presentation of analysis.

2.6. Ethical approval

All the measures to observe ethical acceptability of the study were formally considered and approved by respective authorities. The study proposal, data collection tools, information form and consent form were approved by the Ethics Committee under the Medical Faculty of the Ruprecht Karls University of Heidelberg (S-169/2016). As the study was under the GIZ project, the study plan was provided to the project team leader before the start of field study. Since there is no formal institution in Uzbekistan responsible for the ethical consideration and approval for studies, the project assured the researcher that their support and involvement can be considered as the approval.

In the course of the field work, the researcher tried to ensure that all ethical considerations related to studies involving direct communication with people were considered and observed. The main concern of the researcher in the field was not to do any harm to the respondents' health, dignity and well-being; ensure confidentiality and anonymity, as well as minimize any potential risks of participating in this study.

Study results

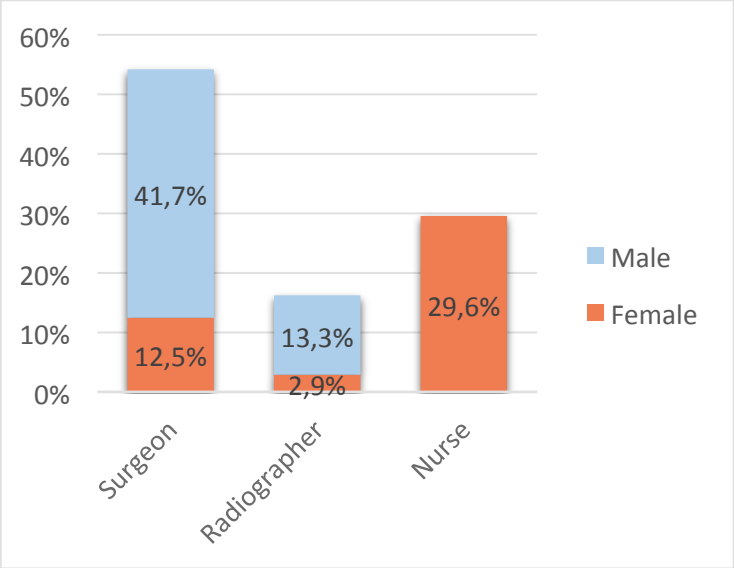
The study results are presented according to method i.e., self-administered questionnaire, FGDs, interview and finally the triangulation. A description of the characteristics of the respondents is followed by findings in each method.

3.1. Self-administered questionnaire

3.1.1. Characteristics of the respondents

Self-administered questionnaire: Among 489 total trained personnel from an initial list in 2014, the personnel trained had increased to almost 600 by 2016. The total response for self-administered questionnaire via online platform were 240. 55% (132) were male and 45% (108) respondents were female. By profession, 54.2% (130) were surgeons, 16.2% (39) were radiographers and 29.6% (71) were theater nurses.

Figure 2: Profession by sex of the online platform respondents



The socio-demographic information on age, profession and number/title of the training attended were collected. The age of respondents ranges from 19-65 years, with overall average age being 40 years. Surgeons were younger compared to others.

Table 1: Age by profession of online platform respondents

	Nurse	Radiographer	Surgeon	All professions
Age groups				
<20 yrs	1	0	0	1
20-29 yrs	13	3	1	17
30-39 yrs	19	16	63	98
40-49 yrs	31	15	52	98

50-59 yrs	7	4	12	23
60+ yrs	0	1	2	3
Age statistics				
Mean	38.83	40.62	39.99	39.75
Mode	44	39	33	33
Gender				
Male	0	32	100	132
Female	71	7	30	108
Total	**71**	**39**	**130**	**240**

The total number of training topics provided by the project are, 1 for nurses, 10 for radiographers and 11 for surgeons. The training received ranges from 1-10 for radiographers and surgeons whereas 1-3 for nurses as some nurses also attended the training provided for surgeons. The radiographers and surgeons received more trainings on average compared to nurses.

Table 2: Number of trainings received by profession

	Nurse	Radiographer	Surgeon	All professions
Training received				
1	66	18	51	135
2-5	5	8	53	66
6-10	0	12	24	36
>10	0	1	2	3
Total	**71**	**39**	**130**	**240**

3.1.2. Knowledge and skills on use and basic care of equipment

In general, participants think that trainings have enhanced their level of knowledge on use and basic care of equipment. The vast majority of surgeons (81%) and radiographers (77%) think that now they have above average knowledge for basic care of equipment. Some nurses (around 4%) think they do not have much knowledge on the use of equipment.

Respondents perceived that, they had a good gain in the skill to use the equipment for treating or diagnosing patients. Only 23.33% of respondents felt that they had above average skills for that, before the training, whereas after training, more than 82% of respondents think they have above average skills.

The majority of professionals think the skills from the training can be applied in their daily work. Most of participants (around 80%) think that they now have above average skills of use and basic care of equipment. Nurses, compared to other professionals, seem to have less skills even after the training. 14% of nurses do not think skills learnt from training are applicable in their daily work.

3.1.3. Training reflection to actual work setting

Most of respondents think practical exercises during training has reflected their actual work setting. The majority (77%) think the reflection on their actual work is very high. A minority (7%) of all nurses thinks there is no or poor reflection.

3.1.4. Confidence using equipment

Training has significantly enhanced the confidence of health workers on using equipment to treat patients. Earlier, 37% of respondents had no or poor confidence whereas only 32% of them thought that they had average or high degree of confidence. However, after training, 82% have excellent or good confidence on using the equipment and less than 1% still have poor confidence.

3.1.5. Need of supervision

After the training, majority of participants (59%) feel that they can work independently. Less than 5% think they need full-time direct or indirect supervision.

3.1.6. Clinical errors

69.23% of surgeons responded that they used to have one or more errors, but currently, 50% of surgeons think they do not have clinical errors.

Almost 80% of radiographers still think that they make some clinical errors, but they think the frequency of errors have reduced. Before training, as much as 48% of radiographers were making at least one or two mistakes in a month. After training, only 20.5% of radiographers think so.

3.1.7. Patient care and work load

35.4% of respondents who thought overall patient care was less or not effective at all now believes that overall patient care is more effective than before the training. Actually 78% think that after training, quality of care for patients has improved substantially, however 13% thinks that there was no change and some of them (5.42%) even felt that patient care has decreased after the training. 66% of professionals think that application of new skills and new equipment has substantially increased their workload and only 32% feel the other way. The majority of nurses (52.11%) still feel stressed out working with modern equipment.

3.1.8. Hindrances

Figure 7 shows that 60% of the respondents responded that there are hindrances to apply their gained knowledge. The main causes of hindrances are unavailability of equipment that they are trained in, followed by lack of enough quantity of equipment, instruments and tools; non-

functioning equipment due to lack of maintenance services and shortage or unavailability of consumables.