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Komal Patel
University of Tennessee Health Science Center

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Assessment of Knowledge, Attitude, Perception of Pharmacy

Students Towards Telepharmacy

Komal Patel, PharmD Candidate

The University of Tennessee Health Science Center

Department of Health Informatics & Information Management

Advisor: Dr. Sajeesh Kumar, PhD

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Abstract

Telemedicine is one of the fastest growing area in health care technology and COVID-19 pandemic has changed the way of practicing Telemedicine. Telepharmacy is a part of telemedicine where pharmacy use this technology to provide patient care services. Success of any technology depends on users' willingness to learn and attitude towards technology. Early assessment of students' attitude during pharmacy school is important to know in order to assess how receptive students are to accept Telepharmacy in their work setting currently or in future. That will also help to determine success of Telepharmacy implementation. This study will focus on assessing knowledge, attitude and perceptions of student pharmacists towards Telepharmacy.

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Assessment of Knowledge, Attitude, Perceptions of Pharmacy Students Toward

Telepharmacy

Appendix B

Chapter 1

Introduction

Historically healthcare has lagged behind in accepting technological application in their work flow system. However, with COVID-19, it is without any doubt that healthcare services are being reshaped in a way that patients get services with the social and physical distancing (Hasani, et al. 2020). One of the solutions to arise is telehealth, a technological practice where patients can interact with providers remotely for their healthcare needs and concerns. As a response to pandemic, telehealth has emerged very quickly as it offers a new method of bringing medical care to patients remotely across different geographical areas (Hasani, 2020). Every one including patients as well as health care professionals are preferring Telehealth for their appointments. The use of telemedicine/ telehealth has increased as this pandemic require to keep social distance to prevent spreading of COVID-19.

Telehealth and Telemedicine

Telehealth is a very broad term and refers to an array of remote health care services, which can include clinical services but also nonclinical services, monitoring vitals, health education, and more. Whereas, Telemedicine is a part of telehealth that typically states the remote clinical health services. To clarify, telemedicine services are typically administered by physicians, when telehealth services can be provided by a wide range of health care professionals, "such as nurses, pharmacists, and others," according to the World Health Organization (American Pharmacists Association, 2020). The Centers for Medicare & Medicaid Services (CMS) describes telemedicine as a means for improving a patient's health by permitting two-way, real-time interactive communication between a patient and a healthcare provider who

are geographically separated (American Society of Health System, 2020). The interactive communication should be conducted at a minimum level of audio and video to comply with the standards for telehealth set by the U.S. Department of Health and Human services (American Society of Health System, 2020). The main purpose of telemedicine is to provide health care services to the rural areas where services are not easily available or patients who are not able to visit doctor's office physically. However, within a year during COVID pandemic, the scope of telemedicine is broaden as patients use Telemedicine regardless of their location and physical condition.

Telepharmacy

One of the areas that may create an enduring bond with Telemedicine is Telepharmacy where pharmacists, one of the most accessible healthcare professionals in community, provide patient care activities with or without the dispensing of drugs or devices, intended to achieve outcomes related to the medications, cure or prevention of a diseases (American Society of Health System, 2020). Being expert in medications, pharmacists are looking for ways to expand their profession to provide more benefits for the community and improve the outcomes for patients in their communities during COVID-19 pandemic. To provide best services, pharmacists and student pharmacists need to understand the currant needs of technology in pharmacy field as Telepharmacy is a rapidly evolving field where telecommunication is the method used for clinical services. The Model State Pharmacy Act and Model Rules of the National Association of Boards of Pharmacy defines the "practice of telepharmacy" as "the provision of pharmacist care by registered pharmacies and pharmacists located within U.S. jurisdictions through the use of telecommunications or other technologies to patients or their agents at distances that are located

within U.S. jurisdictions" (American Pharmacists Association, 2020). Through Telepharmacy

services, pharmacists can play important role in different services like, but not limited to,

Medication therapy management, Chronic disease management, transition of care,

pharmacogenomics, remote dispensing, ambulatory care, outcome assessments, decision support

(American Pharmacists Association, 2020).

Significance and Purpose of the Study

Although Telepharmacy has a number of benefits as any other information system, it is

important to explore users' views about the technology (Izham, et al. 2010). In fact, pharmacists'

and student pharmacists' knowledge and perception towards Telepharmacy is determining factor

on success of Telepharmacy in the pharmacy field. In the past, there are several barriers to adopt

the telemedicine or telehealth services in health care setting. Some of the barriers were

reimbursement for services, training of employees, adoption of new technology, expenses to

implementation, patients' acceptance. Beginning of the pandemic, Congress included a provision

in new COVID-19 supplemental funding package where congress waives some of restriction for

Medicare telemedicine coverage and Medicare outlines some flexibility in paying for this

telemedicine services. These telehealth visits are paid at the same as in-patient visits. It was

effective for visits beginning March 6, 2020 and federal and state governments are trying to

encourage the implementation of telehealth services by reimbursing for services (CMS, 2020).

Therefore, understanding of technology in the pharmacy field is also an important requirements

to meet those expectation and to provide best services to the patients in this pandemic and also in

future. The purpose of this study is to understand the perception, knowledge and attitude of

student's pharmacists towards Telepharmacy to assess the success of Telepharmacy.

Research Questions

The purpose of the study to determine the student pharmacists' perspectives on different attributes of Telepharmacy. The questions below are were designed based on the purpose of the study. In the survey, there are 26 questions where 18 questions are design to assess student pharmacists' view on Telepharmacy and other 6 questions are regarding demographics of population. The questions selected for the survey are as follows:

1. **How do you describe your knowledge of Telepharmacy and its use?**

   - Extremely knowledgeable

   - Very knowledgeable

   - Moderately knowledgeable

   - Slightly knowledgeable

   - Not at all knowledgeable

2. **How comfortable are you while talking to patients through technology?**

   - Extremely comfortable

   - Very comfortable

   - Moderately comfortable

   - Slightly comfortable

   - Not at all comfortable

3. **How effective is Telepharmacy in reducing medical errors?**

   - Extremely effective

   - Very effective

   - Moderately effective

   - Slightly effective

   - Not at all effective

4. **How beneficial can Telepharmacy be in order to reduce the number of visits to Health Care Services including pharmacy visit?**

   - Extremely beneficial

   - Very beneficial

   - Moderately beneficial

   - Slightly beneficial

   - Not at all beneficial

5. **How helpful is Telepharmacy to increase communication among health care providers?**

   - Extremely helpful

   - Very helpful

- Moderately helpful

- Slightly helpful

- Not at all helpful

6. **How cooperative is Telepharmacy to accomplish my task quickly?**

- Extremely cooperative

- Very cooperative

- Moderately cooperative

- Slightly cooperative

- Not at all cooperative

7. **How helpful is Telepharmacy to improve clinical decisions?**

- Extremely helpful

- Very helpful

- Moderately helpful

- Slightly helpful

- Not at all helpful

8. **How effectively does Telepharmacy fit with the way I like to work?**

   - Extremely effective

   - Very effective

   - Moderately effective

   - Slightly effective

   - Not at all effective

9. **How often do you see other health care professionals using Telepharmacy technology for their work task?**

   - Extremely often

   - Very often

   - Moderately often

   - Slightly often

   - Not at all

10. **In your work setting, how frequently do you use Telepharmacy technology for your tasks?**

    - Extremely frequently

    - Very frequently

- Moderately frequently

- Slightly frequently

- Not at all

11. What impact does COVID-19 pandemic have on the way of practice of Telepharmacy?

- Extremely impactful

- Very impactful

- Moderately impactful

- Slightly impactful

- Not at all impactful

12. How true is it that the Telepharmacy requires a lot of mental work?

- Extremely true

- Very true

- Moderately true

- Slightly true

- Not at all true

13. How challenging is it for you to learn technology in your work setting?

- Extremely challenging

- Very challenging

- Moderately challenging

- Slightly challenging

- Not at all challenging

14. At what degree, does Telepharmacy increase staff workload?

- Extremely high

- Very high

- Moderately high

- Slightly high

- Not at all

15. To what extent, does Telepharmacy create new responsibilities for staff?

- Extremely high

- Very high

- Moderately high

- Slightly high

- Not at all

16. How likely is Telepharmacy threatening information confidentiality and privacy of patients?

- Extremely high

- Very high

- Moderately high

- Slightly high

- Not at all

17. How likely do you work in Telepharmacy setting as a Pharmacist if opportunity arrives in future?

- Very likely to work

- Somewhat likely to work

- Somewhat unlikely to work

- Very unlikely to work

- Not sure

18. How likely do you join a Telemedicine training Certificate program if it is offered online in your school?

- Very likely to join

- Somewhat likely to join

- Somewhat unlikely to join

- Very unlikely to join

- Not sure

Demographics:

1. **What is your age in years?**

   - 18-30 years

   - >30 years

2. **Which of the following apply for you?**

   - P1

   - P2

   - P3

   - P4

3. **What is your gender?**

   - Female

   - Male

- Trans-Female

- Trans-Male

4. On which campus are you currently located?

- Nashville

- Memphis

- Knoxville

5. How many years have you been working in the pharmacy?

- < 1 year

- 1-5 year

- >5 year

6. Which of the followings best describes your ethnic background?

- Asian/Pacific Islander

- Black/African American

- Native American

- White

- Other: Please Specify

Chapter 2

Literature reviews of health professionals' perception on Telemedicine use

Introduction

Healthcare system has been changing drastically over the past years and one of biggest change that is seen at most of healthcare systems is the use of Telemedicine. COVID-19 Pandemic has fastened the availability of the technology and acceptance of the Telehealth among patients and healthcare professionals. Despite having great benefits of telemedicine, its implementation and success rate are depend on how receptive the users would be to the use of telemedicine in their practice. There are many articles that have been published on the telehealth and its implementation. Most of the articles are focused on proper use of telehealth, how to implement in the work flow, and regulatory aspects of utilization. There are limited articles focused on users' outlook on use of technology in clinical setting. This section will review literatures conducted in the past to assess understanding of Telemedicine or Telehealth among healthcare professionals.

Method and Findings of Literatures

The literature review was conducted using several electronic sources such as PubMed, MEDLINE@OVID, CINAHL. Various search terms were used to identify relevant articles such as perception or attitude or knowledge with advanced search Telehealth or Telemedicine or Telepharmacy. The articles were restricted to be 2010 to present. This search method identified limited studies that have been completed to show the understanding of Telemedicine among clinical staffs and patients. For example, a study conducted by Ayatollahi et al. in 2013 showed that overall, the most of the clinician (96.1 percent) had little knowledge

about telemedicine and they perceived the advantages of Telemedicine at a moderate level. A study by Biruk et al. showed 37.6 percent of the respondents had good knowledge of Telemedicine and 64.0 percent had good attitude toward Telemedicine. 54 percent respondents strongly agreed that telemedicine improves the quality of clinical decision, whereas 66 percent agreed and strongly agreed that Telemedicine threatens information confidentiality and privacy of the patients. 61 percent responders appeared to know the benefits of telemedicine in saving time. In another study by Albarrak et al., participants have average knowledge about telemedicine. More than 90% of participants agreed that telemedicine can save time and money. A more detailed expansion on each study utilized for this study can be reviewed in Table 1a and Table 1b on page 33 and 34.

Conclusion

This literature review indicates that more research is needed in the field of Telepharmacy. The literature articles utilized in this review discussed clinicians and their perception towards Telemedicine. Only few literature studies were conducted having student pharmacists as population to assess their outlook towards Telepharmacy. Telepharmacy is a unique method of Telemedicine that can be used to provide medication related services. To meet the increasing demand of Telepharmacy services, it is important to understand the future pharmacists' attitude towards Telepharmacy. This study also will help to understand literacy of technology among pharmacy students and that will be helpful to determine whether pharmacy students should be educated on technology during their didactic curriculum or not.

Chapter 3

Methodology

This section will review the methods and techniques that will be used to obtain data for this research study. The research study hopes to assess knowledge, attitude, perceptions of pharmacy students towards Telepharmacy.

Population Design

The potential participants included all pharmacy students from College of Pharmacy at University of Health Science Center, Memphis (UTHSC), TN USA. The population was composed of individuals over the age of 18 years of age and had a basic comprehension level of the English language.

Research Design and Data Collection Method

It is single center, cross sectional study. The survey of the descriptive research method was used to collect the data. Survey questions were designed to be multiple choices with three free text questions. Dillman's principle and QuestionPro software were used to create a survey questions. There are six questions directed toward patient demographics, while eighteen questions were written to assess the information relating to purpose of study. There is one free text question where participants are asked to put their opinions or comments regarding Telepharmacy. Survey was sent to pharmacy students in all campuses Memphis, Knoxville and Nashville via their school email ID and ethical clearance was secured from Institutional Review Board of UTHSC. Additional permissions to access participants were obtained from College of Pharmacy, and written informed consent from the respondents was also attained.

Rational for Survey Questions

The study questionnaire was generated and modified based on previously published research articles. Rationale for the inclusion of each question utilized in this survey is listed below.

1. How do you describe your knowledge of Telepharmacy and its use?

   Rationale: Evaluate pharmacy students' knowledge regarding Telepharmacy

2. How comfortable are you while talking to patients through technology?

   Rationale:

3. How effective is Telepharmacy in reducing medical errors?

   Rationale: Student Pharmacist's opinion on relative advantage of Telepharmacy

4. How beneficial can Telepharmacy be in order to reduce the number of visits to Health Care Services including pharmacy visit?

   Rationale: Student Pharmacist's opinion on relative advantage of Telepharmacy

5. How helpful is Telepharmacy to increase communication among health care providers?

   Rationale: Student Pharmacist's opinion on relative advantage of Telepharmacy

6. How cooperative is Telepharmacy to accomplish my task quickly?

   Rationale: Student Pharmacist's opinion on complexity of Telepharmacy

7. How helpful is Telepharmacy to improve clinical decisions?

   Rationale: Student Pharmacist's opinion on relative advantage of Telepharmacy

8. How effectively does Telepharmacy fit with the way I like to work?

   Rationale: Student Pharmacist's opinion on compatibility of Telepharmacy in work flow

9. How often do you see other health care professionals using Telepharmacy technology for their work task?

   Rationale: Student Pharmacist's observability on current use of Telepharmacy

10. In your work setting, how frequently do you use Telepharmacy technology for your tasks?

    Rationale: Student Pharmacist's observability on current use of Telepharmacy

11. What impact does COVID-19 pandemic have on the way of practice of Telepharmacy?

    Rationale: Student Pharmacist's Observability on current use of Telepharmacy

12. How true is it that the Telepharmacy requires a lot of mental work?

    Rationale: Student Pharmacist's opinion on complexity of Telepharmacy

13. How challenging is it for you to learn technology in your work setting?

    Rationale: Student Pharmacist's opinion on complexity of Telepharmacy

14. At what degree, does Telepharmacy increase staff workload?

    Rationale: Student Pharmacist's opinion on complexity of Telepharmacy

15. To what extent, does Telepharmacy create new responsibilities for staff?

    Rationale: Student Pharmacist's opinion on complexity of Telepharmacy

16. How likely is Telepharmacy threatening information confidentiality and privacy of patients?

    Rationale: Student Pharmacist's opinion on complexity of Telepharmacy

17. How likely do you work in Telepharmacy setting as a Pharmacist if opportunity arrives in future?

    Rationale: Student Pharmacist's attitude to accept Telepharmacy in their work flow

18. How likely do you join a Telemedicine training Certificate program if it is offered online

in your school?

Rationale: Willingness to learn about Telemedicine

19. Comments/Suggestions about Telepharmacy

Rationale: Capture opinions that may have not been included in the multiple choice

portion of survey.

20. Demographics (age, gender, ethnicity, geographic area, year of school)

Rationale: Demographic impact

21. How many years have you been working in the pharmacy?

Rationale: Impact of experience on attitude of Student Pharmacists toward

Telepharmacy

Chapter 4

Results

Response Rate of Population

The survey link was active for 3 weeks of period. In total, 167 pharmacy students viewed questionnaire. Among 167 students, 135 students have started survey and 93 students have completed the questionnaire. Incomplete surveys of 42 students were filtered out from data and the response rate was 68.89 percent. Average time required to finish questionnaire was 5 minutes. The data is presented in Table 2 page 35.

Summary of Findings

Demographics

More than half of the respondents (n = 73, 78.5%) were women, and 20 respondents (21.5 %) were men in this study. The findings showed that the age group with the highest frequency was 18–30 years (n=89, 95.69 percent). The sociodemographic characteristics of the study participants in detail are presented in Table 3 page 35.

Attributes of Student Pharmacists' outlook

The results of this study were divided into four attributes: Knowledge and observability, relative advantage, complexity, trial ability and compatibility.

The students' knowledge and observability towards Telepharmacy described in Table 4a. The graphical presentation is shown on page 42 and 43. Pharmacy students' knowledge about Telepharmacy was observed from the study that 53.8% responders are moderately knowledgeable. Among total of 93 students, 30.1% students see other health professionals using

Telemedicine moderately often for their work task and . While 26.6 % students agreed that they

do not use Telepharmacy technology for their task. More than 80% of students believed that

COVID-19 pandemic is very or extremely impactful on changing the way of practice of

Telepharmacy.

This study indicated the students' positive attitude towards relative advantage of

Telepharmacy. Around 87% students believed that Telepharmacy will be moderately (55%),

very (30.8%) or extremely (1.1%) effective in reducing errors. More than 95% students believed

that Telepharmacy will be moderately beneficial (21.5%) or very beneficial (47.3%) or

extremely beneficial (28%) in order to reduce the number of visits to Healthcare services

including pharmacy. More than 90% responders believed that Telepharmacy is moderately

helpful (22.6%) or very helpful (43%) or extremely helpful (28%)to increase communication

among health care providers. More than 90% of students believed that Telepharmacy will be

moderately helpful (43%) or very helpful (35.5) or extremely helpful (11.8%) helpful to

improve clinical decision, while only 2.2% students believed that Telepharmacy will not be

helpful to improve clinical decision (Table 4b). The graphical presentation of data is shown on

page 44 and 45.

The questions related to students' thoughts on complexity of Telepharmacy and how

Telepharmacy can impact on their workload showed in Table 4c. More than 90% students cited

that Telepharmacy is moderately (32.2%), very (42%) or extremely (17.2%) cooperative to

accomplish my task. However, more than 75% students believed that Telepharmacy increases a

lot of mental work. On the question of learning technology, around 40% student cited that it is

moderately (34.4%), very (3.2%), or extremely (2.2%) challenging to learn technology in their

work setting. Only 8.7% students cited that Telepharmacy does not increase staff workload,

while others believed that it increases workload at some degree. More than 90% students feel comfortable while talking to the patients through technology. However, they also believed that Telepharmacy also compromise the confidentiality and privacy of patients. The graphical presentation of data is shown on page 46 to 49.

Data related to students' wiliness to accept Telepharmacy showed in Table 4d. When students were asked "how likely do you work in Telepharmacy setting if opportunity arrives in future" 18.5 % said "very likely", 43% said "somewhat likely", 18.3 % said "somewhat unlikely", 12.9% said "very unlikely" and 7.5 % said "unsure." When students were asked how likely they will join Telemedicine certificate program, 34.4 % said "very likely", 40.9% said "somewhat likely", 12.9% said "somewhat unlikely", 7.5% said "very unlikely" and 4.3 % said "unsure." Around 80% students believed that Telepharmacy effectively fits with the way they like to work. The graphical presentation of data is shown on page 49 and 50.

Most of the free comments are regarding Telepharmacy as a new way to provide health care. Many students that any king of training in Telepharmacy would be helpful to get prepared for future. Few students believed that it's less receptive on patient site and may not have a great impact on patients.

Chapter 5

Conclusion

In era of technology, use of Telemedicine is becoming an important tool in health care systems. Telepharmacy is an part of Telemedicine where pharmacy use this tool to provide services and success of this services depends on how receptive the users are. Therefore, it is significant to know what pharmacy students think about Telepharmacy and what their attitude towards it. This study aimed to assess the knowledge, attitude and perception of pharmacy students towards Telepharmacy Use. By selecting pharmacy students as an population, data/results helped us to decide if students need more education on Telepharmacy or not.

One of the most significant findings in this study is that around 40% students are slightly and not at all knowledgeable about Telepharmacy. That shows that student pharmacists need more basic training of Telepharmacy. Majority of students believed that COVID pandemic has an strong impact on the way of practicing Telepharmacy. That concludes that, in the future, pharmacy students will see Telepharmacy practice as an important tool in their work setting. Overall students have positive perception about relative advantage of Telepharmacy as compare to traditional method like face-to-face visit. More than 85% students believed that Telepharmacy is helpful to minimize errors, to make clinical decisions, to reduce unnecessary trips to pharmacy as well as other healthcare facilities. It also facilitates better communication among health care professionals which can lead to better and safe patient care management. Majority of students stated that Telepharmacy cooperates with their task, however, it also increases mental work. Half of the students believed that it will be challenging to learn Telepharmacy tool that can impact on success of Telepharmacy implementation. That concludes that students should receive more

training while learning this tool. Most of students states that Telepharmacy increases the staff

work load and creates new responsibility. That can create a barrier to accept new Telepharmacy

tool. However, more than 50% students shows positive attitude to learn Telemedicine certificate

program and also would like to work in Telepharmacy setting if opportunity arrives.

In conclusion, this study provided insight to how student pharmacists perceive the use of

Telepharmacy and how receptive pharmacy students are towards accepting Telepharmacy in

their work setting. Despite the fact that students' knowledge towards Telepharmacy is limited,

they firmly believe that Telepharmacy is a great tool to improves clinical aspects of health care

and COVID pandemic has fastened the use of Telepharmacy. Despite the fact that Telepharmacy

increases the workload, Most of students are willing to learn about telemedicine and want to

work in this setting. Overall, students have positive attitude towards Telepharmacy and they are

willing to learn about Telepharmacy despite having limited knowledge.

Limitations of the study

Limitation of this study included one center study, unanswered questions, possible

fatigue answering questions, duration of the survey. There are multiple surveys that were started,

but not completed. Limited knowledge of students on Telepharmacy can have impact on other

questions. Survey was conducted only for students enrolled in college of pharmacy, UTHSC.

Students have different extent of exposure on Telepharmacy and, therefore, cannot be

generalized for bigger population. Survey was sent to around 400 students and only 137 students

started the survey. Results would be more accurate if more students participate.

Future Recommendations

Based on the data collected form this study, it is found that pharmacy students have limited knowledge of Telepharmacy. To keep up with the updated technology used in pharmacy, students should get more education training on technology like Telepharmacy. Pharmacy school should include some training in their curriculum.

This study only included students, future study can be conducted with faculty and staffs and assess their perceptions on Telepharmacy. Future study can be conducted with students from multiple schools and can compare differences on their views on Telepharmacy.

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Appendix A

Table 1a: Review of Literature

Article Title	Year	Journal	Conclusions
Assessment of physician's knowledge, perception and willingness of telemedicine in Riyadh region, Saudi Arabia	2021	J Infect Public Health	The majority of medical professionals still have low knowledge of telemedicine technology. In addition, most of the participants showed positive perceptions of telemedicine and are willing to adopt it in clinical practice. The major reported barriers for the adoption of telemedicine were privacy issues, lack of training, cost and issues related to information and communication technology.
COVID-19 outbreak and pediatric diabetes: Perceptions of health care professionals worldwide	2020	International Society for Pediatric and Adolescent Diabetes	This large global survey during COVID-19 pandemic showed that many Healthcare professionals adapted to the pandemic by resorting to telemedicine. One fourth of HCP reported delays in diagnosis and an increased rate of DKA. The emergence of COVID-19 pandemic had an important impact on family's behavior that might have led to increase in diabetic ketoacidosis presentation.
Telemedicine adoption issues in the United States and Brazil: Perception of healthcare professionals	2020	Health Informatics Journal	This research reveals that information privacy does not significantly impact adoption of telemedicine. This is an interesting finding, but it may just mean that the users believe that the benefits of telemedicine outweigh the risk of violating patient privacy.
The Use of Telephone Consultation in Primary Health Care During COVID-19 Pandemic, Oman: Perceptions from Physicians	2019	Journal of Primary Care & Community Health	The current evidence suggests that the use of Telephone Consultation (TC) in Primary Health Care (PHC), especially in chronic cases, is promising. However, measures including training of staff, improving the structural setting, and TC consultation are the main elements for high quality and sustainable TC services in PHC from physician's perspective.

Table 1b: Review of Literature

Article Title	Year	Journal	Conclusions
Knowledge and Attitude of Health Professionals toward Telemedicine in Resource-Limited Settings: A Cross-Sectional Study in North West Ethiopia	2018	Journal of Healthcare Engineering	Although the respondents' knowledge of telemedicine is limited, most of them have good attitude toward telemedicine. This study underlined the need of giving training on telemedicine in order to fill the knowledge gap.
Perceived sustainability of community telepharmacy in North Dakota	2016	Journal of the American Pharmacists Association	North Dakota Telepharmacy aims of restoration and retention have been achieved via the investment and shared decision making with pharmacy owners in North Dakota. The Telepharmacy model is sustainable, even if it does not generate significant economic profit.
Performance and Perceptions: Evaluation of Pharmacy Students' Consultation via Telepharmacy	2015	Journal of Pharmacy Technology	The need to teach professional pharmacy students how to provide patient consultation via Telepharmacy, additional exposure to Telepharmacy technology could be beneficial by enhancing student comfort and proficiency.
Clinicians' Knowledge and Perception of Telemedicine Technology	2015	Perspectives in Health Information Management	The limited knowledge of clinicians about telemedicine seems to have influenced their perceptions of the technology. Therefore, providing healthcare professionals with more information about new technologies in healthcare, such as telemedicine, can help to gain a more realistic picture of their perceptions.
Evaluation of Knowledge and Perception of Malaysian Health Professionals about Telemedicine	2010	Journal of Clinical and Diagnostic Research	The respondents have a low inclination towards working in rural areas for a telemedicine project. The study hopes to suggest ways to access the potential benefits of computer technology in terms of improving access to information, enhancing communication, increasing efficiency of healthcare delivery and higher quality of medical care.

Table 2: Response Rate

Viewed	Started	Completed	Completion Rate	Drop-outs (After starting)	Average Time to Complete Survey
167	135	93	68.89%	42	5 minutes

Table 3: Sociodemographic Characteristics of Study Participants

Sociodemographic status		Number	Percent
Gender	Male	73	21.5%
	Female	20	78.5%
	Others	0	0%
Age	<18	0	0%
	18-30	89	96%
	>30	4	4%
Area located	Nashville	23	25.3%
	Memphis	50	55%
	Knoxville	18	19.8%
Years of Experiences	< 1 year	11	11.8%
	1-5 years	68	73.1%
	>5 years	14	15.1%

School Year	P1	19	20.4%
	P2	25	26.9%
	P3	19	20.3%
	P4	30	32.3%
Race/Ethnicity	Asian/Pacific Islander	13	14.1%
	Black/African American	15	16.3%
	Native American	0	0.00%
	White	59	64.1%
	Other	5	5.4%

Table 4a: Knowledge and Observability Attributes

Knowledge and Observability	Answers	Total	Percent
How do you describe your knowledge of Telepharmacy and its use?	Extremely knowledgeable	1	1.1%
	Very knowledgeable	5	5.4%
	Moderately knowledgeable	50	53.8%
	Slightly knowledgeable	28	30.1%
	Not at all knowledgeable	9	9.7%
How often do you see other health care professionals using Telepharmacy technology for their work task?	Extremely often	6	6.5%
	Very often	25	26.9%
	Moderately often	28	30.1%
	Slightly often	26	28%
	Not at all	8	8.6%
In your work setting, how frequently do you use Telepharmacy technology for your tasks?	Extremely frequently	7	7.5%
	Very frequently	14	15.1%
	Moderately frequently	25	26.9%
	Slightly frequently	22	23.7%
	Not at all	25	26.9%
What impact does COVID-19 pandemic have on the way of practice of Telepharmacy?	Extremely impactful	40	43%
	Very impactful	38	40.9%
	Moderately impactful	8	8.6%
	Slightly impactful	6	6.5%
	Not at all impactful	1	1.1%

Table 4b: Relative Advantage Attributes

Relative Advantage	Answers	Total	Percent
How effective is Telepharmacy in reducing medical errors?	Extremely effective	1	1.1%
	Very effective	28	30.8%
	Moderately effective	50	55%
	Slightly effective	11	12.1%
	Not at all effective	1	1.1%
How beneficial can Telepharmacy be in order to reduce the number of visits to Health Care Services including pharmacy visit?	Extremely beneficial	28	28%
	Very beneficial	44	47.3%
	Moderately beneficial	20	21.5%
	Slightly beneficial	2	2.2%
	Not at all beneficial	1	1.1%
How helpful is Telepharmacy to increase communication among health care providers?	Extremely helpful	26	28%
	Very helpful	40	43%
	Moderately helpful	21	22.6%
	Slightly helpful	5	5.4%
	Not at all helpful	1	1.1%
How helpful is Telepharmacy to improve clinical decisions?	Extremely helpful	11	11.8%
	Very helpful	33	35.5%
	Moderately helpful	40	43%
	Slightly helpful	7	7.5%
	Not at all helpful	2	2.2%

Table 4c: Complexity attributes

Complexity	Answers	Total	Percentage
How cooperative is Telepharmacy to accomplish my task quickly?	Extremely cooperative	16	17.2%
	Very cooperative	39	42%
	Moderately cooperative	30	32.2%
	Slightly cooperative	6	6.5%
	Not at all cooperative	2	2.2%
How true is it that the Telepharmacy requires a lot of mental work?	Extremely true	8	8.7%
	Very true	24	26.1%
	Moderately true	39	42.4%
	Slightly true	15	16.3%
	Not at all true	6	6.5%
How challenging is it for you to learn technology in your work setting?	Extremely challenging	2	2.2%
	Very challenging	3	3.2%
	Moderately challenging	32	34.4%
	Slightly challenging	35	37.6%
	Not at all challenging	21	22.6%
At what degree, does Telepharmacy increase staff workload?	Extremely high	1	1.1%
	Very high	12	13%
	Moderately high	32	34.8%
	Slightly high	39	42.4%
	Not at all high	8	8.7%

To what extent, does Telepharmacy create new responsibilities for staff?	Extremely high	5	5.4%
	Very high	12	12.9%
	Moderately high	52	55.9%
	Slightly high	21	22.6%
	Not at all high	3	3.2%
How comfortable are you while talking to patients through technology?	Extremely comfortable	9	9.7%
	Very comfortable	38	40.9%
	Moderately comfortable	37	39.8%
	Slightly comfortable	7	7.5%
	Not at all comfortable	2	2.1%
How likely is Telepharmacy threatening information confidentiality and privacy of patients?	Extremely high	6	6.5%
	Very high	11	11.8%
	Moderately high	28	30.1%
	Slightly high	41	44.1%
	Not at all	7	7.5%

Table 4d: Trial Ability and Compatibility Attributes

Trial ability and compatibility	Answers	Total	Percent
How likely do you work in Telepharmacy setting as a Pharmacist if opportunity arrives in future?	Very likely to work	17	18.3%
	Somewhat likely to work	40	43%
	Somewhat unlikely to work	17	18.3%
	Very unlikely to work	12	12.9%
	Not sure	7	7.5%
How likely do you join a Telemedicine training Certificate program if it is offered online in your school?	Very likely to join	32	34.4%
	Somewhat likely to join	38	40.9%
	Somewhat unlikely to join	12	12.9%
	Very unlikely to join	7	7.5%
	Not sure	4	4.3%
How effectively does Telepharmacy fit with the way I like to work?	Extremely effective	12	12.9%
	Very effective	34	36.6%
	Moderately effective	29	31.2%
	Slightly effective	16	17.2%
	Not at all effective	2	2.2%

Appendix B

Figures: Knowledge and Observability Attributes

Figure: How do you describe your knowledge of Telepharmacy and its use?
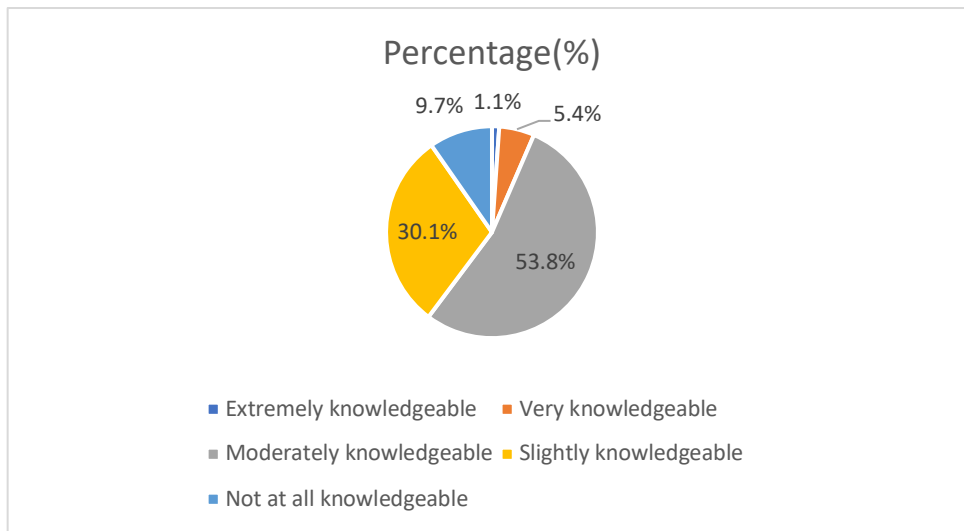
Figure: How often do you see other health care professionals using Telepharmacy technology for their work task?
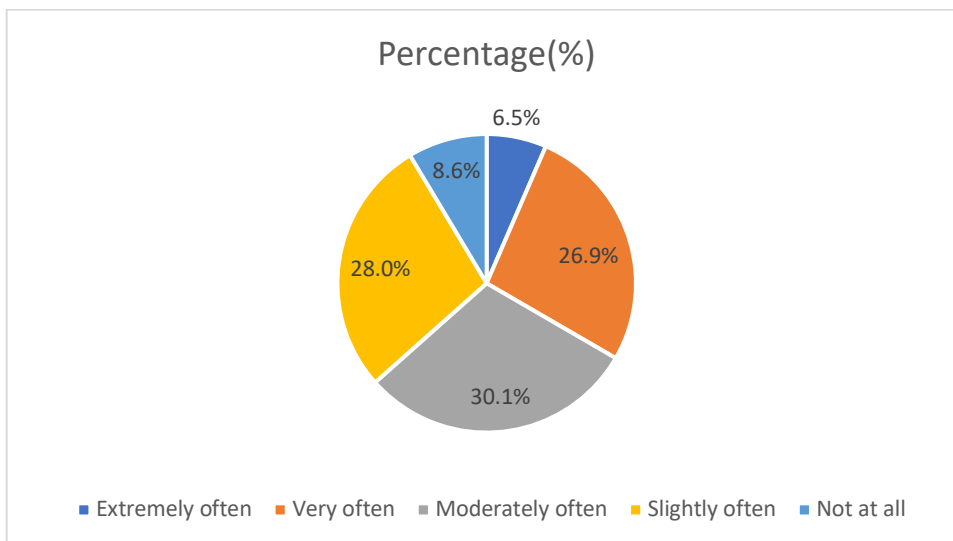
Figure: In your work setting, how frequently do you use Telepharmacy technology for your tasks?
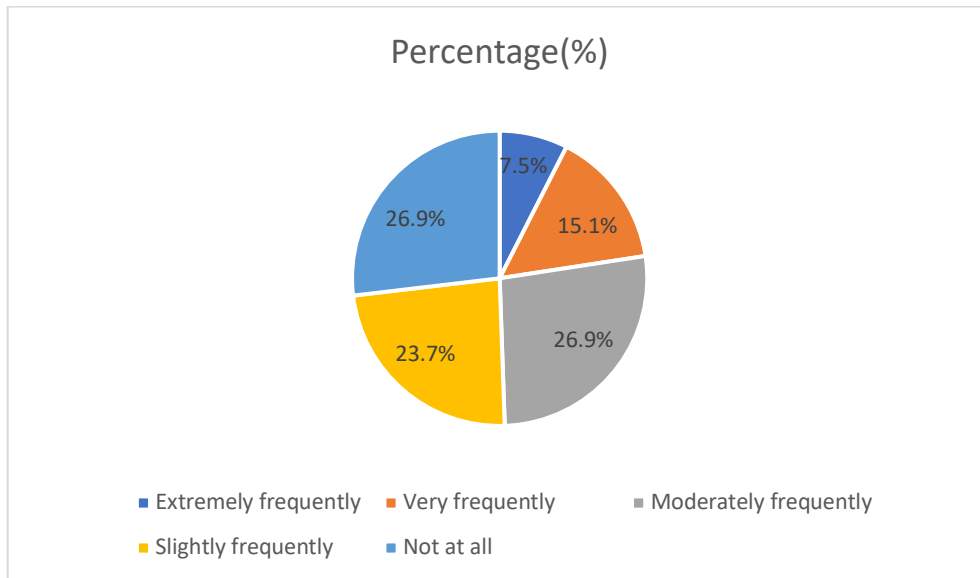
Figure: What impact does COVID-19 pandemic have on the way of practice of Telepharmacy?
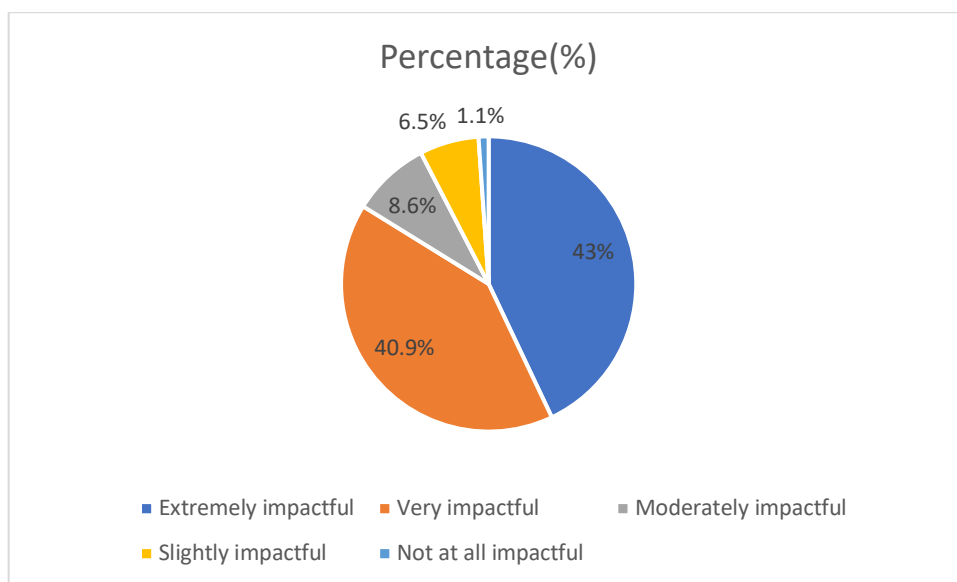
Figures: Relative Advantages Attributes

How effective is Telepharmacy in reducing medical errors?
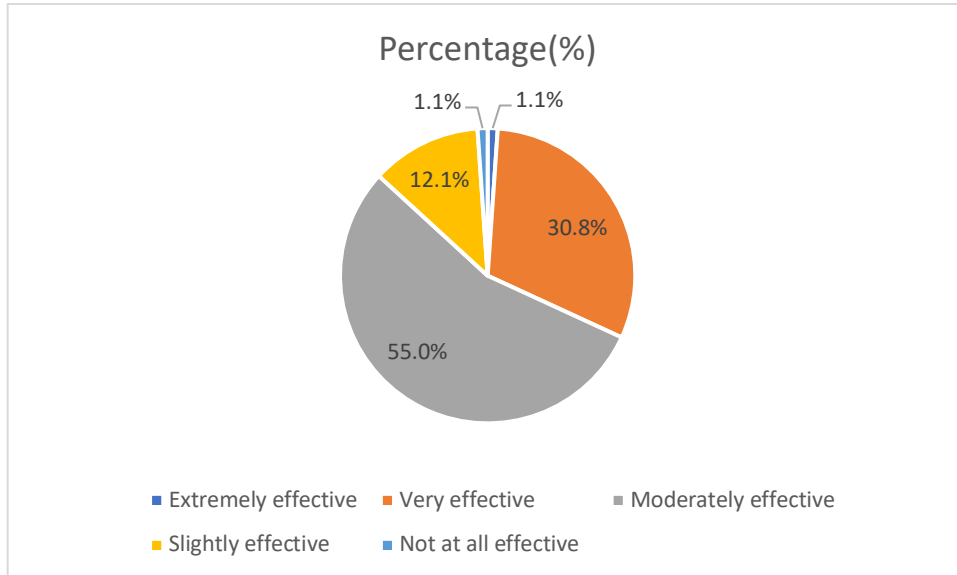
Figure: How beneficial can Telepharmacy be in order to reduce the number of visits to Health Care Services including pharmacy visit?
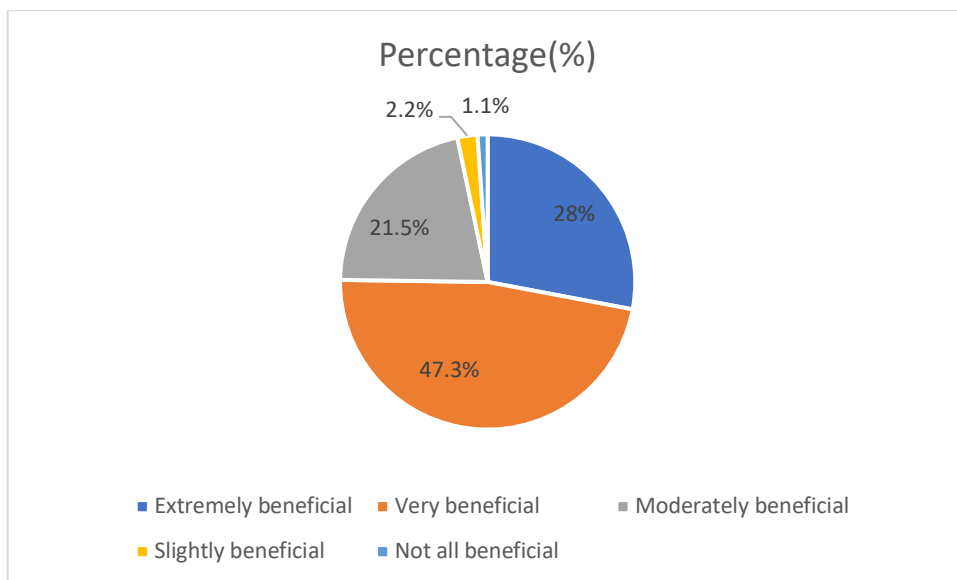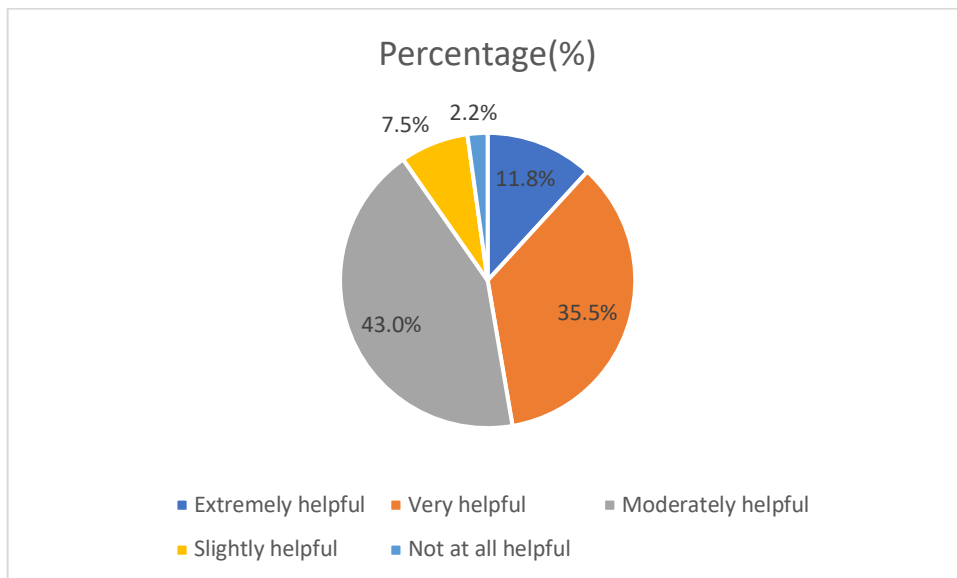
Figure: How helpful is Telepharmacy to increase communication among health care providers?
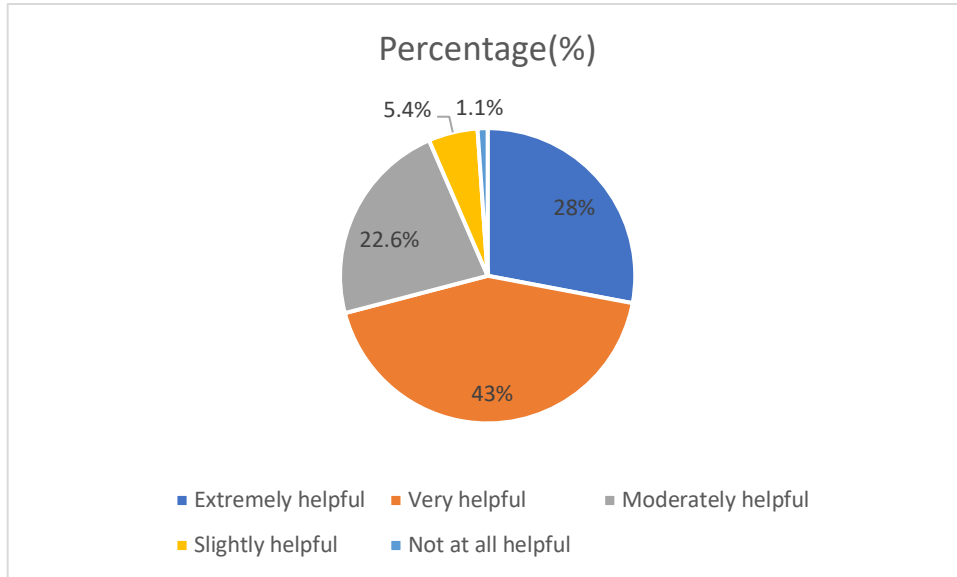
Figure: How helpful is Telepharmacy to improve clinical decisions?

Figures: Complexity Attributes

Figure: How cooperative is Telepharmacy to accomplish my task quickly?
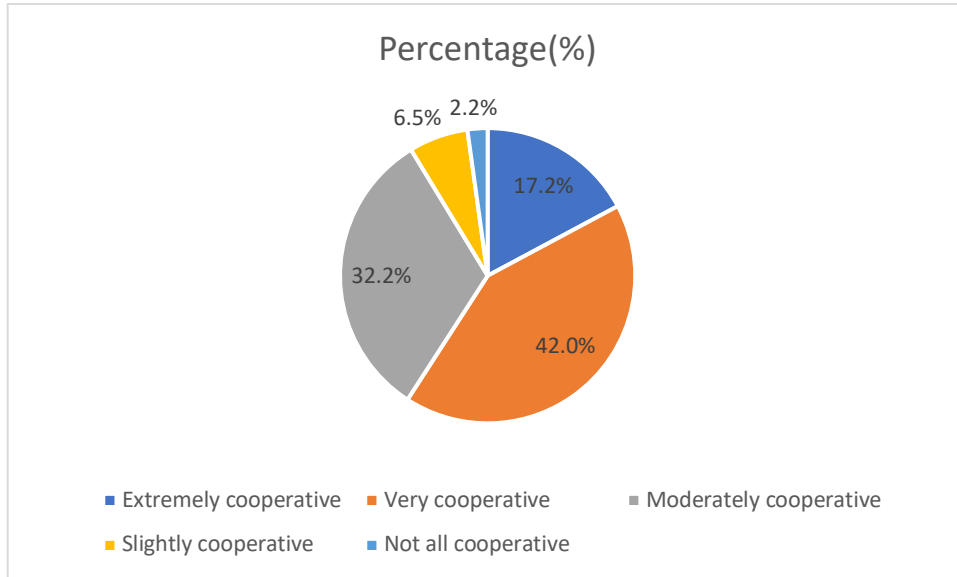
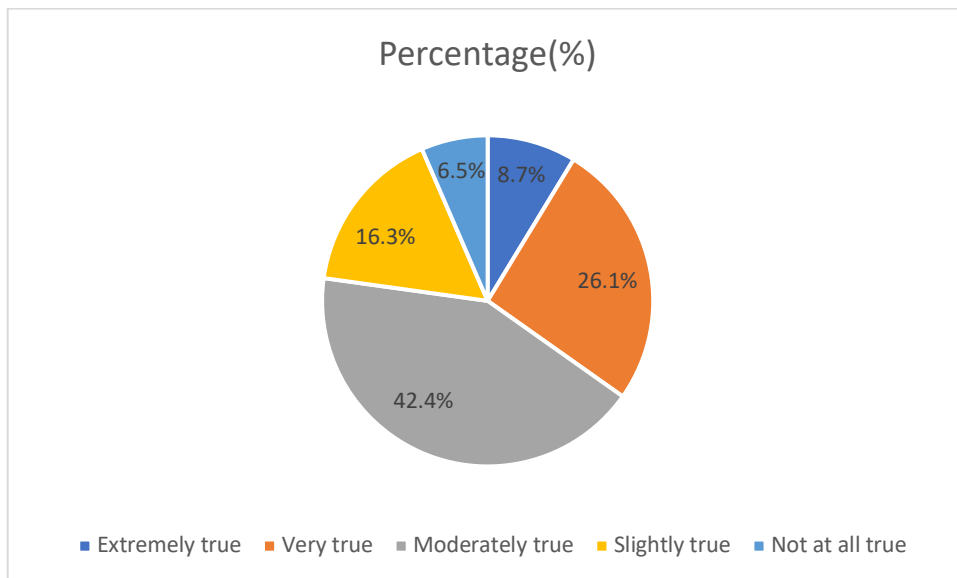Figure: How true is it that the Telepharmacy requires a lot of mental work?

Figure: How challenging is it for you to learn technology in your work setting?
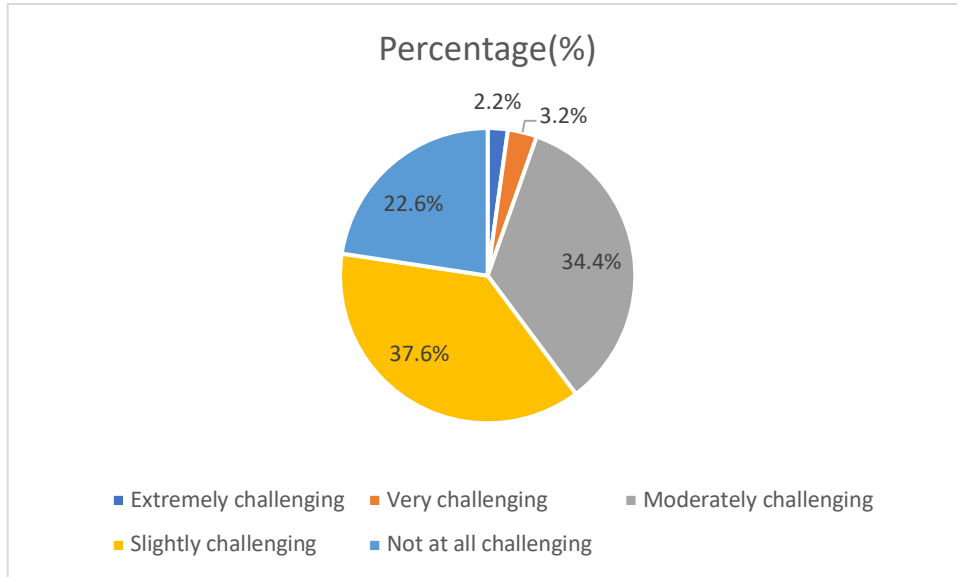

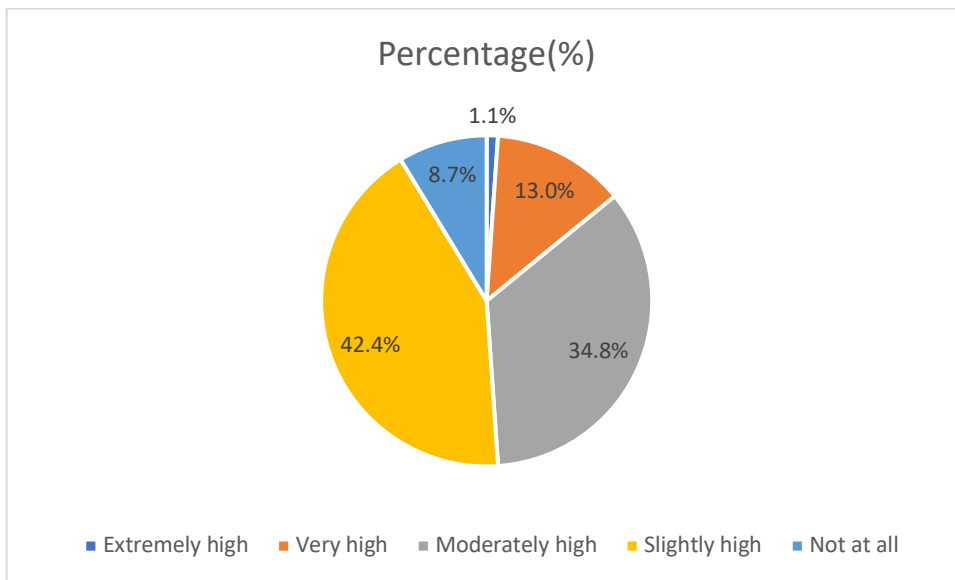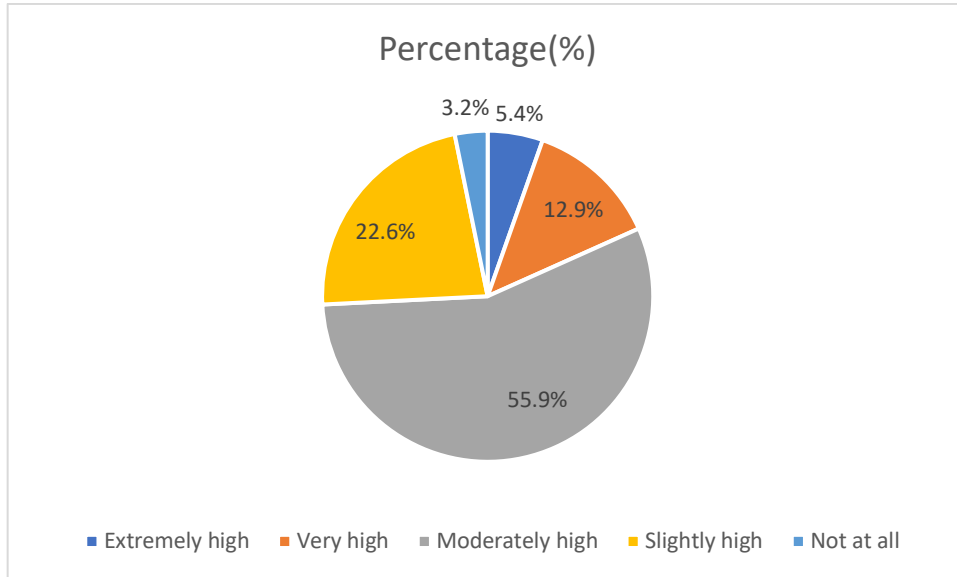Figure: At what degree, does Telepharmacy increase staff workload?

Figure: To what extent, does Telepharmacy create new responsibilities for staff?

Percentage(%)

- Extremely high - Very high - Moderately high - Slightly high - Not at all

How comfortable are you while talking to patients through technology?

Percentage(%)

- Extremely comfortable - Very comfortable - Moderately comfortable
- Slightly comfortable - Not at all comfortable
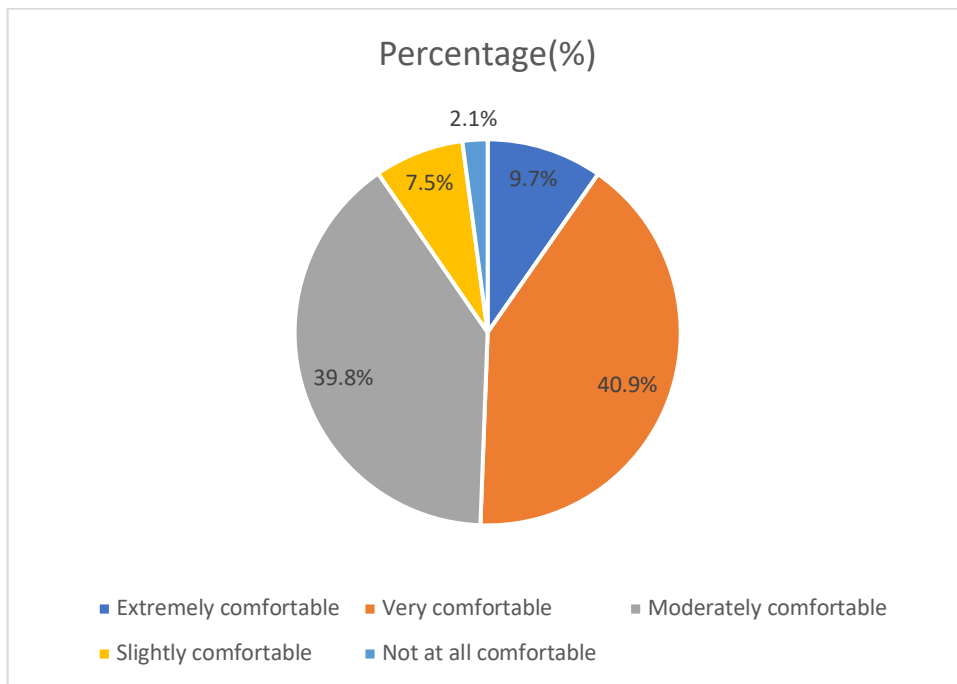
Figure: How likely is Telepharmacy threatening information confidentiality and privacy of patients?

Percentage(%)

7.5% 6.5%
11.8%
44.1%
30.1%

■ Extremely high   ■ Very high   ■ Moderately high   ■ Slightly high   ■ Not at all
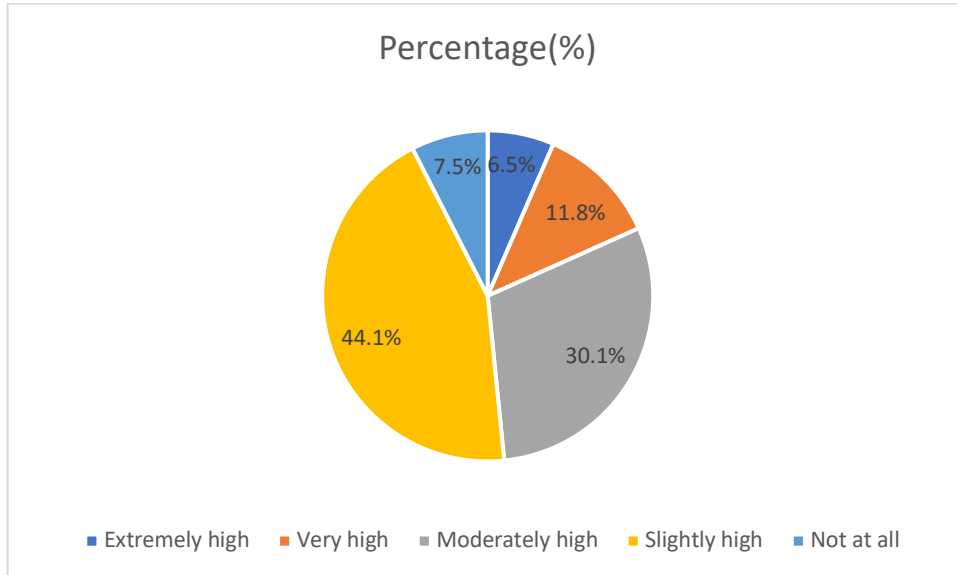
Figures: Trial Ability and Compatibility

Figure: How likely do you work in Telepharmacy setting as a Pharmacist if opportunity arrives in future?
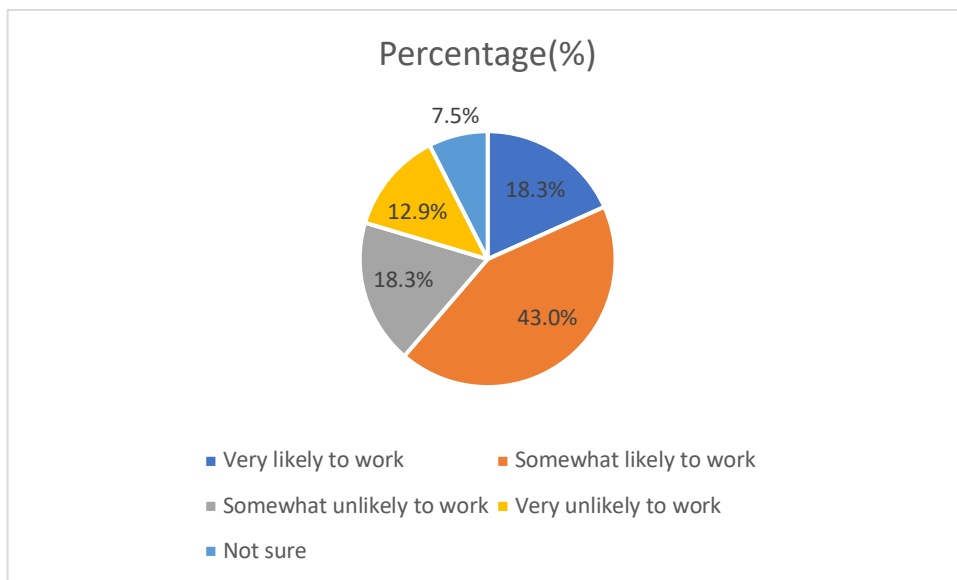

Percentage(%)

7.5%
18.3%
12.9%
18.3%
43.0%

■ Very likely to work   ■ Somewhat likely to work
■ Somewhat unlikely to work ■ Very unlikely to work
■ Not sure

Figure: How likely do you join a Telemedicine training Certificate program if it is offered online in your school?

Percentage(%)

- Very likely to join — 34.4%
- Somewhat likely to join — 40.9%
- Somewhat unlikely to join — 12.9%
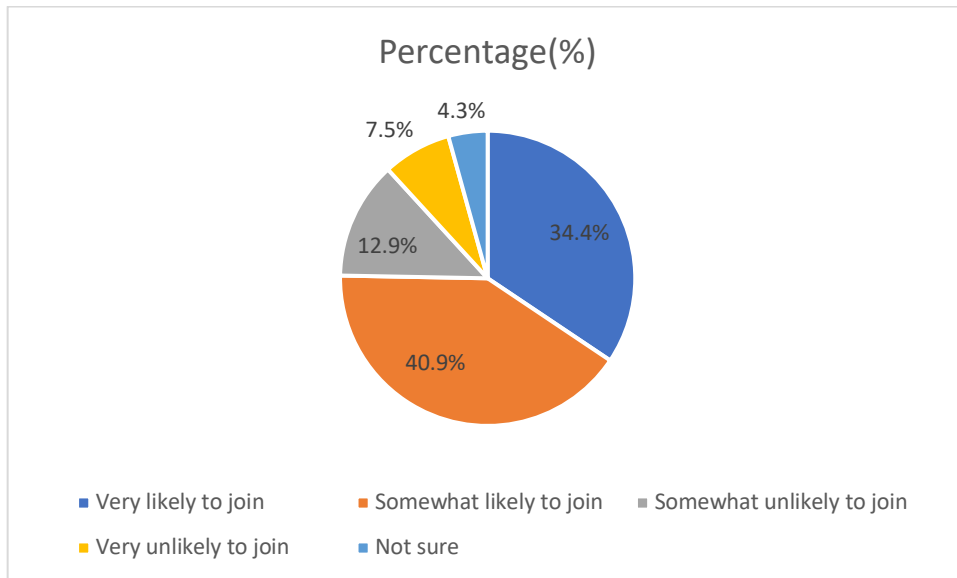- Very unlikely to join — 7.5%
- Not sure — 4.3%

Figure: How effectively does Telepharmacy fit with the way I like to work?

Percentage(%)

- Extremely effective — 12.9%
- Very effective — 36.6%
- Moderately effective — 31.2%
- Slightly effective — 17.2%
- Not at all effective — 2.2%