Enhancing Children's Knowledge On Medicine By Lab Education:

From A Nottingham Outreach Program

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Statement

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Abstract

Aim: This research project acknowledged the impact of educational pharmacy labs on the understanding of medication safety among children aged 10-11 years within 120 students from two different schools in Nottingham, England. The study has been conducted at the University Of Nottingham during Nottingham Festival of Science and Curiosity. It determines whether such educational programs enhance student's knowledge on medication safety to evaluate whether children can or cannot make stable health decisions from a young age.

Method: By creating a pre and post questionnaire design , 120 children from two schools in Nottingham divided into 60 per school and 30 students in each lab. The students underwent two interactive laboratory classes and one of these labs was the focus of this research. The Lab that was used throughout was facilitated by Dr Grace Chng focused on an activity of making fake medicine using everyday materials that are safe within children's use. The student's knowledge and their view regarding medicines safety were assessed using two questionnaires before and after sessions. The data analysis was performed using Excel to evaluate the effectiveness of the outreach activity in enhancing children's understanding.

Results: According to the findings by comparing each questionnaire, it has clearly indicated that children demonstrated their knowledge of medicine successfully by showing improvements from the first to the second questionnaire.

Discussion: Children's knowledge on medicine safety is vital to ensure that they can make safe and educated decisions about their health when considering paediatric medications. This clarifies the data analysis with detailed explanations for each question used in the questionnaires, along with justifications for their inclusion. This section delves into a clear description of the results and how they contributed to a successful intervention, while also addressing limitations and proposing solutions.

Conclusion: Summarizes the research briefly, concluding the results and discussions and discussing how the literature relates to the study. It also includes suggestions for any future frameworks that could be integrated.

The University of Nottingham

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List of abbreviations

UoN The University of Nottingham

UK The United Kingdom

Lab Laboratory

PPE Personal Protective Equipment

PIL Patient Information Leaflet

OTC Over the Counter

FDA Food and Drug Administration

FOSAC Nottingham Festival of Science and Curiosity

BNF British National Formulary

EMLc Essential Medicine List for Children

U.S The United States of America

Fig Figure

SPSS Statistical Package for the Social Sciences

SoP School of Pharmacy

Glossary

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1. **Pediatric Health Literacy:** The level at which children understand and make informed decisions regarding their health and medical treatments including terms.
2. **Medication Safety**: Practices and precautions that ensure the correct and safe administration and storage of medications to prevent adverse effects.
3. **Health Education**: Instruction and provision of information aimed at improving health knowledge, skills, and behavior in an individual or community setting.
4. **Self-Administration**: The act of managing one's own medication without direct supervision from healthcare providers, emphasizing the importance of correct dosage and timing.
5. **Outreach Activity**: An educational activity designed to reach people who might not otherwise have access to those services, focusing on delivering information and resources to a specific audience.
6. **Ethnicity**: A category of people who identify with each other based on common ancestral, social, cultural, or national experiences.
7. **Educational Pharmacy Lab:** A controlled, educational environment where participants engage in practical, hands-on activities to learn about medications and their safe use.
8. **Nottingham Festival of Science and Curiosity**: A public event that takes place annually aimed at spreading scientific knowledge through interactive activities and educational outreach.
9. **Quantitative Data:** Data that quantifies a problem or question, providing numerical data that can be used to develop statistics and compare groups.
10. **Qualitative Data:** Data that shows understanding by detailed descriptions of participant’s opinions.

Chapter 1: Introduction

Educating the public is vital as it ensures safety while individuals make decisions leading to healthier lifestyles and disease prevention. Public health education supports the community by factors such as improving the quality of life, reducing health costs, and ensuring an educated society. The main treatment for disease is taking medicine from minor to major illnesses which identifies safety use of medication by the public as this is an important component of public health education, specifically, amongst younger populations. Many children aged 7 and above interact with different medications, both over the counter and prescription medications. Given this naturally as children grow, it is substantial to ensure their understanding of pharmacy medications generally to allow young populations of the public to be able to make stable decisions and ensure that errors are avoided (Dawood, Mohamed Ibrahim, and Abdullah, 2015). Additionally, many children are highly influenced by the taste, colour or size of medication rather than the labelling of the packaging itself resulting a risk of harm when children are around medicines especially during self-administration without parent supervision which introduces preservative factors to be added to ancillary labels such as "keep out of reach of children" (Dawood, Mohamed Ibrahim, and Abdullah, 2015). Schools is the place to educate children about health as firstly it influences on their academic abilities and on their health and wellbeing as students because they spend most of their time at school. A study conducted by Kolbe in 2019, stated that different children from several backgrounds are influenced by their knowledge of health and education and that not all children have the same level of health literacy.

1.1 Addressing the Problem

As children are increasingly getting involved in self-administration of medicines, a gap remains in their understanding of medicines literacy and utilization causing a risk to their health when misuse occurs. As this issue effects the public widely, this research aims to introduce new educational methods for schools and communities to allow for school aged children to acknowledge the aspect of medicine safety which leaves young people to be prepared when taking decisions relating to treatment when necessary.

1.2 Hypothesis

The study's main hypothesis is that university labs can improve primary school student's knowledge of medication safety when they interact with them. As a prediction of this research, engaging educational activities such as the method that has been used throughout the research, will significantly enhance the student's ability to distinguish main writings on medicine labels, understand physical medicine properties and avoid common misconception of medicines between children that will allow an overall result of having safer medicine practice between young learners.

1.3 Aim of Research

This research project evaluates children aged 10-11 years understanding through the implementation of an outreach activity in laboratory of the School of Pharmacy at the University of Nottingham. This activity aimed to improve primary school children's knowledge of medicine safety by allowing them to use real medicine containers and real medicine stickers with a mimic medicine solution.

As this topic particularly focuses on pediatric medicine, it is important to ensure that profound understanding is reached to gain the aim of the study. Generally, children have knowledge of hygiene throughout their early education which is also important when using medicines that is also addressed throughout the research. This project is undertaken with Nottingham Festival of Science and Curiosity (FOSAC), allowing primary students to engage with us as the pharmacy team from the University of Nottingham including students, supervisors, technicians, and Doctors of Pharmacy. The project is also narrowed to Nottingham's society as it was with two different schools in Nottingham at the University of Nottingham.

1.4 Layout of Research

This study mentions the existing framework of different health education and it highlights gaps in paediatric medicine safety awareness programs with different methods used throughout the years to improve medicine safety within children. As the years pass by there has been an increase in medicine usage and accessibility while many children use self-administration giving another reason why to take this research for the public safety for a long term (Ahmed *et al.*, 2021). The lab activities that were taken including analysis serves as an

educational program and a new research opportunity to explore new methods of health education on children's knowledge on paediatric medicine.

Throughout the following chapters, this research details the methodology in delivering an educational program, by a lab with FOSAC and UoN, the qualitative and quantitative analysis of the data collected through two different questionnaires pre- and post- activity. The questionnaires for this project were designed by the supervisors, Dr. Grace Chng, and Dr. Rebecca Rickaby. They were printed on A4 paper and distributed anonymously to participants. The participants completed these questionnaires both before and after the laboratory activities under the supervision of four researchers. By analyzing the data collected the results were conducted by using Excel for data interpretation of specific questions from the questionnaires. The research mainly focused on 15 questions (8 questions from questionnaire 1 and 7 questions from questionnaire 2) that highlighted children's knowledge and perception of medicines.

This dissertation has been divided into 6 chapters starting from chapter 1 as the introduction, then chapter 2 literature review, chapter 3 methodology, chapter 4 results, chapter 5 discussion, and chapter 6 conclusion. Each chapter derives specifically to its heading to create a successful study.

Chapter 2, literature review clarifies the studies on paediatric medication including age-appropriate formulation and specific health literacy used to communicate between children as healthcare professionals. This chapter also identifies paediatric medicine gaps that needs deeper studies and showed studies on educating young age on health and safety regarding to medicine.

Chapter 3 methodology, outlines the structured method used to conduct this research, detailing the design, data collection, and analytical methods employed by Excel. It explains the rationale behind the chosen methodology, including the use of two questionnaires and observation within educational labs given to school aged students in a university lab to gather data on children's understanding of medication safety. The chapter also justifies the selection of tools, such as Excel for data analysis, and extends on the procedures followed to ensure data stability.

Chapter 4 results, includes an explanation of the findings throughout the research by detailed tables for questionnaire 1 and questionnaire 2 then specific question tables for each

questionnaire to highlight accuracy of the results. According to the findings by comparing each questionnaire, it has clearly indicated that children demonstrated their knowledge of medicine successfully by showing improvements from the first to the second questionnaire.

Chapter 5, titled Discussion, clarifies the data analysis and interpretation with detailed explanations for each question used in the questionnaires, along with justifications for their inclusion. This section delves into a clear description of the results and how they contributed to a successful intervention, while also addressing limitations and proposing solutions.

Chapter 6, titled Conclusion, summarizes the research briefly, concluding the results and discussions and discussing how the literature relates to the study. It also includes suggestions for any future frameworks that could be integrated.

Chapter 2: Literature review/theoretical framework

The literature on paediatric safety includes a range of research worldwide which offers views into the consequences and possible solutions in this medical field. This literature review was written to show a comprehensive overview of existing knowledge including what studies were successful and to distinguish between limitations of each study for references and comparison. This also highlights gaps and future recommendations to ensure that this new research project adds on a foundation of understanding from previous research and fills gaps from previous work and evidence to back up the research.

2.1 Overview of Health Literacy

Pediatric medication is manufactured according to children's health needs usually containing low dose liquid preparation with child- friendly forms such as flavored formulations, chewable tablets, patches these formulations make it easier to administer when given or taken by a young patient (*BNFC*, 2023). As children grow, they naturally take care of them selves whereas they take their own medicine by self-administration especially for children with long term disease such as asthma where the child must undergo learning about medicine safety including reading medication labels and PIL if possible. For children to understand the correct use of medicines they will need specific health literacy by healthcare professionals and parents/guardians, this prevents harmful errors such as accidental ingestion, overdosing this makes the medicine effective and safe. Teaching children about the safe use of medicines promotes healthy habits from a young age and protects them from possible emergencies as these factors develop independence of the child whilst being around medicine; in case they urgently needed the medicine when not being around an adult (Fairbrother, Curtis and Goyder, 2016). This study investigates the safety of medicines when pediatric patients are discharged. It showed a randomized clinical trial which included 198 healthcare professionals (caregivers) of the children that were hospitalized and assessed their communication to health literacy by giving simple counselling points to reduce medication errors post discharge. This research includes written instructions supported by pictograms, demonstration of liquid medication dosage and applying techniques such as 'teach back' and 'show back' which clarifies the understanding for the caregiver. The findings of this study showed that the caregivers who received the communication made less medication errors than the caregivers

that did not receive. Overall, this paper suggested health literacy to reduce paediatric medication errors to be explained to children further on so that they can understand how to take their medication in details which as a primary factor reduces medication errors by dispensing the correct medicine and as a secondary factor when the caregiver is given instructions they pass it on to the children (Fairbrother, Curtis and Goyder, 2016).

2.2 Approaches to medication safety

The education for the child for reducing MEs allows the child to understand their prescribed dosage which adheres to guidelines like those issued by the FDA in 2009, which is used for clear labelling and standard units of measurement on OTC medications. Despite these guidelines, research, as noted by Stapleton (2011), has indicated that errors in dosing and measurement devices continues, making children safe use of medicines as a challenge in the medical field. Another study by the same author F Bruden Stapleton working with American Paediatric Society was about paediatric gaps where, the research emphasized the gaps by showing demographics of children in the U.S and the paediatric workforce that were considered as an issue in the paper. The gap within paediatric research has been seen and studied. The results showed changing in the demographic landscape whereas during 2016 many children under 18 from these backgrounds —24.4% Hispanic, 14.1% African American, and 4.7% Asian— need to address the representational disparity. Overall, it has showed a demographic shift highlighting the children below the age of 5 and giving a result of non-Hispanic white children as the minority (F, Stapleton , 2019).

A Research was conducted in Kenya to assess children from age 11-17 years on their health seeking behaviours and gave the result on average that each individual experiences 25 illnesses such as fever over the period of 30 weeks. The illnesses were divided into colds, headaches, abdominal issues, and injuries. 21% were severe that needed absence from the child and 28% involved seeking advice from an adult such as parent, guardian, or schoolteacher, 72% of the studied cases did not seek for adult advice and kept untreated and 19% self-treated themselves with herbal or OTC medicines such as from local supermarkets or pharmacies. (Geissler et al., 2000). This research supported my current project by highlighting how many children on average in general use self-treatment as an option when experiencing minor illnesses. This also gives me evidence to clarify how vital children education on medication is to the public health.

The research “Academic Division of Child Health School of Graduate Entry Medicine and Health University of Nottingham” highlights MEs in both children and adults showing fewer studies focusing on paediatric population (Alsulami,2013). Even though this research shows issues in MEs in children due to several factors, it is also important to educate and teach children about MEs and avoid harm. Pharmacists may face several challenges whilst in practice one example is calculating specific dosage for the patient especially for children , the dosage must be calculated precisely to avoid any errors which includes mathematical calculations. Many of the standards forms that are available within medications are for adults which therefore needs dosing adjustments by pharmacists for paediatric use (Alsulami,2013). These articles highlight a huge part of paediatric medicine but also showed gaps in educating children on labelling of medication which is the main focus of the dissertation.

2.3 World Health Organization EMLCs

A study supported by the World Health Organization as evidence considers age-appropriateness to what medicines should be given to children as listed in the WHO EMLCs (*WHO* Orubu, 2021). This research shows the urge of using medications so that each medicine is adaptable for use it safely and effectively according to children's specific age and weight, considering their ability to swallow. WHO also emphasizes the need of having the right medication to ensure that peadtric medicine administered or prescribed to children are clearly understood by the child which is the patient and is able to use it safely when using them. This aligns with my research as it clarifies what medicines are used for children and the instructions that they need to follow in order to self-administer their medicine, when possible, this study also allows me to look at educating children in another perspective to future pharmacist and healthcare professionals . The analysis of EMLc’s 3rd to 7th editions from 2011-1019 showed that children from age (6-11 years) have a better age-appropriate medications which are available than younger age categories. In details, 77% of medications in the 3rd edition were available to use as in license medicines for older children simultaneously showing an opposite result of decreasing for younger individuals. WHO also showed that for more severe diseases such as HIV and tuberculosis, the majority of the age category was 7thh edition medications and are deemed within as age appropriate for all groups.

WHO Model List of Essential Medicines for Children – 9th List (2023)

docusate sodium	**Capsule:** 100 mg. **Oral liquid:** 50 mg/5 mL.
hyoscine hydrobromide	**Injection:** 400 micrograms/mL; 600 micrograms/mL. **Transdermal patches:** 1 mg/72 hours.
lactulose	**Oral liquid:** 3.1 to 3.7 g/5 mL.
midazolam	**Injection:** 1 mg/mL; 5 mg/mL. **Oral liquid:** 2mg/mL. **Solid oral dosage form:** 7.5 mg; 15 mg.
☐ ondansetron [a] Therapeutic alternatives - dolasetron - granisetron - palonosetron - tropisetron	**Injection:** 2 mg base/mL in 2 mL ampoule (as hydrochloride). **Oral liquid:** 4 mg base/5 mL. **Solid oral dosage form:** Eq 4 mg base; Eq 8 mg base. [a] > 1 month.
senna	**Oral liquid:** 7.5 mg/5 mL.

Figure 1: A Sample from EMLc (WHO,2023)

Chapter 3: Methodology

Throughout this research project a mixed-methods approach was used to gather and analyze data, ensuring a comprehensive understanding of the efficacy of our educational intervention in improving children's knowledge of medicine safety. This research is based on qualitative and quantitative information forming an experimental study to improve children's knowledge on the safety use of medication. The study was conducted in the context of the Nottingham Festival of Science and Curiosity (FOSAC), taking advantage of its educational environment to access a population of primary school children from two different schools in Nottingham, UK.

3.1 Participants

A total of 120 children aged between 10-11 years attended an educational lab from two different schools (School A and School B) participating in FOSAC in East England, each school attended a whole day. Once the children arrived, they were allocated evenly into two separate laboratory workshops, with each workshop accommodating 30 students to ensure personalized attention and interaction within us as the pharmacy student's researchers and SoP staff. Almost 60 students attended from each school per day, which divides into two different days. To make sure that this study was anonymized, each student was given a participant number starting from 1 as stickers as they wrote their participant number on the questionnaires in line with the ethical standards highlighted by Toom and Miller (2018). The anonymization process within participants included removing direct and indirect identifiers which widely allowed students to provide information without any risk of any personal data being disclosed.

3.2 Intervention Design

Two interactive lab workshops took place on February 7, 2024, and February 9, 2024, at the University of Nottingham (SoP) conducted by Dr Grace Chng and Dr Rebcca Rickaby with assistants at the School of Pharmacy. A workbook that included specific steps for each activity that the participants had to do was printed to each student and used throughout the lab. This methodology was used for our study because it has been used by schools for a long time and is known to work accurately when educating school aged children. Cassidy and

Sanders (2002*)* explain how school children attending labs at universities allow direct application and research which helps in boosting their knowledge through lab universities. The first lab, led by Dr. Rebecca, utilized microscopes to examine parasites and mosquitoes and was guided through a presentation slide and the steps in the workbook provided. The second lab was a hands-on activity where children made 'fake medicine' using safe household substances to simulate the compounding and labeling of medications as used in real pharmacy practice. The products that were used for making fake medicine were lemonade, fruit squash, water, icing sugar, corn flour, food colouring and the tools that were used are conical flask, spatula, weighting boats, measuring cylinder, syringe, and plastic sealable container with parafilm and medicine label sticker. All participants including supervisors and researcher and schoolteachers had to wear Personal Protective Equipment (PPE) consisting of safety googles and lab coat provided by the university.

3.4 Activity [Appendix 2].

The steps that were given to the participants were guided by a workbook, which was specifically designed for them by the supervisors. The workbook was used as an educational tool for the students to ensure that they all receive the same information and instructions throughout the lab. Additionally, it allowed the learning to be equal within all participants to maintain a fixed educational outcome between students.

Figure 2 : The arrangement of the lab tray

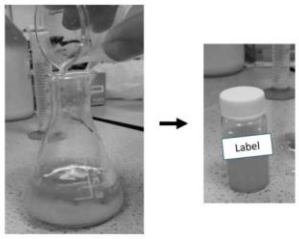

Figure 3: Instructions from workbook to complete. [Appendix 2]

The workshop was designed around key educational principles, with a focus on integrating clear learning objectives throughout a presentation at the beginning of the day and during each lab, ensuring participant safety, and applying active learning techniques. The first presentation given highlighted main aspects while working in labs such as safety and action to be taken in case of emergency and the second presentation was taken in each lab that was delivered smoothly to the children one about parasites and mosquitoes (not the focus of this research) and the second about using medicine and how to be safe around them which was the main focus in data collection and analysis.

3.5 Data Collection

Data were collected through two structured questionnaires developed specifically for this study, applying questions suitable for the comprehension levels of the targeted age group. As this research is both qualitative and quantitative, the questionnaires were structured according to different types of questions; open " Can you tell us what you liked BEST about the workshop?" , closed "Would you attend more activities like this one?" , factual "Liquid medicines are usually cheaper than tablets", Attitudinal "On a scale of 1 to 4, how did you find the workshop today?" and classification questions " what is your ethnic group?". In addition, the cost, and implications of were considered and the best option was chosen to print out papers of the questionnaire avoiding the use of any electronic device as it has been aimed to a young population of participants. The systemic review of using qualitative methods to generate a questionnaire was covered by Ricci et al., 2019. Even though we approximately aimed for 120 children, 150 papers of the questionnaires were printed for each day. The cost of the questionnaires was covered by the university of Nottingham at the day of the lab workshops. The questionnaire also specifies the study population age group and was decided to best collect the data on campus during the school visit to the school of pharmacy

at UoN. The questionnaires were administered before the first lab and immediately after the second lab to assess the change in children's knowledge and understanding after the presentation and activity taken. As all data were as A4 papers, they were filled in by Google forms using the same questions which directly converted into excel. There was a total of approximately 120 papers for each questionnaire giving a total of 240 papers that were filled in Google Forms.

3.6 Data Analysis

Responses from the pre- and post- questionnaires were analyzed using Microsoft Excel as it is efficient for small data handling as the focus were based on several questions from each questionnaire and not all questions to narrow down the results specifically focusing on knowledge on children on medicines before and after teaching them. Even though the Statistical Package for the Social Sciences (SPSS) was also considered to be used when the data was analyzed but Excel was chosen over SPSS because of the wide availability and compatibility allowing that data to be easily shared and interpreted into a comprehensive statistical data such as graphs when required.

The questions that were added to Excel were from questionnaire 1. [Appendix 1]

1.What is your ethnic group

2.How would you describe your identity

3.Have you ever taken a medicine

4. Liquid medicines are easier to swallow than solid medicines

5.Liquid medicines are usually cheaper than tablets

6.tabletes works faster than liquid medicines

7.what do you think must be on a medicine label

8. Solid medicines has a longer expiry date than liquid

The questions that were added to Excel were from questionnaire 2. [Appendix 1]

Fill in the blanks with the word 'liquid' or 'solid'.

1. A _____ medicine is more expensive than a _____ medicine.

2. A _____ medicine works faster than a _____ medicine.

3. A _____ medicine is harder to swallow than a _____ medicine.

4. A _____ medicine has a longer expiry date than a _____ medicine.

5. Can you remember what must be on a medicine label?

6. On a scale of 1 to 4, how did you find the workshop today? Choose ONE answer only.

7. Would you attend more activities like this one?

Plotting the data in Excel started by entering all the responses into a spreadsheet, forming a separate column for each of the seven questions from both questionnaires. This gave a clear, organized way to look at the data collected. Then calculated the average rating for questions that used a scale , and how many times certain answers were given for classified questions (ethnic group or medicine types). The data was visualized by creating charts highlighting clear patterns and the correlation between knowledge.

3.7 Consent

Approval for this study was obtained from the university's research department at the school of pharmacy. Consent was gathered from parents or guardians from the children, in line with ethical guidelines for research with minors from the schoolteachers.

3.8 Safety parameters

A presentation was given at the beginning of the activity to ensure that all participants were aware of the safety aspects while being in a university lab, which may contain harmful substances [Appendix 3]. Interacting with the students throughout the presentation helped ensure that they were focusing and fully understood all safety parameters.

Chapter 4: Results

The results were collected from Questionnaires 1 and 2. Both questionnaires were given as A4 paper to all participants which are a group of year 6 students from two different schools in Nottingham, England. There were 60 students per school all together 120 participants. Then the responses were entered into Google Forms, and automatically converted into Excel, then re written into Excel spreadsheets then into pivot tables were utilized to obtain detailed information on the questions.

4.1 Questionnaire Design

The questions that were used throughout the research were a mix of qualitative and quantitative methods. For the quantitative aspect, structured questions that included defined responses such as True and False answers or Multiple-choice answers. Quantitative results were used to allow straightforward analysis of the response that were quantified and presented into counts. On the qualitative aspect, open-ended questions that were included in the questionnaire which allowed for more descriptive answers or questions relating to the participants opinions. The combination of qualitative and quantitative methods enabled a detailed analysis of the student's knowledge and different perceptions allowing for factual data and narrative data.

The results of questionnaires 1 were used to compare with questionnaire 2 which is used as evidence to answer the overall research question. The results of both questionnaires were clearly displayed by forming two different tables detailing the question asked, the correct answer and the participant's answers. Additionally, specific tables for each question were also provided to consider the accuracy of the findings.

By using a specific guide and design of the questionnaires aimed at 10–11-year-old children, they were able to answer the following questions [Appendix 1] that covered key topics such as labeling, usage of medications and general practice regarding health safety of medication. The pre- lab helped to distinguish between participants baseline of knowledge regarding the focused subject and by using the results it clearly showed an improvement and change of understanding. A method of direct comparison of data was used providing clear tables into the efficacy of outreach programs.

4.2 Questionnaire 1 Results

Question From Questionnaire 1	Answer	Results of 120 participants
How would you describe your gender identity?		Female: 60 Male : 54 Prefer not to say: 1 Left blank : 5
What is your ethnic group?		White: 43 Mixed: 19 Asian/Asian British: 23 Black: 26 Other ethnic group: 4 Left blank: 5
Have you ever taken a medicine?		Yes: 115 Left blank: 5
Liquid medicines are easier to swallow than solid medicine . (True/False)	True	Correct answers: 110 Incorrect answers: 5 Left blank: 5
Liquid medicines are usually cheaper than tablets. (True/False)	False	Correct answers: 68 Incorrect answers: 44 Left blank: 8
Tablets works faster than liquid medicines. (True/False)	False	Correct answers: 51 Incorrect answers: 61 Left blank:7
Tablets have a longer expiry date than liquid medicines.(True/False)	True	Correct answers: 71 Incorrect answers: 43 Left blank: 6
What do you think must be on a medicine label?	Name of the medicine Warning labels	Correct answers: 90 Incorrect answers: 28 Left Blank: 2

Table 1: Questionnaire 1 results table

The first questionnaire included all 120 participants, with 60 females and 54 males; one participant did not specify their gender, and five did not respond as they left the answer blank. According to the label information from the first questionnaire given, most participants identified the 'Name of the medicine' as necessary label content, while a few answered the ‘Warning Labels' as a necessary label. Regarding the question on medication expiry also from the first questionnaire, a majority correctly answered that tablets have a longer expiry date than liquids. The participant’s ethnicities had the largest group being White and Asian, and a notable representation of Black and Mixed ethnicities. All participants answered that they have used a medication before even though 5 were left blank. When asked about the ease of swallowing different medication forms, the majority answered with liquids being easier to swallow than solids. Participants had mixed thoughts about the cost of medication, with a higher number incorrectly answering that liquids are cheaper than tablets. Lastly, most students thought that tablets work faster than liquids whereas liquids work faster than tablets.

4.3 Questionnaire 2 Results

Question From Questionnaire 2	Answer	Results of 120 participants
Fill in the blanks with the word 'liquid' or 'solid' A _____ medicine is more expensive than a _____ medicine.	Blank 1: Liquid Blank 2: Solid	Correct answers: 96 Incorrect answers: 12 Left blank: 12
A _____ medicine works faster than a _____ medicine.	Blank 1: Liquid Blank 2: Solid	Correct answers: 89 Incorrect answers: 19 Left blank: 12
A _____ medicine is harder to swallow than a _____ medicine.	Blank 1: Solid Blank 2: Liquid	Correct answers: 108 Incorrect answers: 5 Left blank: 7
A _____ medicine has a longer expiry date than a _____ medicine.	Blank 1: Solid Blank 2: Liquid	Correct answers: 110 Incorrect answers: 3 Left blank: 7
Can you remember what must be on a medicine label?	Name of the medicine Warning labels	Correct answer: 114 Incorrect: 0 Left blank: 6
On a scale of 1 to 4, how did you find the workshop today?		4/4: 69 3/4: 37 2/4: 6 Left blank: 8
Would you attend more activities like this one?		Yes:85 Maybe: 29 Left blank: 6

Table 2: Questionnaire results table

In Questionnaire 2, the participants showed strong understanding of key information, with 114 correctly recalling essential label information on medications. The results of questionnaire 2 showed that the research was successful, as all focused questions showed an improvement of knowledge within participants. In addition, 85 participants were interested in attending similar activities in the future, and 29 were open to the possibility. The results demonstrated a clear understanding of medicines; 110 participants knew that solids have longer expiry dates than liquids, and 108 answered that liquids are easier to swallow compared to solids. Moreover, 89 students answered that liquids work faster than solids, and 96 answered the higher cost with liquid medications than solids. The results from questionnaire 2 conclude a successful educational outcome within participants, as it demonstrated the ability of participants to recall information regarding medicine properties such as labeling and expiry of medicines.

4.4 Specific Results for Questionnaire 1

Ethic group	Participants
Yes	**115**
Asian	23
Black	26
Mixed	19
Other	4
White	43
(blank)	**5**
(blank)	5
Grand Total	**120**

Table 3: Question 2 from questionnaire 1 results

Gender	Participants
Yes	**115**
Female	60
Male	54
Prefer not to say	1
(blank)	**5**
(blank)	5
Grand Total	**120**

Table 4: Question 3 results from questionnaire 1

Taken medicine before	Participants
Yes	115
(blank)	5
Grand Total	**120**

Table 5: Question 4 from questionnaire 1 results

Liquid medicines are easier to swallow than solid	Participants
False	5
True	110
(blank)	5
Grand Total	120

Table 6: Results of question 5 from questionnaire 1

Liquid medicines are cheaper than tablets	Participants
False	68
True	44
(blank)	8
Grand Total	120

Table 7: Results of question 6 from questionnaire 1

Tablets works faster than liquid	Participants
True	62
FALSE	51
(blank)	7
Grand Total	120

Table 8: Results of question 7 from questionnaire 1

Tablets has longer expiry date than liquids	Participants
True	71
FALSE	43
(blank)	6
Grand Total	120

Table 9: Results of question 8 from questionnaire 1

Medicine label	Participants
Email address	1
Name of the medicine	114
Warning Labels	3
(blank)	2
Grand Total	120

Table 10: Results of question 9 from questionnaire 1

4.5 Questionnaire 2 specific Results

__ more expensive than __	Participants
liquid	96
Sold	12
(blank)	12
Grand Total	**120**

Table 11: Results of question 1 from questionnaire 2

__ works faster than __	Participants
liquid	89
Sold	19
(blank)	12
Grand Total	**120**

Table 12: Results of question 2 from questionnaire 2

__ harder to swallow than__	Participants
liquid	5
Solid	108
(blank)	7
Grand Total	**120**

Table 13: Results of question 3 from questionnaire 2

___ has longer expiry date than___	Participants
liquid	3
Solid	110
(blank)	7
Grand Total	**120**

Table 14: Results of question 4 from questionnaire 2

Medicine label requirement	Participants
Name of the medicine and warning labels	114
(blank)	6
Grand Total	**120**

Table 15: Results of question 5 from questionnaire 2

Rate on a scale 1-4	Particpants
2	6
3	37
4	69
(blank)	8
Grand Total	**120**

Table 16: Results of question 11 from questionnaire 2

attend more activities like this one	Number of Participant
Maybe	29
Yes	85
(blank)	6
Grand Total	**120**

Table 17: Results of question 12 from questionnaire 2

Chapter 5: Discussion

The study aims to increase public health, specifically children's knowledge aged 10-11 years old on basic information of medicines such as labelling by using enhanced educational programs of university labs as an intervention. The main objective of this research is to distinguish the gap of paediatric medication knowledge based on young population and to enhance their understanding. By using lab methodology which included a guided workbook given to each participant, the overall aim for this research was reached successfully and conducted results for each questionnaire concluding an overall positive response of children.

In summary of the results showed a clear relationship between the educational program that was given to the students and their general knowledge on medicine. According to the questionnaire results, it has identified that such educational approach taken place by using hands on methods by children in a university lab does enhance their knowledge on medicine safety. The second questionnaire specifically identifies how young students retain specific information about general facts such as medicine labelling and expiry date of medicines which underlines the importance of targeted educational programs to be given to school aged children. As a result, these findings concluded that educating the public from a young age has a positive influence thereby having a more educated public society in the future. The improvement that was identifies when comparing questionnaire 1 to questionnaire 2 also clarified the efficacy of using practical teaching methods with complex health literacy to young students which is considered as an aspect that can be either replicated expanded in similar ways and to use this as an educational methodology. Overall, the second questionnaire demonstrated that the intervention provided was successful to the specified audience as it clarified a difference in certain responses whereas the majority of students got quantitative answers correctly.

5.1 Evaluation of Methodology

The evaluation of the methodology, particularly in terms of the software used for analysing survey data, highlighted challenges and led to changes when considering the most appropriate software to use. Initially, a lot of time was spent to learn more about the software SPSS, a

statistical analysis program for data interpretation and analysis. Even though SPSS is very detailed and advanced for data analysis, Microsoft Excel was chosen over it as it was more appropriate to use for the collected data whereas this research did not require the advanced functions available in SPSS.

5.2 Challenges

Safety issues during the lab were challenging as the participants were making medicine. To make sure that no one accidentally or intentionally consumed the fake medicine that was made, I interacted with the students thoroughly to decrease risk of harm which helped them understand clearly. Another consequence was students refusing to wear safety googles, because it is a universities lab it was vital for the participants to have their safety googles and lab coats at all times to overcome this, we made sure to speak to them as a whole and individually for anyone that refused to wear their PPE [Appendix 3]. Even though these challenges took time to overcome, the method that was used worked successfully as the students were involved in learning about medicine safety and gave us a hands-on experience to answer our questions regarding pediatric medicine.

Several children left several answers blank in the questionnaires, which may have impacted the results. For instance, in questionnaire one, 15 students left blank questions regarding their identity, ethnic group, previous medicine use, and whether liquid medicines are easier to swallow than solid medicines. Additionally, 8 left the question about liquid medicines being cheaper than solid one's blank; 7 did not respond to whether tablets work faster than liquids; 6 skipped the question on tablets having a longer expiry date than liquids; and 2 did not answer what must be on a medicine label. This aspect is important to consider because it may introduce potential bias and reduce data completeness of the results.

5.3 Relating to Literature

According to the literature review in chapter 2, it clarifies several studies for instance, health literacy and medication safety broadly that aligned directly to the research aim. The studies mentioned reflects on improving children's health literacy by healthcare professionals for locations such as hospitals/ wards (Fairbrother, Curtis and Goyder, 2016). This allowed for a focus on the type of questions provided in the questionnaires and it also gave background information to what extent children know about medicines.

Table 1

Sample of items used in questionnaire

Question	0	1	2	3	4
When did you brought your kid last time in the hospital?	Last week	Last month.	6month ago.	Last year.	Never
Your kid often suffers from:	Never before.	Fever or headache.	Abdominal pain, vomit, diarrhea.	Flu	Cough or sore throat.
When your kid gets sick you prefer to give him medicine:	As your doctor prescribes.	By using old prescriptions	With the help of advertisements.	Whatever, your relatives or friends told you.	By your own personal experience.

Figure 4: A sample questionnaire from a recent study (Ahmed *et al.*, 2021)

The questionnaire used in the figure is a reference for designing questions that assess knowledge of health practices among parents in Indonesia. This aligns closely with my own study, where the aim is to compare the understanding of medication safety between children the UK. By having a similar structure of the questionnaire, it allowed a systemic data collection and a source for comparable data to provide insights into how children understand medication usage compared to their parents. This comparison was used to identify the gap in young people knowledge and to identify what areas to improve that will be most effective. By using these methodologies, my research aims to enhance educational strategies within schools, thereby increasing children's comprehension in managing their health and making stable decisions about medications usage.

5.4 Interpretation of Results

The study was interpreted by focusing on evaluating the aim of the research. The findings of the questionnaires provide an insightful relation about the effectiveness of knowledge related to children and medicine use and the ability of young individuals to identify certain information that are complex when mentioning medicine labels and medicine properties. This section delves into discussing the specific improvement of each question and considering how many participants improved and calculate it as a percentage to compare and distinguish between data. This chapter also specifies and answers the question of the research which is to what extent educational laboratories enhance children’s knowledge on medicine and whether lab settings is a good strategy to educate school aged children or not by using before and after

results of the surveys used. Analyzing the data allows for long term solutions in applying this study into real practice such as in several communities of the public to improve overall public health outcomes and to create long term benefits that this knowledge could support safe medicine practice among young individuals. This interpretation frames the discussion on the applicability of such educational methods to be used in practice and their relevance in health education on public health.

5.5 Medicine Labelling

Firstly, the main aspect of the goal is enhancing knowledge of medicine as for data justification, it has showed that there was a significant increase in correct answers when considering what should be on a medicine label while comparing it to the first questionnaire which was taken before the lab. At the beginning, most students did get the answer partially correct which was having the name of the medicine on the label, but they did not consider warning labels as important as the majority did not choose this. There was a noticeable improvement difference between the first and second results indicating that the learning given was indeed effective during the lab given.

5.6 Understanding Medicine Properties

The participants clearly showed that there was an increase of knowledge according to medicine properties such as expiry date of medicine, pricing of medicine and which formulation is easier to swallow. There was an increase in awareness between students that tablets have a longer shelf life than liquid formulations, liquids are easier to swallow, and tablets are cheaper than liquids. The main points of the medicine properties throughout the study were that less students understood before the educational program was given.

5.7 Medication Forms responses

Participants in the second questionnaire showed positive results about physical properties of medicine whereas solid forms of medications have a slower mechanism of action than liquid formulations, which corrects the common misconception within students distinguished in Questionnaire 1. This indicates that the educational content provided to students throughout

the program increased their knowledge on medication forms according to the mechanism of action of different formulations.

5.8 Cost of medication

The questionnaires appear to have been effective in correcting misconceptions about the cost of liquid versus solid medications whereas 57% got the answer correctly prelab workshop then it increased by 23% giving an overall of 80% getting the answer correctly post lab as in the second questionnaire. This is also an indication that the intervention has been successful in enhancing participant's knowledge on cost of medicines.

5.9 Indirect measurements

Addressing participant's ethnicity and gender in the results was also important because it shows a clear representation of the study. For example, knowing all participants ethnicity provides context when analyzing the data as the results clarifies different race and ethnicity which shows generalizability of study findings (Bibbins-Domingo and Helman, 2022). Even though collecting qualitative data on student's ethnicity and gender are considered as an indirect measurement for the research topic, it is still vital to note the findings because of reasons such as students with different backgrounds that may affect how health literacy is understood and applied into practice. This may also influence on children's views and beliefs on different medicines during disease prevention of treatment (Dawood, Mohamed Ibrahim, and Abdullah, 2015). Considering participants identity and ethnicity also forms an equitable and inclusive data by knowing how well the research works on different ethnicities and weather patterns appear within males and females answers throughout the questionnaire. Focusing on this question, the study clarifies aspects of cultural, social, and individual factors and further studied can be made such as their impact on educational effectiveness. This approach allowed a wider context to be distinguished and a clear understanding on how children from different backgrounds benefit from health educational programs.

5.10 Practical Application of Knowledge

Comparing pre and post questionnaire responses according to the quantitative results of medicines such as general information on medicines and cost of solid/ liquid formulations.

The results of each questionnaire suggested that the students were able to apply their theoretical knowledge of general, medicine information regarding properties and characteristics of medication to practical contexts allowing them to apply it to real life situations.

5.11 Limitations

There was a limited scope in this study as the knowledge of children was measured after the educational activity provided which shows an immediate application of information limiting the long-term knowledge as this may not allow students to apply it to real life scenarios. To overcome this limitation firstly introduce continuous assessments by giving participants the same questionnaires for example within 3 months, 6 months and 1 year. This method will ensure that the information is fully retained as a long term by students to ensure safety over time. This limitation was partially fixed by the use of a workbook [Appendix 2] and students took them home which allowed the students to show independent learning to provide a reference for a long term whereas they could re-read to reinforce the education given.

In addition, the results of this study are focused from a specific group of children, which may not precisely represent the knowledge levels of all children due to several backgrounds and cultural influences as everyone lives in a different environment. The results could have been enhanced by further analysing how responses varied across different ethnic groups, potentially allowing for a more tailored and effective educational approach that considers the diverse contexts from which the participants come. Another limitation was the questions that was used in the questionnaires were written in different format , this is considered as a limitation because he audience are children and giving them the same question within both questionnaires may influence in the results that was found. A solution for this is to ensure questions are written in simple format and are age appropriate according to the targeted audience to make it understandable. This strategy will reduce any potential bias. Additionally, to the quantitative data, providing qualitative measurements to gather deeper insights on participants perceptions of their interaction within the educational program provided.

Overall, the findings of the research are significant which indicates a well-structured educational program performed by The University of Nottingham to primary school children and have shown a successful intervention that helps in developing safer health practices within 10–11-year-old minors.

Chapter 6: Conclusion and Future Work

The project conducted via a lab activity by The University of Nottingham in collaboration with two different schools showed a clear finding of positive impact on expanding school aged individual's cognition and learning about medicine safety. According to the results from questionnaire 2, it clearly identified participating in the lab activity allowed the majority of participants to answer correctly giving a positive result and forming successful research. Factors considered such as medicine label, medicine properties and cost associated depending on medicinal forms also showed elevated understanding.

6.1 Future Work

Additional future work must be considered to complete the gap of this research aim which is to ensure public health safety specifically within the young population. Focusing on applying the same method but through longitudinal research, which would assess participant's long-term retention, could be highly beneficial. This could be achieved by conducting a similar study with the same audience and assessing them at several intervals (months). Another approach for future work should consider educating and providing training to schoolteachers about health safety, specifically relating to the properties and safe use of medicines. This training could start with Year 6 students and be incorporated into subjects such as Biology or Science.

An intervention such as developing a new application for tablets aimed at children could significantly enhance their knowledge of health and medicine usage. This app could be divided into several sections, for example, a section focusing on medicine labelling and properties, another section for children with long-term conditions like asthma, which would include guidance on the safe use of medications such as inhalers. Additionally, there could be a section for parental control , providing parents with resources and information to help them oversee their children's medication practices effectively and educate them about health safety measures. This detailed approach facilitates learning directly for the children that can be designed to attract them and involves parents, making it an educational tool as future work.

6.2 Summary

Evidence based findings indicated that there was an increase in knowledge on the other hand, the results suggested several limits to this understanding and to the targeted young audience. For instance, the young participants demonstrated quantitative data according to medicine safety post-lab , however the study did not measure depth of understanding within a longer time frame or whether the education is applied practically.

In conclusion, the lab activities within the educational workshop effectively enhanced children's awareness of medicine safety, but the extent of their understanding, especially regarding the practical application and long-term knowledge, remains an area for further exploration. To ensure that this gap has been looked at, future work should be considered, and further interventions aimed for the targeted population to ensure safety.

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The following questionnaires were used to gather data before (Questionnaire 1) and after (Questionnaire 2) laboratory sessions.

Note that ONLY highlighted questions from both questionnaires were used for data throughout this research

Ectoparasites & Medicines Questionnaire 1

Participant Number:

Participant Information

This workshop is being undertaken by staff and students in the School of Pharmacy at the University of Nottingham as part of a research project investigating public understanding of ectoparasites and medicines.

Your participation is voluntary, your responses are anonymous and you may withdraw. If you decide to withdraw, you/your teacher can email the project supervisor and state your participant number before the end of February, after which time the data will be analysed. All data will be handled in accordance with the University of Nottingham Data Protection Policy. Information can be provided on request. If you have any questions, please email the project supervisor, Dr Rebecca Rickaby, at rebecca.rickaby@nottingham.ac.uk.

Questions about you

1. How old are you?

---

2. What is your ethnic group?
Choose ONE option that best describes your ethnic group or background.

- ❑ White (e.g., English, Welsh, Scottish, Northern Irish, British, Irish, Gypsy)
- ❑ Mixed/Multiple ethnic groups
- ❑ Asian/Asian British (e.g., Indian, Pakistani, Bangladesh, Chinese)
- ❑ Black/African/Caribbean/Black British
- ❑ Other ethnic group

If other, you can write here:

---

3. How would you describe your gender identity?
Choose ONE option that best describes your gender identity.

- ❑ Male
- ❑ Female
- ❑ Prefer not to say
- ❑ Other

If other, you can write here:

Questions about medicines

4. Have you ever taken a medicine?
   - ❑ Yes
   - ❑ No
   - ❑ Prefer not to say

Decide if the sentences are TRUE or FALSE:

5. Liquid medicines are easier to swallow than solid medicine (e.g. tablet).
   - ❑ True
   - ❑ False

6. Liquid medicines are usually cheaper than tablets.
   - ❑ True
   - ❑ False

7. Tablets works faster than liquid medicines.
   - ❑ True
   - ❑ False

8. Tablets have a longer expiry date than liquid medicines.
   - ❑ True
   - ❑ False

9. What do you think must be on a medicine label?
Choose TWO answers only.

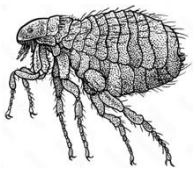
- ❑ Name of the medicine
- ❑ Email address
- ❑ Warning labels
- ❑ Price

❑ Recycling information

10. What do you think you can you get from a pharmacy?
Write down everything you can think of.

Questions about ectoparasites

11. Do you/your family have a pet?
    - ❑ Yes
    - ❑ No

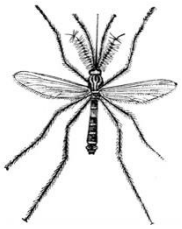


12. Have you heard of the word ectoparasite before today?
    - ❑ Yes
    - ❑ No

Decide if these sentences are TRUE or FALSE:

13. Fleas can jump to find food.
    - ❑ True
    - ❑ False

14. Both male and female mosquitoes eat blood.
    - ❑ True
    - ❑ False



15. What do you think fleas eat?
Choose ONE answer only.

    - ❑ Nectar
    - ❑ Hair/fur
    - ❑ Skin
    - ❑ Blood
    - ❑ Other insects
    - ❑ I don't know

16. Guess which disease you think can be caught from flea bites?
Choose ONE answer only.

    - ❑ Chickenpox
    - ❑ COVID-19
    - ❑ The Plague
    - ❑ Asthma

- ❑ Malaria
- ❑

17. Guess which disease you think can be caught from mosquito bites?
Choose ONE answer only.

- ❑ Chickenpox
- ❑ COVID-19
- ❑ The Plague
- ❑ Asthma
- ❑ Malaria

END OF QUESTIONNAIRE 1

Ectoparasites & Medicines Questionnaire 2

Participant Number:

Questions about medicines

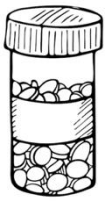
Fill in the blanks with the word 'liquid' or 'solid'

8. A _____ medicine is more expensive than a _____ medicine.

9. A _____ medicine works faster than a _____ medicine.

10. A _____ medicine is harder to swallow than a _____ medicine.

11. A _____ medicine has a longer expiry date than a _____ medicine.



12. Can you remember what must be on a medicine label?
Choose TWO answers only.

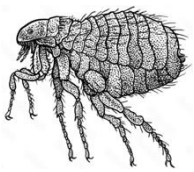
- ❑ Price
- ❑ Warning labels
- ❑ Email address
- ❑ Name of the medicine
- ❑ Recycling information

Questions about ectoparasites

Decide if these sentences are TRUE or FALSE:

Fleas can jump to find food.

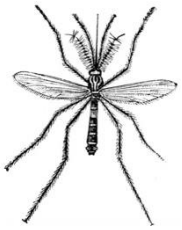
- ❑ True
- ❑ False



13. Male and female mosquitoes eat blood.
- ❑ True
- ❑ False

14. What do you think fleas eat?
Choose ONE answer only.

- ❑ Nectar
- ❑ Hair/fur
- ❑ Skin
- ❑ Blood
- ❑ Other insects



- ❑ I don't know

15. Can you remember which disease can be caught from flea bites?
Choose ONE answer only.

- ❑ Chickenpox
- ❑ COVID-19
- ❑ The Plague
- ❑ Asthma
- ❑ Malaria

16. Can you remember which disease can be caught from mosquito bites?
Choose ONE answer only.

- ❑ Chickenpox
- ❑ COVID-19
- ❑ The Plague
- ❑ Asthma
- ❑ Malaria

Workshop Feedback

17. On a scale of 1 to 4, how did you find the workshop today? Choose ONE answer only.

- ❑ 1 (I didn't like it)
- ❑ 2 (It was ok)
- ❑ 3 (It was good)
- ❑ 4 (It was great)

18. Would you attend more activities like this one?

- ❑ Yes
- ❑ Maybe
- ❑ No

19. Can you tell us what you liked BEST about the workshop?

20. If you wanted to find out more about ectoparasites and medicines, where would you go first?
Choose ONE answer only. ?

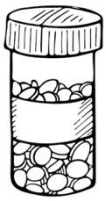
21.

- ❑ Look in books
- ❑ Ask my teacher
- ❑ Go to the doctor/pharmacist
- ❑ Search the internet
- ❑ Ask a parent/carer
- ❑ Other

END OF QUESTIONNAIRE 2

Ectoparasites & Medicines Questionnaire Answers

Questions about medicines



A liquid medicine is more expensive than a solid medicine.

A liquid medicine works faster than a solid medicine.

A solid medicine is harder to swallow than a liquid medicine.

A solid medicine has a longer expiry date than a liquid medicine.

Can you remember what must be on a medicine label?

Choose TWO answers only.

- ❑ Price
- ❑ **Warning labels**
- ❑ Email address
- ❑ **Name of the medicine**
- ❑ Recycling information

Questions about ectoparasites

Fleas can jump to find food.

- ❑ **True**

Male and female mosquitoes eat blood.

- ❑ **False (only females eat blood)**

22. What do you think fleas eat?
    - ❑ **Blood**

23. Can you remember which disease can be caught from flea bites?
    - ❑ **The Plague**

24. Can you remember which disease can be caught from mosquito bites?
    - ❑ **Malaria**

Workshop Activity Answers

Ectoparasites up Close!

Words can be found in any direction (including diagonals) and can overlap each other. Use the word bank below.

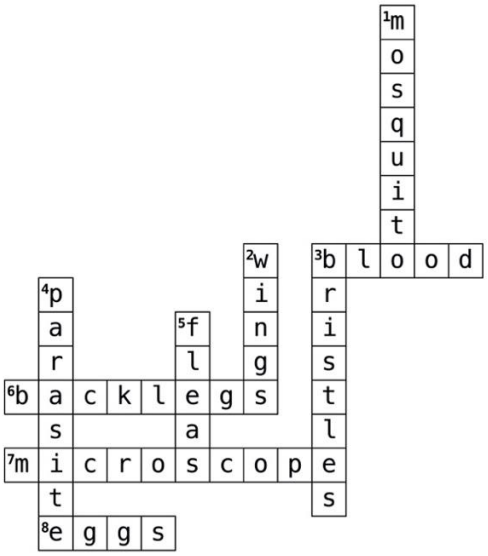
P **A** B **F** Q S X P J P R Y A S R
H **N** V **P** **L** J F K A D A J X M R
H **N** Q L **R** **E** C **M** **O** **U** **T** **H** I P Y
M **E** S D O **O** **A** G F P S O I M W
O **T** V K H K **B** **S** A I Q Z N T R
A **N** Q B O M **U** **O** M M Y R W G Q
J **A** P W I **C** F X **S** I T P A **W** **N**
Q R R A **O** C N Y N **C** E M **I** R **E**
B M Q **F** C **L** E U X V **I** **N** H I **M**
X D V L **E** T V D O R **G** **S** H N **O**
H N G **G** T M K G F D **C** **O** **M** **B** **D**
B **R** **I** **S** **T** **L** **E** **S** Z P B S X C **B**
P **M** **A** **G** **N** **I** **F** **Y** F N W U O I **A**
X **I** P Y X H H P D F B L T D D
X O U M **O** **T** **I** **U** **Q** **S** **O** **M** A I P

Word Bank

1. leg
2. proboscis
3. wing
4. flea
5. focus
6. comb
7. bristles
8. mouth
9. abdomen
10. magnify
11. antenna
12. mosquito

Dictionary.com

Exploring Ectoparasites



Learning about Medicines

Words can be found in any direction (including diagonals) and can overlap each other. Use the word bank below.

V N Q H O Q Y V I J N W S B G
B Y T D X **C** **A** **P** **S** **U** **L** **E** K F U
Z **P** M B E D K A V M T T B S R
U **U** **W** W X O T T F I C U S W G
O **R** **A** H **D** **I** **S** **S** **O** **L** **V** **E** K P R
M **Y** **R** J **M** **E** **D** **I** **C** **I** **N** **E** B L O
J **S** **N** K **P** **H** **A** **R** **M** **A** **C** **Y** W V C
F H **I** Y D B I E V L I W O V O
L R **N** D I **M** **I** **X** **T** **U** **R** **E** O J Z
I **A** **G** **N** **O** **I** **T** **U** **L** **O** **S** C L K U
L D **B** X D U G **T** **E** **L** **B** **A** **T** U I
I U H **E** R U F S T E V R C I S
N S T T **L** G L R P P Z P V G B
E **X** **P** **I** **R** **Y** **D** **I** **U** **Q** **I** **L** L E R
Z A N P Q M N I R O U N G I W

Word Bank

1. tablet
2. pharmacy
3. label
4. capsule
5. solution
6. mixture
7. medicine
8. liquid
9. warning
10. expiry
11. syrup
12. dissolve

Dictionary.com

CONTACT US

This workshop was delivered by staff and students in the School of Pharmacy at the University of Nottingham, as part of a research project investigating public understanding of ectoparasites and medicines.

Your participation is voluntary, your questionnaire responses are anonymous, and you may withdraw. If you decide to withdraw, you/your teacher can email the project supervisor and state your participant number before the end of February, after which time the data will be analysed. All data will be handled in accordance with the University of Nottingham Data Protection Policy. Information can be provided on request. If you have any questions about the workshop, please contact the workshop supervisor below:

Name: Rebecca Rickaby

Email: rebecca.rickaby@nottingham.ac.uk

Web: nottingham.ac.uk/pharmacy

University of Nottingham

Pharmacy School Building

University Park

Nottingham

NG7 2RD

School of Pharmacy

Appendix 2: [Workbook]

Ectoparasites & Medicines Workshop

School of Pharmacy

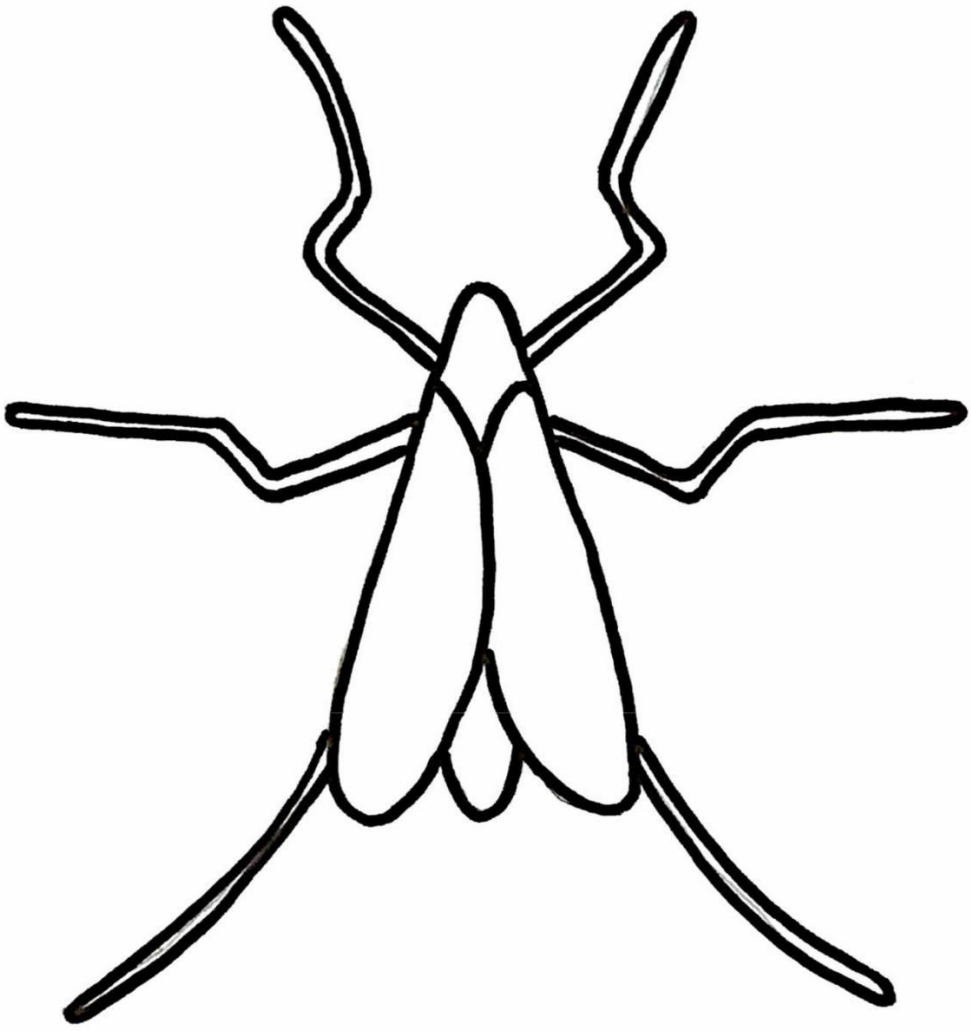
Name: Participant Number:

Table of Contents

Activity: Magnifying Mosquitos

1. Draw on the head and any other missing parts – look under the microscope!

2. Add detail to the wings and legs using the image on the screen.



3. Label the body parts of the mosquito using the box below to help you.

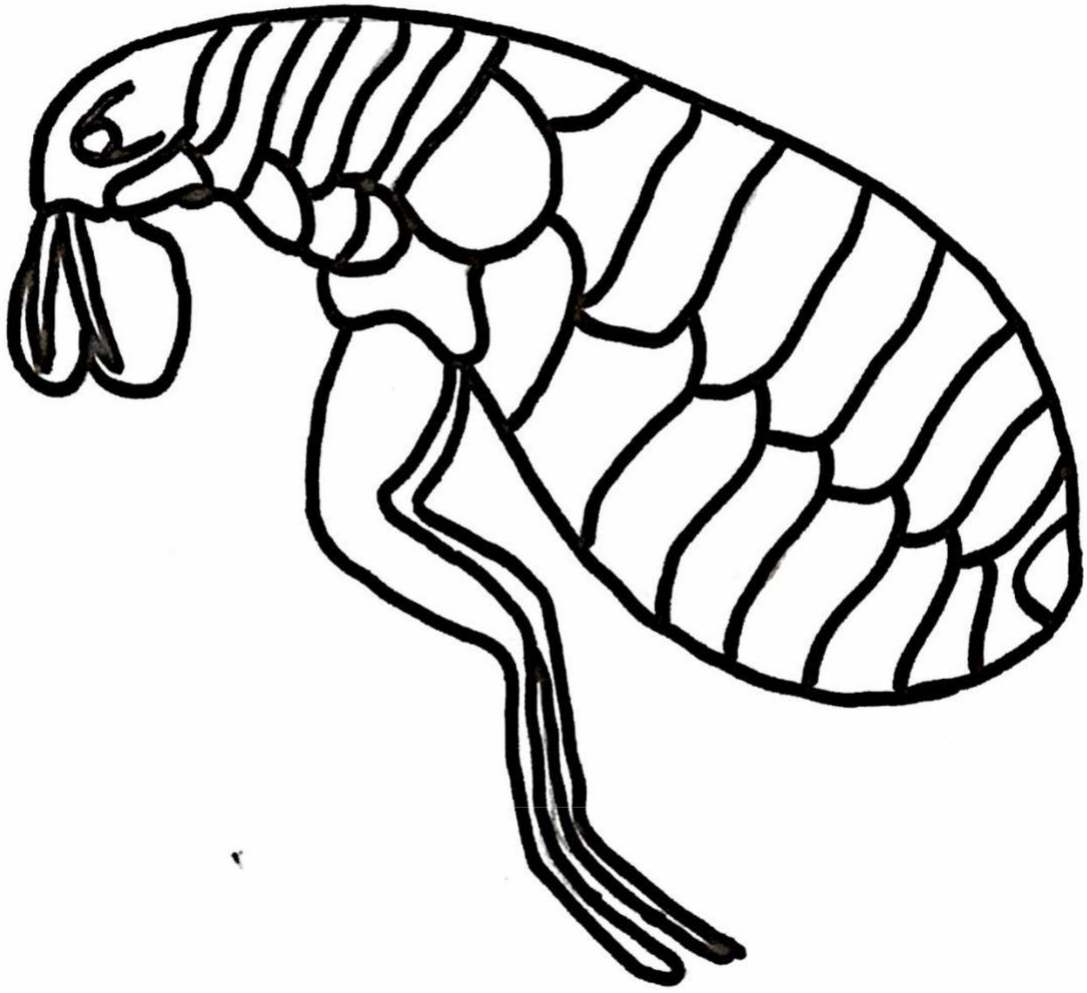
Eye	Abdomen	Front leg	Middle leg
Back leg	Antenna	Proboscis	Wing

Activity: Focus on Fleas

Activity: Focus on Fleas

1. Draw on the missing parts – look under the microscope!

2. Add detail to the head, body and legs using the microscope and image on the screen.



3. Label the body parts of the flea using the box below to help you.

Eye	Abdomen	Front leg	Middle leg
Back leg	Comb	Bristles	Mouth

Activity: Making a Medicine

Now that you've learned about what goes into a liquid medicine, let's make a Pretend Medicine Mixture to help you understand the different parts of a liquid formulation.

Materials & Equipment

Lemonade	Conical flask
Fruit squash	Spatula
Water	Weighing boats
Icing sugar	Measuring cylinder
Cornflour	Syringe
Food colouring	Plastic sealable container and Parafilm

Method

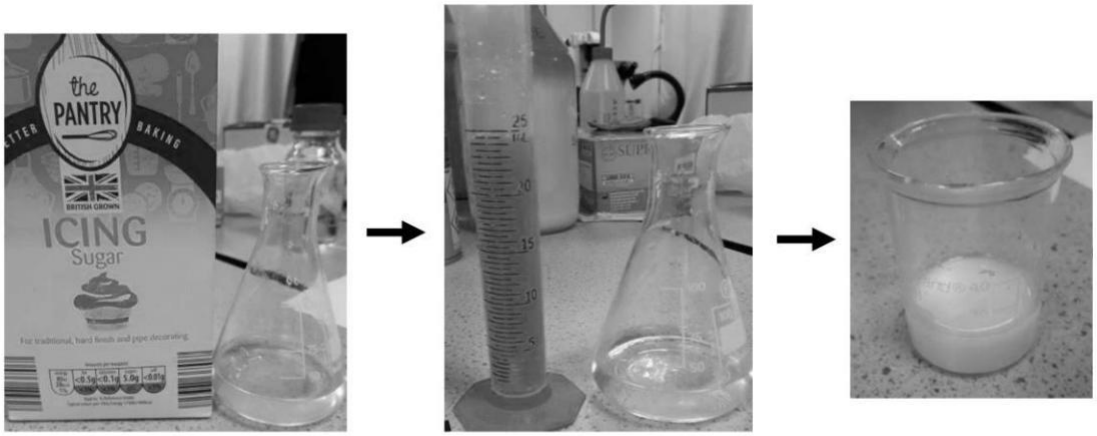
Follow the steps in the method and use the images to help you.

A. In a weighing boat, weigh 3 grams of icing sugar. Then add this to the conical flask.

B. Measure out 25 mL lemonade and pour into a conical flask – mix.

C. Measure out 25 mL of fruit squash and pour into the conical flask – mix.

D. Add 15 mL of water to a beaker then add 2 grams of cornflour – mix.



A & B C D

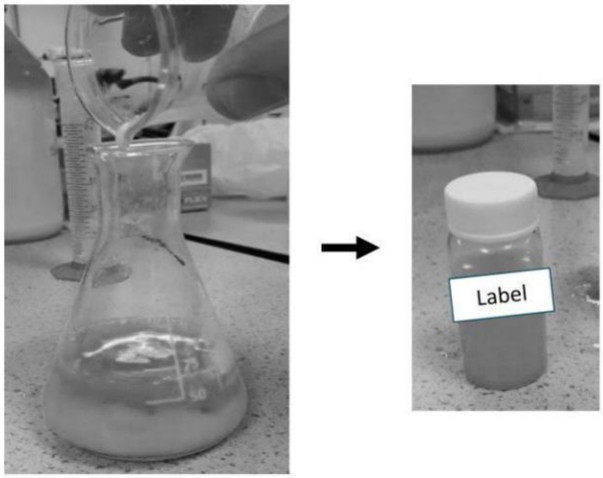
Turn to the next page for the rest of the method (E-H).

E. Pour the cornflour and water mixture from the beaker into the conical flask – mix.

F. Add 3 drops of food colouring to the flask and mix.

G. Measure out 30 mL of mixture and add to plastic container and seal with parafilm.

H. Fill out the label (see 'Labelling Medicines') and attach to container.



E & F G & H

Activity: Labelling Medicines

You've learned about why it is important for medicines to always have a label. Even though your Pretend Medicine is not a real medicine, you should label it, so you know what it is and any important warnings.

Method

1. Fill in your name and the date on the label below.
2. Ask a grown up to cut it out for you.
3. Attach it the bottle containing your Pretend Medicine.

30 mL Pretend Medicine Mixture
For demonstration only. Do NOT consume.
Discard after one week.

Name: _____

Date dispensed: _____

Keep out of sight and reach of children.
ABC Pharmacy, Pharmacy Street, Pharm County, PH4 8MA

EXTRA ACTIVITIES

Here are some extra activities to complete during or after the workshop.

Word Searches

Ectoparasites up Close!

Words can be found in any direction (including diagonals) and can overlap each other. Use the word bank below.

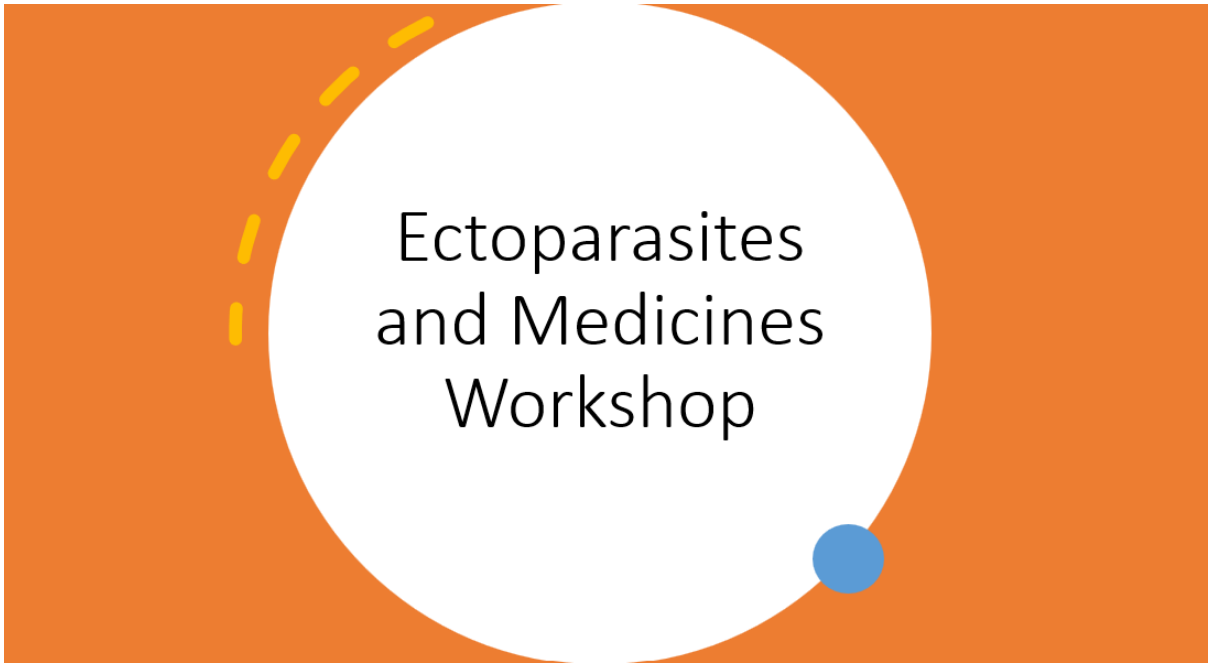
P	A	B	F	Q	S	X	P	J	P	R	Y	A	S	R
H	N	V	P	L	J	F	K	A	D	A	J	X	M	R
H	N	Q	L	R	E	C	M	O	U	T	H	I	P	Y
M	E	S	D	O	O	A	G	F	P	S	O	I	M	W
O	T	V	K	H	K	B	S	A	I	Q	Z	N	T	R
A	N	Q	B	O	M	U	O	M	M	Y	R	W	G	Q
J	A	P	W	I	C	F	X	S	I	T	P	A	W	N
Q	R	R	A	O	C	N	Y	N	C	E	M	I	R	E
B	M	Q	F	C	L	E	U	X	V	I	N	H	I	M
X	D	V	L	E	T	V	D	O	R	G	S	H	N	O
H	N	G	G	T	M	K	G	F	D	C	O	M	B	D
B	R	I	S	T	L	E	S	Z	P	B	S	X	C	B
P	M	A	G	N	I	F	Y	F	N	W	U	O	I	A
X	I	P	Y	X	H	H	P	D	F	B	L	T	D	D
X	O	U	M	O	T	I	U	Q	S	O	M	A	I	P

Word Bank

1. leg	2. proboscis	3. wing	4. flea
5. focus	6. comb	7. bristles	8. mouth
9. abdomen	10. magnify	11. antenna	12. mosquito

Dictionary.com

Appendix 3 [Introduction Presentation Slides]



What do Pharmacists do?

- Pharmacists are experts in medicines
- Provide advice about treating illness and about maintaining good health and wellbeing
- Can dispense and prescribe medicines
- Work in a range of settings
- Can you think of places where a pharmacist might work?

What do Pharmacy students learn about?

- How medicines work and what they contain.
- The causes and symptoms of diseases.
- The types of medicines which can be prescribed and dispensed to treat diseases.
- How medicines are safely stored and transported.
- How to talk to patients appropriately.

What will you do today?

- You will learn about how to study parasites under the microscope and about how liquid medicines are made. You will complete 2 activities:
  1. Ectoparasites up Close!
  2. Making a Medicine
- You will complete some worksheets and quizzes
- You will get to take some things home
- Please ask questions about the activities if you have them

Time	Activity	Location
09.30	Arrival and Welcome!	C30, Dispensary
10:00	Questionnaire 1	C30, Dispensary
10.10	Split into groups and get a lab coat	B Floor Social Space
10.20	Lab Session 1	B01 and B10 Labs
11.10	Toilet break and swap laboratories	B Floor Social Space
11.20	Lab Session 2	B01 and B10 Labs
12.10	Remove lab coats and **wash hands**	B01 and B10 Labs
12.20	Lunch	A06* and C29
13.00	Questionnaire 2	A06 and C29
13:30	Worksheets, handouts, collect your bags and coats	A06 and C29
	Coach collection	A Floor

Health and safety

Personal Protective Equipment (PPE)

- Always wear appropriate personal protective equipment (PPE)



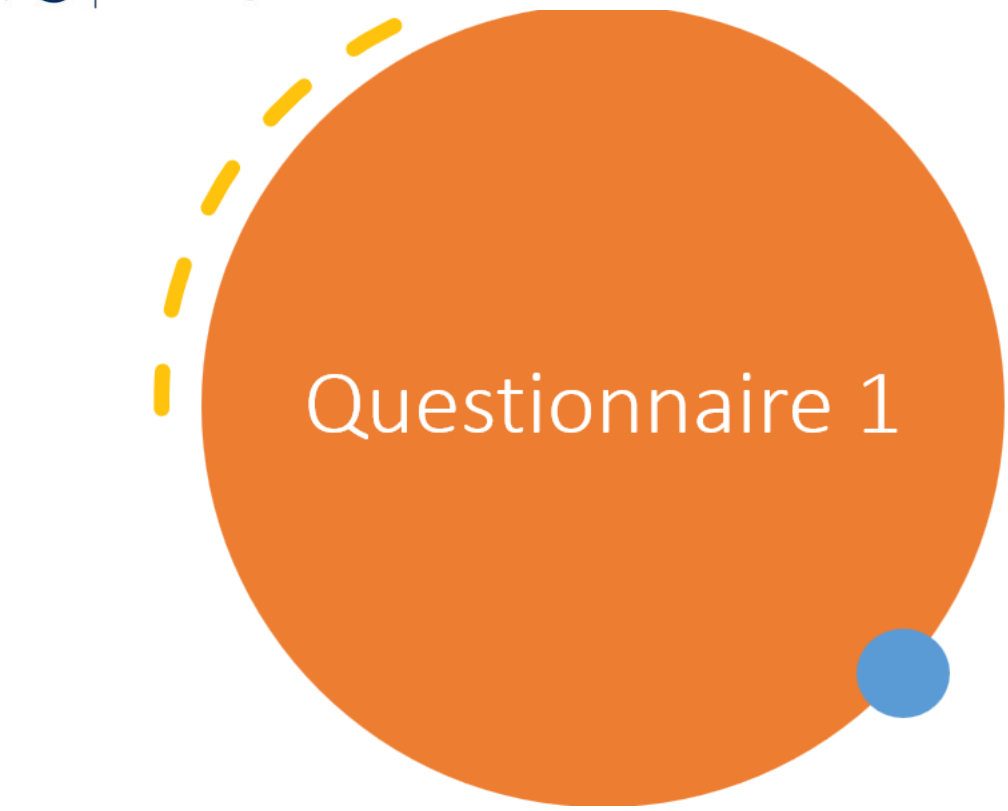
- Change gloves when contaminated and dispose of used gloves with other correct waste in yellow bins
- <u>Why is it important to wear PPE?</u>

Hygiene

- Wash your hands before and after the lab
- No eating and drinking in the lab
- Tidy up your working area before leaving
- Why is it important to do this?

What if an accident happens?

- You notice some broken equipment
- You or another person spills something
- What do you think you should do?


Questionnaire 1


Split into groups
for activities!

Appendix 4: [Forms]

Safe Working Practices

The School of Pharmacy, University of Nottingham

Student Name:

Supervisor Name: Qamar alqllaf Task Supervisor:

Title of Project:

¾ *Have you beeß ißformed of the followißg Buildißg/Area Specific Issues?*

	YES	NO
1. How to gain access/exit into the building (if appropriate)	☑	☐
2. What to do in the event of a fire	☑	☐
	☑	☐

AGREEMENT

I have discussed the safety aspects of my project with my supervisor.

Date: 14.02.24

Supervisor's signature

Date: 14.02.2024

The University of Nottingham

Project Student/Supervisor Meetings Form

The School of Pharmacy, University of Nottingham

Name of Candidate: Qamar Alqllaf

Staff Supervisor: Grace Chng

Title of Project: Enhancing Children's Knowledge On Medicine by Lab Education

Task Supervisor:

It is recommended that the student should have regular progress meetings with the supervisor. In order to ensure a degree of consistency in the level of supervision, a **minimum of five 15-minute** meetings should take place and should be documented by the student and supervisor on this form. Items for discussion should include key aims, progress made, new ideas and proposed plans.

Meeting 1	Date: 29/01/2024
Summary of discussion: ☑ Discussion of aims of project ☑ Provision of starting material (reviews, websites etc) ☑ Introduction to Task Supervisor if required ☑ Discussion of Project-specific safety ☑ Aims for next meeting	

☑ Discussion of optional module commitments (internal students only)

Discussed the method of the project and types of questions used in the questionnaires provided. Started preparing for presentation to be given to the students on February 7 for the first school that will visit and for the same presentation for the second school on February 9 2024.

Student's signature: 

Supervisor's signature: 

Meeting 2 Date:06/02/2024

Summary of discussion:

Started preparing for the students that will come on February 7, familiarised with the settings of the lab and went over lab safety just in case of accidents that might occur within the students. Discussed what activities will take place and the timetable for the day and went over the workbook and questionnaires before printing.

☑ Progress on the aims set at last meeting

☐ Agreed aims for next meeting

Make sure that all questionnaires are collected before students leave and ensure safety of the children during both activities.

Student's signature: 

Supervisor's signature: 

Meeting 3	Date:21/02/2024

Summary of discussion:

Distributed the questionnaire between us as four students (Qamar, Khoa, Dominic and Ella).

Made sure that Google Forms works by trying it and plotting the questionnaire answers in it for results and findings.

☑ Progress on the aims set at last meeting

☑ Agreed aims for next meeting

All results ready to decide on the research focus and start writing the dissertation.

Student's signature: 

Supervisor's signature: 

Meeting 4 Date: 29/02/2024

Summary of discussion:

Literature review meeting, introduction to different literature based on the paediatric medicines and children's knowledge on medicine.

☑ Progress on the aims set at last meeting

☑ Agreed aims for next meeting

To start literature review and gather references

Student's signature: 

Supervisor's signature: 

Meeting 5	Date: 14/03/2024

Summary of discussion:

Discussing data analysis and results after plotting everything into Microsoft Excel.

Introduced SPSS for analysis (If appropriate) and distinguished between different questions from questionnaire.

☑ Progress on the aims set at last meeting

☑ Agreed aims for next meeting

To work on the results and arrange by a software throughout the easter break and add it to the dissertation as a draft

Student's signature: 

Supervisor's signature: 

Meeting 6	Date: 25/03/2024

Summary of discussion:

Discussed Abstract , word count and layout of the dissertation individually and spoke about the aim of the research and chose a title for the research.

☑ Progress on the aims set at last meeting

☑ Discussion of poster draft

☑ Agreed aims for submission and sending draft for feedback

Student's signature: 

Supervisor's signature: 

Meeting 7	Date: 19/04/2024

Summary of discussion:

Discussed methodology and discussion, added new references, and made sure that they are relevant for the study, checked if I am on track and set aims for continuing.

☑ Progress on the aims set at last meeting

☑ Agreed aims for next meeting

Student's signature: 

Supervisor's signature: 

Meeting 8 Date: 25/04/2024

Summary of discussion:

Started with the poster, summarized most findings and discussed important references to add to the poster.

☑ Progress on the aims set at last meeting

☑ Agreed aims for next meeting

Student's signature: 

Supervisor's signature: 

Meeting 9 Date: 29/04/2024

Summary of discussion:

Poster meeting discussed main outline of a poster and how to add references of a poster. Used examples of Moodle to get an idea of how poster should look like. Gave final feedback for submission.

☑ Progress on the aims set at last meeting

☑ Agreed aims for next meeting

Student's signature: 

Supervisor's signature: