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Design and Evaluation of a "Pharmacists in Schools" Community Outreach Programme: A Pilot Study.

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Abstract

Aims: To design, evaluate and pilot a novel programme that would allow school children to become "pharmacists for the day", encouraging them to recognise the importance of science, to contribute to the Department of Health's Building the Community Partnership strategy and University Outreach to the community and to provide undergraduate pharmacy students with teaching experience and an opportunity to build their CV.

Methods: Concept and formulation development, branding work, schools visits, questionnaires and semi-structured interviews.

Results:

Suitable formulations were developed and prepared by school children on visits to their schools. The children seemed to enjoy the experience and their teachers gave both positive and constructive feedback. Pharmacy undergraduate students felt they had gained valuable experience that will benefit their future careers.

Conclusion:

The Pharmacists in Schools outreach programme has now been successfully piloted and launched and will now be fully implemented in 20 schools in the local community.

Keywords: *Pharmacy, Science Engineering and Technology, School children, Community outreach*

Introduction

It is well known that the skills of the workforce are critical for productivity and the long term prosperity of the UK. The ten-year science and innovation investment framework, published jointly by HM Treasury, DTI and DfES in 2004, acknowledges the importance of ensuring a healthy supply of people with science, engineering and technology (SET) skills if the UK is to improve upon its already strong science base. It was stated that "These skills will be vital in helping to achieve the ambition of making Britain the most attractive location in the world for science and innovation" (Department of Trade and Industry, 2006).

In meeting the ambitions of the ten-year framework, it was recognised that there is a need for a strong supply of individuals with qualifications in SET subjects. All parts of the education system undoubtedly have a role to play, from the Key Stages of compulsory education through to post-16/ further education and higher education. The Government has already introduced a range of policy initiatives to promote SET study and the framework intends to monitor progress on an annual basis. Concerns have frequently been raised within the UK, US and other developed nations about the supply of SET skills and an apparent decline in interest to study these subjects.

In 2004 there were 2.1 million first degree graduates living in Britain with SET subjects. This is an increase of 57 per cent from the 1.3 million observed in 1997 (Department of Trade and Industry, 2006). The growth in the numbers graduating with SET degrees may only be sustainable if sufficient numbers are acquiring SET qualifications at other levels. Statistics on entries and passes for A levels and GCSE show that the number of passes in A level SET subjects has remained fairly constant over the last ten years, but passes in SET as a proportion of all A level passes has declined (Department of Trade and Industry, 2006).

Demand for higher level skills has been rising and is expected to continue. Employment levels in SET occupational groups are expected to grow faster between 2004 and 2014 than the growth rate across all occupations. There will be considerable requirements for graduates in these occupations, not only to fill the predicted expansion in employment, but also to replace existing workers. If current trends continue, the supply of SET graduates would appear to be on course to maintain the contribution that graduates make to these

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occupations. However, the ambition to raise R&D expenditure is likely to generate an even larger requirement for SET graduates that is not factored into existing forecasting work (Department of Trade and Industry, 2006).

There is not currently a shortage of qualified pharmacists in the UK and Pharmacist unemployment is currently at around 5% (Seston & Hassel, 2009). The number of Schools of Pharmacy in the UK is now 27, meaning a true shortage of trained pharmacy graduates is unlikely in the sector as a whole in the near future. However, the scientific skills and expertise exist in Schools of Pharmacy to make a significant contribution to encouraging school children to consider studying SET subjects at important stages in their development. Moreover, Queen's University Belfast is committed to using its knowledge and resource base to reach out and make a valuable contribution to the local community (Queen's in the Community, 2009).

Aims and objectives

The aims of this work were:

1. To design, evaluate and pilot a novel programme that would allow school children to become "pharmacists for the day", making up simple medicines according to prescriptions for fictional patients, labelling the medicines and dispensing them for their teachers

2. To encourage the children to recognise the importance of science and SET subjects to their daily lives and to show them how science can be interesting and good fun!

3. To contribute to the Department of Health's Building the Community Partnership strategy (DHSSPS, 2009) by educating school children about the role of the pharmacist in the community in providing advice on safe and effective use of medicines and in promoting healthy lifestyles

4. To utilise skills available in the School of Pharmacy to contribute to the local community though an innovative outreach programme

To provide undergraduate pharmacy students with the opportunity to become involved in community outreach, gain teaching experience and contribute towards a "Degree Plus" Award (Queen's University Belfast Degree Plus Award, 2009).

Materials and Methods

Chemicals

All other chemicals used were generally-regarded as safe (GRAS) and of analytical reagent quality (Appendix 1).

Products

When designing products to be made by the children, discussion within the Working Group decided upon the following criteria:

1. The products had to be safe, in that no unduly hazardous chemicals or procedures were involved

2. They had to be relatively simple to make, with a limited number of ingredients

3. The product should be able to make quickly (within around 30 minutes)

4. They had to be easy for children to relate to

5. They needed to emphasise an important aspect of science and/or pharmaceutical practice

There needed to be some variety so that all children in a group would not make the same product

The first product that we decided upon was a cream that had to be diluted to make it suitable for application to a child's skin. The second was a tablet formulation that has to be crushed and suspended in a liquid so that it could be given to a baby. The third product was a colourful mouthwash based on the popular Dentyl pH^{Ò} brand.

Oral Presentation

An oral presentation was devised, including PowerPoint slides to be delivered at the start of each session. This detailed the role of the Pharmacist in the community as the "expert on medicines" and the "scientist on the high street" and outlined the advice on safe and effective use of medicines and the maintenance of health lifestyles. The importance of science to our everyday lives and the role of science in making medicines was also incorporated. The presentation concluded with an overview of what the children would do.

Branding

It was decided to apply distinctive branding to the programme, with a representative logo, to use in promotional materials and publicity. The Media Services Department at the University were contacted and an experienced graphic designer produced an eye-catching logo. This was then used to brand a pull-up display stand, promotional leaflets, pens and a squeezable stress ball in the shape of a tablet. The pens and "stress tablets" (Partridge Peartree Promotions, Derry, UK) were to be given to the children as souvenirs of their participation in the programme.

Recruitment of Schools

It was decided to make the programme accessible to children of all abilities in the 8-14 age range. Consequently, a number of schools (25) in the three major school groups in Northern Ireland (Primary, Secondary and Grammar) were contacted by mail inviting their participation. Letters of invitation were accompanied by the promotional leaflet. Schools responding positively were visited by a team consisting of one Pharmacist member of academic student, three members of technical staff involved in teaching extemporaneous formulation & dispensing to undergraduate students and two pharmacy students. These schools were used to pilot the programme, provide feedback and highlight areas for improvement.

Recruitment of Pharmacy Students

All Level 3 Pharmacy students were contacted *via* an email circular and invited to an information session outlining the Pharmacists in Schools programme. The purpose of involving

the students was to give them the opportunity to become involved in community outreach, gain teaching experience and contribute towards a Degree Plus Award (Queen's University Belfast Degree Plus Award, 2009). This Award is a new initiative by Queen's University Belfast designed to provide official recognition of extra-curricular activities and achievements. The Award is open to all full-time undergraduate students and they receive the Award alongside their degree when they graduate. The Award is intended to allow graduates to demonstrate to prospective employers that they have the skills needed for workplace success. Many activities students participate in (eg serving as a Course Rep, part-time jobs, voluntary work) may allow students to acquire important employability skills, such as teamwork, leadership, communication and commercial awareness. The Degree Plus Award allows these skills and this experience to be formally recognised. It was felt within the working group that involvement in Pharmacists in Schools would allow our students to contribute towards a Degree Plus Award. The programme was registered on the Degree Plus database.

Assessment of the Programme

In order to obtain the relevant information from schools who had participated in the pilot of the programme, a self-completed questionnaire and a covering letter was sent by email to the teacher contact. A reminder was sent to non-respondents after 14 days and again after 28 days. Responses were received by email or post and treated anonymously. Local ethical committee approval was obtained in each case prior to distribution of questionnaires.

Each questionnaire was based on a series of set questions but did, however, include a section for respondents to add free text (additional comments) regarding the subject matter of the investigation. Free text sections of questionnaires allow respondents an opportunity to express thoughts, beliefs and opinions relevant to the survey (Taylor *et al.*, 2004). Such data are effectively documentary data and belongs to a qualitative research tradition (Scott 1990). However, free text can offer insights which place the quantitative data in context. Here the free text was used to place the quantitative data into some form of broader context, allowing expression of teachers' views on the programme. Numerical data from each individual questionnaire was entered into Microsoft Excel, which was then used to construct frequency distributions and compile tables.

In order to ascertain views of the undergraduate students a qualitative method was used. Semi-structured interviews were carried out. The interviews were carried out by PMcC. Topics covered in the interview schedule included:

- Students' perception of the aims of the programme
- How it has influenced their career choices for the future
- Skills achieved through the programme
- How participation has helped with their undergraduate studies
- Feedback on their perceived benefits for the children taking part.

Emails were sent by PMcC to Level 3 Pharmacy Students who had taken part in the Pharmacists in Schools programme, inviting them to take part in an interview and a brief description of the aims and objectives of the research was provided. The subjects replied and a suitable time was arranged for the interview. Interviews were carried out in a tutorial room within the School of Pharmacy, with no other persons present. The interviews were conducted in January 2010 and lasted 15-45 minutes. Saturation was considered to be the point at which no new issues were raised, and this was reached by the end of all interviews conducted. Interview data were audio-recorded with the participants' permission and fully transcribed. Transcriptions were read and re-read to enhance familiarity with the content. The transcriptions were checked independently against original recordings by a second researcher (RD) to minimise investigator bias. Transcriptions were analysed as the interviews progressed and emergent themes and theories were identified.

Results and Discussion

Development of Products

When considering the best range of products to use in the programme, thought was given to different types of formulation, ease of manufacture, safety of materials used and relevance to products used in practice. Importantly, it was decided to make products that might be prescribed for, or given to, a child. Formulations were chosen with different routes of drug delivery, namely topical, local and systemic.

The topical formulation chosen was a proprietary cream diluted with a base cream chosen from the National Pharmacy Association (NPA) Diluent Directory in effect at the time (June 2008). Betnovate^{Ò} Cream diluted with Aqueous Cream BP was used. This is a topical corticosteroid, used to treat inflammatory skin conditions most children were likely to be familiar with, such as, eczema, insect stings and contact dermatitis.

The local formulation chosen was a mouthwash based on the proprietary Dentyl pH^{Ò} brand. This is a two-phase liquid which must be shaken before use. After swirling in the mouth it is spat out after 30 seconds. The theory is that bacteria and cellular debris are removed by the hydrophobic isopropyl myristate and are then visible in the sink, taking the colour of this phase in the product. It is alcohol free, has anti-bacterial properties and contains fluoride. The simple science and widespread advertising and availability of Dently pH^{Ò} made this a choice that we felt children would be able to relate to.

The systemic formulation chosen was a suspension made from crushed vitamin tablets, namely thiamine 50 mg. In the Revised Curriculum (Northern Ireland Curriculum, 2010), school children in Northern Ireland are taught of the need of vitamins in a healthy diet and that deficiencies can lead to health problems. The product was also chosen to explain that sometimes children (and some adults) are unable to swallow tablets. Where no suitable liquid preparation is available, the pharmacist has to use their scientific knowledge to make an individualised medicine especially for that person suing their scientific knowledge. This product also provided opportunity to explain the need for colours and flavours in liquid

medicines in order to encourage patients to take them as prescribed.

Prescriptions for fictional patients were prepared for each product. An accompanying hospital letter was also prepared for the thiamine product to illustrate the directions often sent to community pharmacists about specialised medicines by their hospital counterparts upon patient discharge. Control of substances hazardous to health (COSHH) forms were prepared for each product to be given to each class teacher in the schools to be visited.

Visits to Schools

Ten schools replied (40% response rate), stating that they were interested in participating in the scheme. Four of the schools were grammar schools, four were primary schools and two were secondary schools. In Northern Ireland, primary schools are attended by children of all abilities. In second level education, up until 2009, children were selected for grammar schools based on performance in the 11-Plus exam, a test based on verbal reasoning, mathematics and science, taken during the last year of primary school (Wikipedia, 2010). Children not selected for grammar school attend a secondary school.

Dates for visits were arranged with teachers and the Pharmacists in Schools team then arrived at the schools on the agreed dates. The children in the primary schools were in the 10-11 age group. Those in the secondary and grammar schools were in the 11-13 age group. The children in the grammar schools were all members of the lunch time or after-school "Science Clubs", run by science teachers for children with a particular interest in science, where enjoyable science-based activities take place on a weekly basis.

Each session began with the children putting on white coats, blue nitrile gloves and safety glasses. The importance of safe working and respect for chemicals was emphasised during this time. The oral presentation was then made and the children divided into groups to work with a member of academic staff, a pharmacy technician or an undergraduate pharmacy student.

The children then, guided by a staff member or student, worked together to read a prescription for a fictional patient with, in the case of the thiamine product, an accompanying hospital letter detailing how to make the product for the patient. The children then prepared the product and labelled it using proprietary pharmacy labelling software (MPS, McLernon Computers NI Ltd, Saintfield, UK). The children then took on the role of the Pharmacist, advising their teachers, who played the role of the patient, on safe and effective use of the "medicines" they had just made.

The children appeared to enjoy their experience, as evidenced by their response to informal questions from their teachers during the session and their general demeanour while participating in the various activities. The programme can be seen in action in a promotional film made by the University's Media Services Department, available at: http://www.mediator.qub.ac.uk/ms/streams/Pharmacists.wmv for Macs and http://www.mediator.qub.ac.uk/ms/streams/Pharmacists.mov for PCs.

Tables 1 and 2 detail the responses of the teachers to the assessment questionnaire distributed to them after the session.

Table 1. School responses to assessment questionnaire (*n* =10).

1.Children are now more aware of the different roles carried out by Pharmacists

Agree (100%) Disagree (0%) Neither Agree nor Disagree (0%)

2. Children are now more aware of the health promotion activities carried out by Pharmacists in the community

Agree (70%) Disagree (0%) Neither Agree nor Disagree (30%)

3. Children are now more aware of the role of scientific knowledge in the profession of Pharmacy

Agree (100%) Disagree (0%) Neither Agree nor Disagree (0%)

4. Children enjoyed preparing medicines according to a prescription

Agree (100%) Disagree (0%) Neither Agree nor Disagree (0%)

5. Children enjoyed playing the role of Pharmacists in "dispensing" a prescription

Agree (100%) Disagree (0%) Neither Agree nor Disagree (0%)

6. The Pharmacists in Schools Programme is a worthwhile exercise with respect to encouraging children's interest in science

Agree (100%) Disagree (0%) Neither Agree nor Disagree (0%)

Table 2. Examples of free text responses from teachers completing the assessment questionnaire.

"A very interesting and enjoyable morning was had by the pupils".

"The children are now familiar with the role of pharmacy and the pharmacist in the community".

"The pupils thoroughly enjoyed their experience with the pharmacy team. They broadened their perception of what pharmacy involves and peaked their interest in this branch of science"

"Thought should be given to the language used in the introduction to year 8 pupils (11-12 year olds) in a secondary school. Some will have a limited knowledge of scientific/ career words".

"The visit was an excellent opportunity for the pupils – very enjoyable and worthwhile. Queen's University Belfast School of Pharmacy staff were highly organised and professional".

Undergraduate Students

Research interviews are used to gather information from individuals. In particular, when considered responses are required and the researcher wishes to have the opportunity to explore the contexts, rationale and details of the interviewees' responses [1]. Such methods have been previously employed to ascertain views of undergraduates students on matters such as the value of the Level Four Project (Vosper, 2009), industrial pharmacy (Kirby-Smith, 2008) and diversity amongst international pharmacy students (Norris, 2007).

In the present study, the interview methods used were very successful in ascertaining opinions and views of undergraduate Pharmacy students who worked on the Pharmacists in Schools programme. When initially told about the programme, the undergraduate students believed this was an innovative scheme, a good opportunity to promote science and to change the view of the public to the role of the pharmacist, as illustrated by the comments of those who participated in the scheme. Examples of these are given below.

"I thought it was a very good concept... there's a misconception of what people [pharmacists] do... So it's good to get out, and from an early age to change the conception to what people think of Pharmacy and to show them it's a lot wider and more varied than what most people would think".

"I thought it was something new and a good way of making a school child more interested in science and think about doing Pharmacy or something related".

"It lets them interact and become more interested in science. So it's not that they think of the biology and chemistry as separate entities but they can integrate it all together and apply it to Pharmacy".

As the latter quote illustrates, the undergraduate students believed that the programme allows school pupils to apply science to a particular career. This highlights to the child the importance of learning the theory behind science in order to apply it at a practical level to a particular job, in this case Pharmacy.

Undergraduate students were asked about careers they had considered. After taking part in the programme, those who had considered teaching or an academic career were convinced that this was the right career path to pursue after graduating. Those who had not considered such a career choice were now considering it as an option. Accordingly, this programme may help broaden the mind of undergraduate students and encourage them to realise that there will be a variety of career options available to them upon qualification.

"Doing different things such as the Pharmacists in Schools has interested me... There are so many different options and variations of what you can do as a Pharmacist. You're not pigeon holed into one career".

"I hadn't thought about a career in teaching/academia in the past... [but since attending the Pharmacists in Schools event] I would consider it".

Undergraduate students expressed enjoyment in the experience and found the staff members approachable and welcoming. The following comment illustrates that some students felt they were part of the "teaching team" rather than being "just a student".

"I found them [the Pharmacists in Schools team] very friendly and helpful...considered me as a colleague rather than their student".

The undergraduate students believed the experience had benefited their communication and demonstration skills, which are important for pharmacists and pharmacy students (Coffey, 2005; Stupans, 2009). Whether counselling a patient on how to take their medication in a community setting or teaching undergraduate students in a lecture theatre or laboratory, good communication are vital. The students believed that taking part in this programme has enhanced these key skills, and in turn, encouraged them to become 'better Pharmacists'. The below comments highlight the valuable experience the undergraduate students found the

programme to be.

"I was able to break down the skills needed...to pass on to the students. I learnt how to communicate effectively in a language that they would understand. Pharmacy has very technical language so [it was important] to be able to translate it into an easier, understood language. I benefited from that and I can apply these communication skills in other areas".

"It was good for confidence. Interacting with young people helped with communication skills. It was a good chance to learn".

It is clear that the skills acquired on the MPharm Degree course can help the students when participating in the Pharmacists in Schools Programme. The undergaduate students believe that oral presentations have helped them build up sound communication skills as well as confidence when speak to an audience.

"In first year we did a lot of presentations and communication. Level 2 extemporaneous dispensing...if I hadn't done (it) I wouldn't have known where to start. Undergraduate studies helped build up confidence to communicate with the children".

Likewise, the Pharmacists in Schools programme may help enhance the skills required for the undergraduate course and Pre-Registration Year, which are outlined in the Pre-Registration Portfolio (Pharmaceutical Society of Northern Ireland Performance Standards for Pre-Registration Students, 2010). The students found the programme particularly useful for professional classes, such as pharmacy practice and responding to symptoms. In these classes, students have to deal with fictional patients and need the ability to communicate effectively to the patients, in a simplified language so that they can understand, avoiding the use of technical jargon. The following comment demonstrates this belief:

" It helped build up skills required for Pharmacy Practice and Responding to Symptoms and of course Pre-Reg... talking to people who are not familiar with the technical language..."

Undergraduate students considered this a good learning opportunity and would recommend it to all undergraduate students. The comments below illustrate their belief that the programme is beneficial to all undergraduate students, not just those intending to pursue a career in academia or teaching. They also believe that the programme could be particularly beneficial to students less confident speaking to an audience and, indeed, to patients.

"It would be beneficial for different students to go out each time to get an idea of what is involved...all [the] practice helps when it comes to making you a better Pharmacist in the future".

"There are students who are more nervous but the only way to overcome this is to practice... this programme would definitely help their confidence, especially since there's no pressure on you".

Undergraduate students were aware that participation in the Pharmacists in Schools programme could contribute to the Queen's University Belfast Degree Plus Award.

"Passing on skills such as communication and teamwork developed through the degree to younger students and giving them a boost in what they are doing… Going out to interact with these students as part of this programme lets them see what is available at Queen's…. The Degree Plus Award allows these skills and this experience to be formally recognised. To actually get a certificate and get 'that plus'... 'That plus' means everything when applying for jobs in the future".

Queen's in the Community is an outreach programme with the aim to *enhance the University's contribution to the educational, economic, cultural and social life of Northern Ireland (*Queen's in the Community). Queen's University is keen to engage with young people to show them that higher education is something that is fun, exciting, accessible to them and will enhance their lives. The undergraduate students were of the opinion that Pharmacists in Schools has a key role to play in achieving the aims of the outreach programme.

"The community as a whole has a misconception of Pharmacy and Pharmacists. Standing behind a counter and handing out tablets... going out into the community gives an idea or shows them Pharmacy isn't all about this… It raises awareness and profile of the profession and of course, our University".

The undergraduate students were all of the opinion that school pupils thoroughly enjoyed the experience. The practical nature of the session encouraged them to take an active role in the formulation and dispensing of a medicine for a fictitious patient. They realised the professional role of a Pharmacist and behaved accordingly.

"I think they enjoyed putting on the lab coats and the gloves and actually getting to make something because it was so interactive they really enjoyed it".

"You could tell they were quite pleased with themselves acting in a professional manner with their white coats and

gloves on…"

Not only did the school children seem to enjoy the session, but they gained experience in many skills, such as team-work and communication skills. School children worked in groups of two or three and, therefore, team-work and communication was perceived by the undergraduate students to be an important aspect of the work.

"Working with each other helps them build their teamwork skills and their communication skills are improved through communicating with each other".

"It made them more confident speaking to their teacher…they were dispensing a product to her".

The undergraduate students all agreed that this programme was an excellent means to stimulate an interest in science in school pupils. The interactive and practical nature of the session allowed them to see science as not just theory, but it can be, and is, applied in every day professions, such as Pharmacy.

"They realise that you don't learn biology for one thing and chemistry for another but its integrated together and comes together for a lot of different careers such as Pharmacy and medicine".

The undergraduate students found it interesting to note that some school pupils who initially showed a lack of interest were the students who became most involved in the practical session and were most eager to participate and learn. This is illustrated by the comment:

"A few admitted they didn't like science and were just there because it was compulsory. They were the students who came to the fore of the class and stood-out as enthusiastic in all parts of the class, which was a shock".

Undergraduate students believed that this programme may motivate some children to work harder at science. After the programme, they may show more interest in a particular career, such as Pharmacy, realise the high entrance requirements and, in turn, focus their attention to science-related subjects and achieving as high a grade as possible.

"When they may realise the high entrance requirements for Pharmacy and they will appreciate they will need to work harder at science if they are to achieve the grades required for such a career".

The school teachers gave positive feedback to the undergraduate students. The teachers seemed to find it beneficial for students to take part.

"The teacher (said) she hadn't seen them interact like that for quite a while because normally she's standing trying to teach them biology and she didn't get their attention like that… she was quite amazed at them all taking part. So she was pleased when she saw them interacting together as a class and in their groups, nobody was isolated. She was pleased that they were willing to take part because sometimes during practical classes one would sit down and the other student did the work, whereas with this everyone took part which was good to see".

"The teacher was pleased with the fact that the students could come and talk to her, as their patient and she was able to interact with hem in a different capacity".

All school children and pharmacy undergraduate students participating in the programme were given a certificate in order to recognise their achievement, with the school children "awarded" their certificates in a mini "graduation" ceremony. Photographs were taken, with the prior permission of the children's parents and used on the website of each individual school. Reports appeared in the local newspapers and in the school newsletters to parents in each case.

Conclusion

Based on the demeanour of the children during the programme and the opinions of their teachers, it can be said that our aims were achieved. Some alterations have been made, however, in order to tailor the programme to the differing ability levels of children in primary secondary and grammar schools. We believe the fully-developed programme is now an extremely useful tool to inform school children about the role the pharmacist plays in the community and the scientific nature of pharmacy. It is hoped that, by emphasising the importance of science to children's everyday lives in a "hands-on", practical and fun environment at an early stage in their development, they will consider studying SET subjects as their education continues. The undergraduate pharmacy students clearly enjoyed their involvement in the programme, which gave them an opportunity to augment their CV by contributing towards a Degree Plus Award. This may prove to be of further benefit should pharmacist unemployment grow significantly. The students believed that the programme enhances skills, such as team-work and communication among school children and their own communication skills. These skills are essential not only in the undergraduate MPharm degree, but also when working as a Pharmacist (Silverthorne, 2009). The students regarded the programme as a useful learning experience, one that all undergraduate students could benefit from. They also considered the programme to be a useful tool to promote science in schools and to encourage children, at an early age, to consider science-based careers, such as Pharmacy in the

future. They felt that programme may help to increase the public's knowledge of the varied roles undertaken by Pharmacists. The programme was officially launched in December 2009 (Donnelly, 2010) and will now be expanded to allow visits to 20 local schools.

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Appendix 1. Chemicals used to manufacture the products.

Aqueous Cream BP (APS) and Betnovate® cream, (betamethasone 0.1% w/w, GSK), pink colouring (Amaranth Solution BP), Concentrated Cinnamon Water BP, Thiamine 50 mg tablets (Zanza Healthcare), Purified Water BP and Blackcurrant Syrup BP (AAH Pharmaceuticals, Belfast, UK).

Dentyl pH® exhilaration icy-fresh cherry and Dentyl pH® exhilaration icy-fresh mint, "triple defence" mouthwashes, food colouring, Blue, Super Cook®,and food flavouring, peppermint, Super Cook®.

Violet colouring, saturated solution made in house:

D and C Violet No 2 (The Soap Kitchen, Devon, UK) in ethanol denaturated 99.6% (Aldrich, Dorset, UK)

Isopropyl myristate 98% (Aldrich, Dorset, UK).

Keltrol® suspending agent, 0.4% w/v, (Victoria Pharmaceuticals, The Royal Hospitals, Belfast, UK).

Appendix 2. Methods of Preparing the Products

The Cream

Ingredients

Betnovate® cream 10g

Aqueous Cream BP 10g

Method

- Weigh each cream in a plastic weighing boat on a top pan balance
- Place each cream on a clean white tile and mix together with a palette spatula

The cream is then packed into a brown plastic pot, labelled and placed in a bag

The Mouthwash (Pink)

Ingredients

Isopropyl Myristate 20 ml

Purified Water 80 ml

Violet Colour 4 ml

Pink Colour 2 drops

Cinnamon Flavour 2 ml

Method

- Measure 20 ml of isopropyl myristate in a 50 ml graduated cylinder. Add the violet colour using a plastic dropping pipette
- Measure 80 ml Purified Water BP in a 100 ml graduated cylinder. Add the pink colour *via* a plastic dropping pipette
- Pour the contents of both cylinders into a 100 ml clear, round, medicine bottle
- Add the cinnamon flavour *via* a plastic dropping pipette directly into the bottle.

Fit a child resistant cap, shake the bottle, label and place in a bag with a measuring cap

As an alternative, a blue colour may be used instead of pink and peppermint flavour instead of cinnamon to mimic the "Ultra Clean" Dentyl pH^{Ò} product.

The Suspension

Ingredients

Thiamine 50 mg Tablets 10 tablets

Blackcurrant Syrup BP 10 ml

Keltrol® Suspending Agent to 100ml

Method

- Tare a 100 ml medicine "flat" bottle with Purified Water BP
- Measure 10 ml of Blackcurrant Syrup BP in a 10 ml conical measure
- Measure about 90 ml Keltrol® in a 100 ml conical measure
- Count out 10 tablets using a triangular tablet counter
- Place in a small mortar and crush gently with a pestle
- Add small quantities of Keltrol® to the mortar to make a smooth paste
- Continue to add Keltrol® until the paste is pourable
- Pour into the tared bottle *via* a plastic funnel
- Add the Blackcurrant Syrup BP. Rinse the measure with Keltrol® and add to the bottle
- Make up to the mark with Keltrol®

Fit a child resistant cap, remove tare mark, label and place in a bag with a 5ml spoon.