



June 2018

Level 3 National in Applied Science Unit 7: Contemporary Issues in Science (31629H)



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Grade Boundaries

What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, at Distinction, Merit and Pass.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark is for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each assessment, because then it would not take accessibility into account.

Grade boundaries for this, and all other papers, are on the website via this link:
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Unit 7: Contemporary Issues in Science

Grade	Unclassified	Level 3			
		N	P	M	D
Boundary Mark	0	7	15	24	34

Introduction to the Overall Performance of the Unit

The learners' answers exhibited a range of abilities and a range of degrees of preparation. A significant number of responses indicated that learners had not made the best use of their preparation time.

Some learners had misinterpreted some of the questions, reflecting possibly a lack of preparation within their centres.

There was variation in the literacy ability of the learners but overall the quality of written communication was good and subsequently many of the responses were a pleasure to read.

In some cases poor handwriting made it difficult for markers to follow the lines of reasoning being presented by the learners.

Some responses indicated a suitable amount of preparation, good understanding and a high degree of literacy.

Individual Questions

Question 1. Discuss the implications of the scientific issue identified in the articles. (12 marks)

Learners were not always clear about identifying the implications of the issue (antibiotic resistance) and some were less able to fully explain the impact by linking the implications to economic, social, ethical and environmental factors. Weaker learners simply described material from the articles, often not using all three articles; they demonstrated limited understanding of the issues or impacts and their discussions often lacked structure. A significant few showed a lack of understanding by talking about people being resistant to antibiotics or to bacteria being immune to antibiotics. Although this paper aims to test understanding of content in articles, rather than specific biology knowledge, these errors demonstrated a lack of scientific literacy among some of the learners.

Some learners thought that bees have to be killed in order to obtain honey.

Some learners approached the task rather mechanistically by listing either the article number or the factor as a sub-heading, thus indicating a lack of ability to synthesise the information across all three articles. Some learners did not read the question carefully and did not make reference to all three articles. Some learners completely failed to identify any factors and submitted responses that consisted of long quotes or précis from the three articles.

In the response shown below the learner has referred to all three articles but is a little confused in places, such as the suggestion that antibiotics used for animals means there are less available for use on humans and that people become resistant and can pass the resistance to each other. The learner has attempted to draw links by referring to the financial implications of treatment costs and costs of research to find new antimicrobials. The learner has also attempted to make links to social and ethical factors. The discussion shows some structure and coherence. This response was awarded bottom of level 2, with 4 marks.

1 Discuss the implications of the scientific issue identified in the articles.

(12)

The scientific issue discussed in all three articles is the effect of antimicrobial resistance. Antimicrobial ~~resist~~ resistance is when Bacteria forms a strain of resistance against antibiotics. If the bacteria is resistant to all forms of ^{antibiotics} ~~Bacteria~~, it is known as a super-bug. All three articles discuss the ^{implications} social, ethical, environmental and the economical ~~effects~~ of antimicrobial resistance

A social implication discussed in Article 1 is about the over use of antibiotics for minor ^{Infections} ~~problems~~ such as a flu, or a cold. The more antibiotics prescribed, the higher the chance of resistance but not many know about this issue, which means antibiotics are used, ^{neglecting the use of} ~~instead of~~ other types of treatments such as herbal medicines. The more antibiotics used, the more money required to do research and find new types of antibiotics, to fight against antimicrobial resistance. Similarly, Article 2 mentions about the increase ~~of antibiotic use~~ in use of antibiotic from 2000 to 2010 (36% increase). Less use of antibiotics will prevent further resistance from occurring.

~~An environmental implication~~ Life expectancy is decreasing for people who require antibiotics to fight against ~~the~~ infections. This is due to the resistance caused by the overuse of antibiotics. ~~on unnecessary~~ unnecessary conditions. This is an environmental implication as it affects everyone globally, ~~potential~~ whether it is the present or the future. People who have the resistance may pass on the resistance to other people as bacteria such as E. coli is highly contagious and is known to cause more than 3000 deaths a year.

Antibiotics are used on animals such as cattles rather than humans who urgently need it. This ~~is an~~ ^{is an} ethical implication. This can be ethically wrong due to the increase in resistance and the ~~as~~ as people who require it may not be ~~able to~~ ^{with} provided the suitable medication required to tackle against the infection they have. This can lead to an increase in the number of deaths as less people are treated due to the increase of resistance, ~~by~~ as animals are treated rather than humans. This can also be ~~an~~ a positive environmental implication as the ~~man~~ ~~the~~ decrease in population will decrease the number of people requiring the antibiotic, thus decreasing the chance of resistance. The more antibiotics used, the less effective it becomes for all users. This can also be a problem as some sufferers are rejected against the chance of using antibiotics.

A ^{financial} ~~social~~ implication discussed in article 2 is about the treatments costs ~~and~~ for antimicrobial resistance. ~~The amount of people~~ The increase in the number of people who are currently suffering from major infections that are resistant to antibiotics ~~is~~ is leading to a ~~major~~ major increase in costs, as more people are required to ~~remained~~ remain hospitalised ~~compared~~ to for a longer period of time. ~~Instead of treating people who have~~ Instead of treating people who have minor infections such as skin disorders, ~~however~~ honey has been ~~tested~~ dermatologically tested, ~~the~~ ~~research~~ which shows results that it is potent to antimicrobial resistance, as stated in article 3.

High scoring candidates demonstrated comprehensive knowledge and understanding of the scientific issues and structured their discussions by selecting and using relevant material from all three articles. They produced coherent and logical accounts and discussed links to and between the factors.

The response below has selected relevant information and developed a discussion that draws a good range of links to and between ethical, social, environmental and economic impacts. There is some confusion about how antibiotics are used in agriculture and in

places the discussion lacks some coherence. This response is just into band 4 with 10 marks.

1 Discuss the implications of the scientific issue identified in the articles.

(12)

The scientific issue that is discussed in the articles is resistance to antibiotics. The ethical impact applies to people's and the environments welfare. In article one, the ethical impact lies between the facts of GP's giving out too many antibiotics and the health of the general public. This is an ethical issue because it was found that 1 in 16 people develop infection from staying on an NHS ward due to poor hygiene from the staff / or dirty equipment. In total around 5,000 deaths will happen due to this, and it contributes to 15,000 deaths per year. This could be happening because GP's are being told not to give out as many prescriptions, which can lead to further infections. This can tie in with the economic impact. Prescriptions have gone from 37.2 m in 2006 to 41.7m in 2014. This costs the NHS a lot of money. However, the more antibiotics needlessly prescribed, the more the resistance builds up. This is a very big issue as

there is not much money being invested into research and development of new drugs for antibiotics. Jennifer Cohn from Doctors without borders agrees that the resistance has been a big issue for areas such as Niger and Syria.

In article two, very similar information is discussed, such as the global usage of antibiotics increased by 36% from 2000-2010, from just humans alone. Animal antibiotic use is expected to rise by 67% from 2010-2030. In Europe, it's found that there are more than 25,000 deaths per year, due to ~~resist~~ resistant bacteria, which has cost up to €1.5bn. This is both a economic and ethical impact because the more resistant bacteria gets, the more peoples lives will be lost and more money will be spent on trying to help people recover. In the united states, it costs around \$55 bn to help patients with ~~anti~~ bacteria resistant illnesses, due to having to have longer expensive treatment and hospitalisation.

A social impact discussed in article one

would be that children could die from falling off their bike and getting an infection or that hospital operations could become deadly. This could make people become anxious about going outside or even just visiting a hospital. However, in article three, it's discussed that honey could be used to heal topical wounds, so it reduces the risk of infection spreading. However this is ~~the~~ an environmental impact as well because bees are endangered so not a suitable source to rely on for treatment. An environmental impact discussed in article two, is that antibiotics are used for agricultural growth in the US (70% of all antibiotics). This is a risk as crops may not grow as fast or more likely to develop diseases which can damage the food supply. An ethical issue in article two is that only a third of children receive antibiotics they need for pneumonia, it accounts for 15% of deaths in children under five. Jennifer Cohn found that the resistance was affecting children in Niger in ~~nutrition~~ nutrition centers.

Question 2. Identify the different organisations/individuals mentioned in the articles and suggest how they may have an influence on the scientific issue. (6 marks)

Most learners identified some organisations with a great many identifying WHO, NICE, FAO, WTO NHS and the UN. Individuals such as Dame Sally Davies, Keiji Fukuda and Danilo Lo Fo Wong were most often mentioned, although in many cases the learners did not demonstrate an understanding of the roles of these individual and how they might exert influence on the issues. In some instances learners struggled to be discerning with the individuals they quoted and made unnecessary and ineffective references to many individuals referenced in the studies in article three. Many learners were also not clear about how the various organisations could influence the development of ideas on the issue by, for example, carrying out research or by influencing political policy worldwide. Some learners demonstrated that they had used their preparation time well and investigated which organisations were governmental, NGO, national or worldwide and some learners also showed understanding of how organisations and individuals could have an influence.

The response below identifies the WHO but the reference to its influence is very basic. The response also mentions an individual and two other organisations but there is little explanation and the knowledge shown is only just adequate for bottom of band 1 and was awarded 1 mark.

2 Identify the different organisations/individuals mentioned in the articles and suggest how they may have an influence on the scientific issue.

(6)

In ~~article~~ article 1, ^{one of} the individuals mentioned was Dr. Keiji, who is a World Health Organisation assistant director ~~of the~~ for Health security. They have an influence on the scientific because ~~at~~ the job-positioned is a high one and therefore people will listen and take into consideration what is being said.

Also, in article 1, the organisations mentioned are; WHO, University of Birmingham, NICE (government body). All of these organisations mentioned are all considered as one of the top researchers. University of Birmingham is part of the Russell groups who are one of the top research based unis. The WHO is listened to and also part of the EU so if there was a problem, the EU would ~~also~~ listen to the WHO.

The response below refers to the WHO, indicating that all three articles have been considered. Throughout the article there are subtle references to how the organisations and individuals influence the issue and the response demonstrates good knowledge. The last paragraph is a little confused and the discussion of the influence of R. Carnworth is incomplete. This response was placed at the bottom of band 2 and awarded 3 marks.

WHO - world Health organisation has conducted hundreds of research in different countries on the effect of antibiotic resistance. It plays a vital role in international public health.

Dr Keiji Fukuda - As a health secretary of WHO he has done extensive research to tell us that with vast usage of antibiotic we are heading towards the pre antibiotic era where we could be killed by minor disease like cold.

FAO - Food and agriculture organisation with the help of WHO in 2016 discussed option for a global development and framework on anti-microbial resistance.

GAP-AMR: Global Action Plan on Anti Microbial resistance, is a programme by WHO which tackles antimicrobial resistance by coming out with five new strategies on 2015. The new thoughts will help people understand the risks more carefully.

R. Carnwath - he did a test with ten different types of honey to find its properties. He found all honey showed antibiotic responses especially scottish Heather Honey.

Jennifer Chin of international medical charity *médicins sans frontières* processed a research that showed the declined condition of people all around the world. In countries like Syria, Niger children at a small age has gotten antimicrobial resistance.

In the response below the learner has identified two key individuals and discussed their influence. They have also suggested how the WHO may influence the issue. The response indicates comprehensive knowledge and understanding and has made use of all three articles. This response was placed at top of band 3 with 6 marks.

2 Identify the different organisations/individuals mentioned in the articles and suggest how they may have an influence on the scientific issue.

(6)

In the three articles, organisations and individuals have been mentioned. They all have an influence on the scientific issue of antibiotic resistance.

Dr Keiji Fukuda is mentioned in article 1. He is an American Physician that has a great range of experience in diseases. In article 1 ~~and~~, he is concerned that if significant action is not taken, we are going to see people with untreatable infections. His aim as a ~~general~~ assistant director general for health security-WHO, is to raise awareness of antimicrobial resistance. He discusses the major threat to global health posed by the rising issue of antibiotic resistance. Dr Keiji Fukuda had a meeting with the UN where 193 UN states signed a declaration in order to combat antibiotic resistance. This declaration recognises prevention and control of infections in humans as well as animals as this is key in tackling antibiotic resistance. Dr Keiji Fukuda was able to influence members of the UN and countries not in the UN.

The World Health Organisation mentioned, demonstrates the organisation's concern with international public health. They launched an action plan in 2015 against antibiotic resistance, and their goal is to reduce the rate of incidence by persuading sanitation and hygiene and also raise

awareness of more medications and produce better medications in order to optimize the use of antimicrobial medications. With the launch of the action plan, action has taken place where 17 countries adapted a plan against antimicrobial resistance. The organisation has also implemented actions in human and animal health sectors, crop production, food, ^{and} safety of environment and this has reduced the consumption of antibiotics through these sectors.

Doctors also have an influence as they are persuading and encouraging patients to take ^{the} full course of the antibiotics as if they are stopped half way, they will not work properly.

Dame Sally Davies is head of medical office in all medical ~~for~~ people such as the GPs in England. She is a chief medical advisor to the UK government and is an independent advisor to the government on medical matters, public responsibilities regarding public health. Her aim is to advise the government on these medical matters.

Question 3. Discuss whether article 3 has made valid judgements. (12 marks)

Many learners did not demonstrate that they understood the meaning of validity within a scientific context. Those that did often started by stating what validity and reliability mean. Most who answered well mentioned the number of references, the publication being a peer reviewed journal, time period and reputation of the authors. Fewer looked at the evidence of the actual research and few learners demonstrated an understanding of scientific method; had they understood this it would have made a useful framework for answering the question. Some learners misread the question and evaluated all three articles, leaving too little time and space to give a good answer re article 3. A significant number of learners criticised the lack of numerical data in table 1, showing that they had misunderstood the reason for this table or did not appreciate that tables do not always have to have numbers in them. However, there were some very elegant

responses which focused on the evidence and the nature of it, as well as using the references; there was often evidence that learners had followed these up. Higher scoring learners recognised that a synopsis of many studies showing agreement could assess reliability. Some learners recognised that there were shortcomings in the methodology such as the need to consider Gram positive and Gram negative bacteria, the need to know how many replicates there were in each study and the need to know the actual protocol used for testing the antibacterial properties of honey in vitro. Higher scoring learners also recognised that more testing in vivo is needed. Some learners misunderstood the focus of the question and talked about how articles one and two could have been improved.

The response below shows understanding of scientific method and comments on the lack of statistical tests as well as commenting on more positive aspects of the studies covered in the article. The response also includes reference to the trials and to sample size. This response was placed at the bottom of band 4 and awarded 10 marks. Had the learner included more detail, for example that peer review is not always infallible or made a comment as to why certain concentrations of honey were or were not used in the tests or that sometimes there were confounding variables impossible to control then this response could have achieved top of band 4.

3 Discuss whether article 3 has made valid judgements.

In your answer you should consider:

- how the article has interpreted and analysed the scientific information to support the conclusions/judgements being made
- the validity and reliability of data
- references to other sources of information.

(12)

Article 3 was written in journal by 3 authors people. Journals are peer reviewed, therefore it is reliable. The first writer Pauline McLoone studied biomedical sciences and has been a co-author of 9 documents. Writer Mary Warnock studied nutrition and biomedical sciences as did writer Lorna Fyfe. Warnock has been a co-author of 6 documents and Fyfe of 24 documents. All three authors have written many other articles as well and hold degrees so article 3 must also be very reliable and valid. Article 3 has quantitative

data as there are lots of measured quantities such as "0%, 1%, 10%, 50%, 70%", different concentrations are mentioned. The data is represented in a table with a key which is easy to interpret so it's reliable.

However in order to increase reliability a graph could have also been provided in order to show any visible trends, tests such as standard deviation or t-tests could have been done, in order to increase reliability. ~~Statistical figures~~

Different studies had been conducted and different types of honeys were ~~mentioned~~ ^{compared} "five concentrations of the" "the honeys tested included medical-grade and shop-bought manuka honeys, Scottish heather honey, blossom honey,

Vipers bugloss honey, Lerness floral honey and Glasgow floral honey."

This increases the reliability of article. Different concentrations of the honeys were mentioned, so the test is repeatable. Different methods were mentioned in the article "agar diffusion method" and "Serial dilutions of the honey", this means that ~~different~~ more results were gained therefore ~~are~~ increase in reliability of the article.

The validity of the article is very high as well as ~~the~~ the investigation sets out what it measures "research investigating the antimicrobial properties of honeys". This was proved by the studies that were conducted and results

from the studies that were obtained upon comparison of different honeys. "All the honeys tested demonstrated antimicrobial activity but the Scottish heather honey was found to be the most active." Another factor which increases the validity of the article is that studies by highly educated and experienced individuals have been mentioned in the article, such as studies by Carnwath, Pimental, Klanic and many more.

Clinical trials were also conducted, "Randomized trial of 368 participants". It is a large sample size but not too large for the study that is being conducted, so it's very precise. In addition more than one clinical trial was conducted so it's ~~no~~ very precise and valid.

There were lots of references mentioned in the article which were all correct and working references, therefore the article is very reliable and valid as it's easy to trace back any information and see whether it's correct or not.

The response below gives a partially supported discussion on the validity of article 3. There is some confusion about what the terms validity and reliability mean but the learner recognises that more types of honey could have been tested and against a greater range of bacterial species. There is some coherence in the response and this was placed in band 2, with 5 marks.

Article 3 is an article posted on ScienceDirect and is written by Pauline McLoone, Mary Warnak and Lorna Fyfe who are Biomedical/Biological Scientists with two working at Queen Margaret University in Scotland.

This article is valid as the link online is still active, was made on 24th November 2014, made online on 30th January ²⁰¹⁵ and accepted as a legitimate research paper 19th Jan 2015. The scientific information is unbiased and uses 50 references to support its conclusions and judgements (except 1 which was found to be an inactive link). Article 3 is formal and informative, it even mentions WHO and universities based in Scotland where studies have been made that is written in the article.

Validity means the quality of being logically or factually sound and reliability means the quality of being trustworthy. I believe that Article 3 is both valid and reliable to a certain extent.

From the only source of data shown in a graph or table in this case, I analysed that manuka honey is not active against candida albicans, Malassezia species and HPV have unknown effects which would say the same sometimes for candida albicans and dermatophytes. However the data is presented, it is not reliable to an extent because not much honeys were tested, only four were and there should have been more common skin relevant microbes tested and even more trials carried out although the data is shown clearly.

In my opinion, Article 3 has made valid judgements, especially using sources such as Seamus Cowman and Dr Georgina Gethin who is an active council member of the European Wound Management Association and WHO but when it is flourishing in scientific data and research, it is lacking in evidence such as graphs, tables ~~the~~ and other data to prove its reliability as one table is not enough. Article 3 is also reliable to an extent as most of the information and research covered in the article are still viable to use and all of them are clearly referred to at least once throughout the article where other

research were carried out to support the judgements made.

When checking all the links in detail, source 11's assessed link was no longer valid any more as there was an error when checking it so any new information used from that link may have made the article 3 less reliable and valid to use. Upon further checking four links proved to be reliable such as 21, 32 as they were written by experts, Dr Georgina Gethin (32), Seamus Cowman (32) of the Royal College of Surgeons who wrote 104 valid research papers and Dr Noori Al-Wicili (21, 35) who specialises in Nethology and

Internal Medicine and is a clinical research director in Warm Care who provides research papers on honey as a therapeutic agent. The last link, [32] is also written by the authors of the article 3, Mary Warnock and Lorna Fyfe who both work at Queen Margaret University. So, overall, the sources and references increase article 3's validity and reliability as most are from Science Direct, Biomed Central and Scopus.

Question 4. suggest any potential areas for further development and/or research of the scientific issue, form the three articles. (5 marks)

There were some excellent and creative suggestions for further research such as use of bacteriophage viruses, indicating that many learners had not only carefully read the articles but had also carried out some research. More able candidates synthesised the suggestions for improvement from the articles and used evidence from all three articles to explain why these areas were necessary. Unfortunately, some learners misread the question and described how article one's style could have been improved and some learners did not refer to all three articles.

In the response below the learner has presented a range of well synthesised areas for possible development and has used evidence from the articles as well as their own research to support the decisions. It was placed at the top of band 3 with 5 marks.

4 Suggest potential areas for further development and/or research of the scientific issue from the three articles.

(5)

There are many areas for further development and/or research of the scientific issue.

Dr's should prescribe less antibiotics to help control antibiotic resistance, for viral infections such as the common cold, natural remedies should be sought out such as honey, using antibiotics for viral infections only worsens antibiotic resistance. They should only be taken when vitally needed.

Hygiene should be improved amongst healthcare professionals to help combat resistant infections

in hospitals which will lead to less strain on healthcare systems.

More medicines should be invested in, however this is unlikely as the system is market based, small returns on drugs are likely to scare off potential investors. Therefore global cooperation is needed

Strong health care systems should be built, whilst overuse of antibiotics occurs, some developing countries still do not have ~~access~~ access. Pneumonia accounts for 15% of all deaths of children under age 5, ~~however only~~ however only 1/3 receive antibiotics.

Price of antibiotics should be regulated and so should antibiotic usage. Therefore people who need it can access medicine and those who don't can be offered natural alternative treatments.

Research should also be conducted on alternative treatments such as phages. Phages are naturally occurring viruses that kill bacteria. Phages DNA replicates bacterial DNA until it kills the host.

There is one therapy which consists of phage solution which kill bacteria such as E.coli. The therapy can be injected, or sprayed onto the site of infection, or swallowed.

However more research and clinical trials should be done, before phages can be considered an effective microbial agent.

The information on phages was gathered with BBC News as the main source.

In the response below the learner has given the response in bullet points which is acceptable. However, the learner has not understood the focus of the question and has not listed areas for development. Instead they have suggested how the articles could have been developed. However, the fifth bullet point is a reasonable suggestion of an area for development but is vague with limited, if any, analysis. It is enough to put the response in band 1 and was awarded one mark.

- 4 Suggest potential areas for further development and/or research of the scientific issue from the three articles.

(5)

POTENTIAL AREAS FOR FURTHER DEVELOPMENT

- * More quantitative data to justify research, especially for article two which was mainly qualitative data.
- * Article three could have included some quotes from health professionals on their opinion like Article one
- * Article one could have include more background knowledge on the subject like article two and three

* Research on how these measures would in fact affect antimicrobial resistance and the difference it would make

* Research into the difference between honey on its own and honey mixed with antibiotics

* More data from the UTS researchers

* More numerical data from WHO's report on global antibiotic resistance

* A judgement could have been made on Article Three on whether honey could stop antibiotic resistance

Question 5. You are an infection control nurse. Write an article, for district nurses, about the possible benefits and limitations of using medical-grade honey to treat skin infections such as leg ulcers. (15 marks)

This question gave the more able learners a chance to show the understanding of the issue in the articles 1 and 2 and the potential use of honey as an alternative to antibiotics, as given in article 3; and to write in an appropriate style. Some succeeded well and showed awareness of their audience and wrote with appropriate tone, authority and terminology. Others adopted a tabloid approach which ignored the fact that the target audience would have medical and scientific knowledge and understanding. Good responses discussed the limitations as well as the benefits and linked some of their ideas to evidence given in article 3. Some of the less good responses adopted a sales pitch approach which was not really appropriate.

The example below is a very good response that synthesises information from all three articles to present a balanced discussion. It was placed at the top of band 4 and awarded 15 marks.

You are an infection control nurse.

You have been asked to raise awareness among district nurses of the problem with antibiotic-resistant microbes that cause skin (topical) infections such as leg ulcers.

One of the roles of a district nurse is to visit the homes of elderly patients to change their medical dressings for skin infections such as leg ulcers.

Your task is to write an article for district nurses about the possible benefits and limitations of using medical grade honey dressings to treat skin infections.

Use information from the three articles provided for this task.

When writing your article you should consider:

- who is likely to read the article
- what you would like the reader to learn from the article.

(15)

Is the use of medical grade honey an option for treating patients with skin infections?

As the demand for new advances in medical research against antibiotic resistant microbes increases, the use of other treatment options become available.

The main question asked among the nurses, who consistently change the dressings of skin infections, typically working along side the elderly on a daily basis to help treat their skin conditions known as leg ulcers, is does this alternative treatment work? and, what are the benefits and limitations of it?

The main clinical advancement in the research and development into new drugs used to treat

bacterial infections is medical grade honey and some nurses are considering to start dressing the wounds of the elderly with it to prevent and reduce the affects of infection.

How honey prevents infection:

Honey is well known for its antibacterial properties, not only can it kill the bacteria, it can also prevent it from growing in the first place.

Honey starts off by sealing the wound, which does not allow any contaminants to get into the wound.

It is also a mild acid which is not the typical environment for most bacteria, meaning growth is minimised. Bacteria also do not like the low water properties of honey, making it difficult to thrive.

How honey kills bacteria:

The high sugar content of honey dehydrates ~~kills~~ the bacteriums which is one way honey is able to kill bacteria. Another way bacteria is killed by the properties of honey is that it produces hydrogen peroxide. When diluted with the patients body fluid, enzymes in the honey create a ~~to~~ to the bacteria. Lastly, the enzymes found within honey create anti-bacteria chemicals which scientists are beginning to isolate in their research.

Some types of honey produce much more of these chemicals than others and some do not produce much at all. This is the main focus of antibiotic resistant research at this time.

Healing properties of honey:

Honey has proven to speed up the growth of various body tissues. By helping to form new blood vessels, collagen and epithelial cells. Honey does this in many ways such as:

- Sealing in good tissue fluid which contains proteins and enzymes which help with healing drug. This is not an efficient way of producing a clinical drug especially
- provides nutrients to tissues
- Honey reduces inflammation which is yet to be discovered why.

What are the limitations of medical grade honey?

The production speed of honey is limited as it can not be made synthetically. This means that biological technicians have to depend on the speed of bees producing the honey so that they can produce the

as it is in such high demand. For example, in the case of an epidemic, it would be highly unlikely that a big enough production rate would be ready to treat the entire population. This means faster ways of development need to be installed or a new drug needs to be developed.

In conclusion, the production of the medical grade honey is beneficial for the treatment of most infection and research and development should be continued. The WHO promotes the use and research of medical grade honey and even though it has not yet managed to reach its full potential, the future of honey based antibiotics looks promising. Especially knowing that no honey-resistant bacteria have emerged.

The example below is at the top of band 1 with 4 marks. The learner has attempted to give some of the main points but these are vague and not supported by relevant evidence. They have not selected material from the articles appropriately as they have spent too long on articles 1 and 2 and given very little time to article 3. The learner shows little awareness of the audience and does not use appropriate scientific terminology throughout the response. The learner was not penalised for using bullet points, which would be an appropriate style for part of the article, but on this occasion the points are too brief and have not been supported by evidence. This response shows some structure and coherence but is too vague in places.

Antibiotics will no longer work,
this is the action we need to take.

Antibiotics were first discovered in the early 1900s. From that moment medicine took a leap forward. Helping to save people and to increase the lifespan of many. Unfortunately due to the lack of care, the misuse of antibiotics, medicine is soon to have to take a step backwards. Infections are developing and are slowly becoming resistant to antibiotics. This is devastation because of negative effects on the population.

prevention techniques:

There are things we can do to ensure that the world can still benefit from antibiotics. When a patient becomes ill make sure it isn't them over ~~reacting~~ ^{reacting}, get all the symptoms together and see what it could be. Then seek medical advice to see treatment. If antibiotics are prescribed, make sure they are correct. double check

if you feel necessary. Once you have the correct antibiotics you must follow instructions. Start the dose when advised and make sure each dosage is taken correctly and on time. make sure full dosage is taken in the time period said by doctors.

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