EXAMINERS' REPORTS

LEVEL 3 CERTIFICATE/DIPLOMA IN MEDICAL SCIENCE

SUMMER 2022

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MEDICAL SCIENCE

Level 3 Certificate

Summer 2022

UNIT 1: HUMAN HEALTH AND DISEASE

General Comments

Unit 1 is the externally assessed examination unit for the Medical Science Certificate. It is worth 50% of the overall marks for the qualification. Candidates are provided with a pre-release article four weeks before the exam (this year this was extended to six weeks due to the date of the Easter break) and they are able to work their way through this pre-release article during this time.

Section A of the exam paper has questions based around the pre-release article. These questions could ask for content directly found in the article, could ask candidates to apply their knowledge, or could bring in another unit of work connected to that which is in the pre-release including synoptic content from units 2 and 3. There are up to 25 marks for this section.

Section B is up to 65 marks of questions based on the specification for unit 1 as well as 8-10 marks from both Unit 2 and Unit 3. The questions will test a range of skills including direct recall, analysis, evaluation and other mathematical skills.

Only a small number of candidates did not attempt all questions and it was apparent that all candidates had sufficient time to complete the paper. Many candidates failed to express themselves clearly and responses lacked the use of appropriate terminology or specificity, this was a problem in both Welsh and English medium scripts again this year.

The quality of written communication was again an issue for some candidates. They are reminded of the necessity for good English/ Welsh on the front of the examination paper. It was also clear that many candidates had difficulty with simple mathematical problems again. Most candidates had appropriate equipment i.e. pencil and ruler for use with drawing the graph, although the type of graph selected by candidates was again often incorrect.

Comments on individual questions/sections

Section A

Pre-release Material

Mean: 10.8/22; FF: 49.0; Attempt rate: 100%.

It was apparent that most centres had spent some time preparing candidates for the pre-release section. These candidates scored some high marks for Section A. There was a small number of candidates, however, that had not thoroughly studied the pre-release article and could not expand beyond the content of the article. The pre-release article was available for six weeks before the examination to allow preparation in advance. Questions were based both directly on the content of the article and wider knowledge taken from the specification.

Q.1 Candidates had no problem in stating three symptoms of TB which were listed throughout the pre-release article.

Q.2 The majority of candidates had no problem in describing the method of transmission of TB.

Q.3 Candidates struggled to correctly describe how the humoral immune response reacts to a foreign antigen. This question had been asked in the context of a vaccine and even though there was no actual necessity for candidates to know anything about vaccines many struggled to simply state simple content from the specification about this method of immune response.

Those that did score marks were credited for naming specific cells e.g. B lymphocytes, plasma and memory cells. This question asked for recall from the specification and as the immune system had been named in the pre-release it was expected to be a very accessible question.

Q.4 This question was linked with unit 2. Endoscopy was stated in the pre-release article, but this was missed during preparations by many centres and candidates. Only a very few were able to give a correct description of how endoscopy is used to detect TB. Answers lacked details e.g., no mention of the light on the camera, no mention of how/where the camera enters the body.

Q.5 **(a)** The majority of candidates successfully gained one mark for this question. However they did not gain the second mark which expected them to expand on their answer by stating that latent TB could become active at a later date.

(b) This question again proved no problem to the majority of candidates who managed to find the information in the pre-release article.

Q.6 **(a)** Describing trends has always proved difficult for some candidates and this year was no different. Candidate communication resulted in missed marks here with answers missing key words e.g. high**er** which resulted in no marks.

(b) Suggesting reasons for the trend was done well by most, which was encouraging.

Q.7 Many candidates struggled when suggesting the reasons for the increase in the number of cases per 100 000 of the population in Wales in 2009. As this was a clear anomaly in the trend of the graph, it was expected that during preparations candidates would have discussed this in class. Answers lacked clarity and detail, and due to the vagueness resulted in no credit for many. Many candidates simply repeated their answers for the previous question which was not appropriate. Centres should spend time preparing candidates for data analysis in the four weeks prior to the exam.

Q.8 **(a)** The graph question, as always, proved difficult for many candidates. It is worth looking at the size of the grid provided before selecting a suitable scale. The graph paper in this instance was perfectly sized so that the scale chosen would completely fill the page. This meant that any other scale would instantly lose marks as the candidates had not chosen the most suitable size for the graph. Candidates also failed to give values at the origin, these do not need to be (0,0) as long as there is a suitable value and then a linear scale. Titles and units on axes were lacking by some candidates and many chose the incorrect type of graph. Two plotting errors were permitted this year as there was a lot of data to plot, and credit was given for clearly labelled lines.

Some candidates used thick crosses or dots that covered more than half a small square which resulted in them losing the plotting mark as it was larger than the tolerance value. All in all, the graphs were disappointing again this year. Basic mathematical skills should have resulted in candidates having no problem at all in dealing with the data provided. Centres also had this data ahead of time so that they could have practised drawing graphs etc. in class. This formed part of the unit 3 link mathematical component for this exam.

(b) Again, describing trends was more difficult than anticipated. Most could state clearly that Isoniazid had a higher resistance to TB but then failed to recognise that Rifampicin had a consistently lower resistance in comparison.

(c) When asked to suggest a way that health authorities could help reduce the incidence of antibiotic resistance for TB many candidates provided good, reasonable suggestions. Marks where lost when candidates failed to express themselves clearly.

Section B

Q.9 Mean: 4.7/10; FF: 47.3; Attempt rate: 99.9%.

(a) **(i)** The majority of candidates were able to identify the peak flow meter. This was a direct link with unit 2 work.

(ii) Candidates successfully described how the peak flow meter is used which showed that they had a good understanding of the device.

(iii) Candidates that had clearly looked over their unit 2 work had no problem at all in giving the final value for the peak flow from data provided. Many candidates, however, calculated a mean of the values, which is incorrect.

(iv) When asked to identify the ages of both Pete and Eurig, candidates had no problem in reading the table. Those that had calculated the value incorrectly for part (iii) were given an error carried forward for this section. Marks were lost by some candidates who failed to give a set figure and decided to guess a value between data groups in the table.

(b) Unfortunately, spirometry was not completed well by candidates. The majority either only scored one or no marks for this question. Candidates lacked the basics with regards to the technique which was again a unit 2 link question. Centres are reminded that between 8-10 marks will come from unit 2 content, so it is essential that centres spend time revising work carried out previously.

Q.10 Mean: 4.6/14; FF: 33.1; Attempt rate: 99.7%.

(a) Only a very few candidates correctly stated that insulin was a protein.

(b) Many successfully gave the correct type of cells and their location in the pancreas.

(c) Candidates that had learnt their work on the control of glucose levels had no trouble in giving a detailed account of the action of insulin and glucagon. It is worth remembering here that spelling of the words, glucose, glycogen and glucagon must be correct in this question. Candidates therefore failed to gain marks where the spelling of these key words was not correct.

(d) **(i)** Calculation questions are always an area of weakness, however this year the majority of candidates scored at least one mark when calculating the percentage of the total energy that John obtains from saturated fats. This was an improvement on previous series.

(ii) LO3 requires candidates to study life choices and improvements to lifestyle. Most candidates were able to state a suitable change but then could not expand their answers to give an explanation on how that change would reduce the risk of developing health conditions.

Q.11 Mean: 6.6/14; FF:47.2; Attempt rate: 99.7%.

(a) This question posed no problem for the majority of candidates and many scored high marks for identifying the different biological molecules. It was evident that candidates had learnt this work.

(b) Completing the blanks was also done well with almost all candidates scoring some marks here. Where mistakes were made, candidates confused the glycosidic and peptide bonds, and did not name a dipeptide as the molecule formed when two amino acids join.

(d) Describing the difference between saturated and unsaturated fatty acid structure is directly from the specification. Some candidates scored well here, however many lacked the detail in their answers that allowed them to access any marks. Candidates must refer to the double/single bonds between carbons if they are to gain marks on a question like this.

Q.12 Mean: 4.1/11; FF: 37.5; Attempt rate: 99.5%.

(a) Whilst studying unit 1 candidates are expected to learn about different diseases and conditions. Angina is named on the specification and as such can be used when examining. Most candidates had no trouble in giving one symptom of angina.

(b) Calculation of the cost of treating angina proved more of a problem for a lot of candidates. The large figures confused many, and so this should be an area that centres work on when preparing candidates for future examinations. Candidates struggled to write £669 million in figures, which led to many mistakes in their calculations. There are many examples from previous exam series that can be used whilst preparing candidates.

(c) Candidates had no trouble suggesting a reason why men have a higher prevalence of angina than women.

(d) Another unit 2 link question here that was done well. Many candidates listed blood pressure testing and ultrasound as methods of diagnosing angina. Those that did name the ECG gained one mark but then failed to state what the test would show.

(e) Describing and explaining how changes in the artery can lead to a heart attack was not done well by the majority of candidates. Key terminology was missing resulting in no marks. Candidates must use scientific language in their responses when answering these types of questions. Reference to the heart muscle should be made when describing that blood/oxygen is not reaching the heart. Candidates needed to name the deposit as plaque. There has been a similar question to this in the past and it was clear that the majority of candidates had not been exposed to this whilst preparing.

Q. 13 Mean: 2.5/5; FF: 50.4; Attempt rate: 99.7%.

(a) The majority of candidates had no problems in explaining why the main causes of death in low-income countries were contagious diseases. They did, however, miss the second marking point for nutritional disease. Simply stating that they could not afford to eat healthily was not enough - they needed to expand on this and mention malnutrition, deficiency disease or starvation to gain the mark.

(b) This question was answered well by the majority of candidates, they suggested a suitable reason for the high number of people that die from HIV/AIDS.

(c) Candidates found this question straightforward with most gaining at least one mark. Correct answers included reference to the lack of road safety, road education and poor road conditions.

Q.14 Mean: 3.7/9; FF: 41.0; Attempt rate: 95.8%.

(a) **(i)** Many candidates correctly identified a nucleotide.

(ii) Fewer candidates correctly identified the phosphate, showing that even though they could identify the sub-unit they struggled with naming the components.

(iii) Many candidates correctly named the pentose sugar found in DNA and RNA.

(iv) Unfortunately, many candidates failed to name the four bases of RNA correctly and therefore did not gain many marks here. This is direct recall.

(b) Many candidates had no problem in describing how nucleotides in a DNA molecule are arranged. This content is again direct recall from the specification and should not have proved a problem for those that had learnt their work.

Q.15 Mean: 1.1/5; FF: 21.7; Attempt rate: 97.5%.

(a) **(i)** Answers for this part ranged from being correct; small intestine/ intestine to being ridiculous; the nephron. It was evident that many may not have seen this structure before.

(ii) Candidates that correctly identified the structure usually went on to gain this mark.

(b) The table was completed very poorly by the majority of candidates. Very few marks were awarded here. This was by far the least well answered question of the paper.

Summary of key points

It was clear this series that centres that had spent considerable time working through the pre-release and candidates generally scored well in section A.

Mathematical skills were a problem again this year and centres should be sure to cover this aspect of the course with candidates before the exam, in particular selecting appropriate graphs, plotting points accurately, calculating percentages and rounding up/down. Centres also need to spend some time working with different data sets and large numbers so candidates are able to confidently know the difference between millions and billions.

The quality of written response and use of subject-specific language was poor this year for a large number of candidates which resulted in many marks being lost. This was particularly evident in the extended answer questions.

Although the content seems to be vast, there is more than enough time within the year for centres to cover all aspects of the work for this unit. Centres should refer to the teacher guidance for the level of detail that should be taught. Centres should also remember to revise work carried out in Unit 2 and 3 as these could be tested within this examination. It was found this year that some responses to the Unit 2 questions were poor and showed that some candidates had not covered this work during lessons.

Centres should also be sure to use the now extensive bank of past papers whilst preparing as this will help the candidates develop their exam technique and the requirements for different types of questions.

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UNIT 2: PHYSIOLOGICAL MEASUREMENT TECHNIQUES

General Comments

The work submitted by many centres was of a very good standard and the assessment decisions made by many centres were generally valid and agreed with the moderator's decisions. However, there are some centres that are unsure of what is required for some of the performance bands. This information is with the subject specification and is available on the exam board website. It is also recommended that centres look closely at exemplar candidate's material there, so that they are clear as to what is expected for each AC performance band.

It was noted this year that there has been an exceptionally high level of copying directly from the NHS websites and American lung/asthma websites, not to mention each other. It is important to stop such blatant copying because candidates most certainly will not be able to do this in HE/university. Centres should discourage candidates from using text directly from medical websites, but to interpret the information they have read and demonstrate their knowledge and understanding in their own words. This will avoid instances where candidates have appeared to have plagiarised work from one another. In centres where Google Classroom and Google Docs is available, centres are encouraged to use the new tool introduced by Google Docs to compare documents. This can be done by selecting 'Tools' tab, followed by 'Compare Documents'. Google Docs then opens a new document highlighting any extended pieces of writing that appear identical in the text between candidates. There are also free websites that allow you to check for plagiarism against online sources.

The administrative work was not always correctly submitted, with authentication sheets not signed by the candidates. Mark record sheets had been correctly completed in most centres and had included detailed annotation on candidate's work in many centres which is extremely helpful.

Comments on individual questions/sections

Task 1

Some candidates did not discuss the principles of the physiological tests in nearly enough detail i.e. how the test works. They do find this hard, but the question they need to answer is 'Why can I use this piece of equipment to measure this physiological parameter?' There should be a clear, detailed explanation of how the physiological blood pressure monitor, peak flow device (or any other test equipment) and the ECG are able to be used in testing (not the same as a method for carrying out the tests). For AC1.2 candidates really do need to quote some correct figures for normal results and then what it means if the results are higher and lower than the norm, in terms of indicators of disease/disorders. Candidates are totally fixated on asthma and nothing else.

Task 2

AC2.1 and 2.2. Both these AC need to be **fully** and accurately **explained** in the plan and then witnessed (from September 2022) for top band. LO2 states that candidates must understand how to deal with patients, with AC2.1 stating that they must **explain** the importance of patient confidentiality and similarly AC2.2 asks them to **describe** conduct towards patients. For 6 marks candidates must say a great deal more than 'I will speak very nicely and calmly to my patient'. Equally 'and I will lock up all my results to maintain confidentiality' will not get 6 marks; neither is even band 2.

Task 3 and 4

Task 3 AC4.1 takes care of all the data processing, not task 4.

AC4.1: The expected clinical requirement is for blood pressure measurement to be repeated three times. This provides opportunities for data processing through the calculation of a mean. The working out should be shown along with the correct use of significant figures. Three readings also provide data for students to then discuss repeatability and outliers in their evaluations (AC4.3). There is no mean calculated for peak flow results; the highest reading is taken; too many candidates are on autopilot and calculating PF means. The ECG traces are producing some wonderfully inventive maths, involving all manner of size of boxes, numbers and timings. Following their calculation, candidates should be using common sense here; if a single heartbeat almost fits into 1 second, how can an answer of 120BPM be correct? Conversely how can a BPM of 33 be correct? There are two traces; each should be calculated and a mean presented in the final report. All the maths can be presented separately in task 3 and the final figures transferred to the pro forma for task 4.

AC4.3: Is causing problems for candidates since they are tending to repeat all that they have put in to 4.2 (conclusions about the health of patients based on test results) but worded differently. Since they may not have evaluated anything, then it is 0 marks. To evaluate, the candidates must assess the design, implementation and outcomes of the tests, with possible suggestions for improvement. How effective have the tests been in allowing conclusions to be drawn; is the data reliable and consistent, how valid is the data, are the results accurate, were the tests carried out correctly? This then leads into the next question on the pro forma asking candidates to suggest factors that could have affected the test results (AC1.3).

AC4.4: Is really assessed throughout the entire assignment. Candidates need to be much more conscious of the fact that the language they use for the patient leaflets and their contact with patients is very different to that which they would use for presenting work to a consultant/head of department/GP. They can use much more scientific terminology in the pro forma, knowing that it would be fully understood.

There is no need to explain all the maths (that is done in task 3), the consultant/eq simply needs to know the results.

Summary of key points

The vast majority of centres followed the model assignment and assessment criteria whilst assessing, produced work that was fairly and consistently marked. Thank you.

A small minority of centres did not take the adaptations for 2022 into account. Candidates were not required to carry out physiological testing in 2021 and 2022 for public health reasons. An adapted assessment (with relevant ACs removed) has been available for centres since September 2020. This year's assessment was out of 72 marks – candidates who carried out the incorrect assessment could not be awarded marks for the sections that were removed.

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UNIT 3: MEDICAL SCIENCE RESEARCH METHODS

General Comments

The quality of the work submitted was generally good and assessments by the centres were in the main accurate and in agreement with the moderators. It was pleasing to see that many centres had acted upon comments made in previous moderator reports.

Administrative work was generally correct, with authentication sheets signed by candidates. Some centres did not use the revised version of the Ethical Evaluation proforma. Most centres had clear annotations on the candidate work indicating why certain bands and marks were awarded for the individual assessment criteria and these marks were then correctly transferred to the Mark Record Sheet. Most centres presented the candidate work as one file rather than as multiple documents which made the moderating process simpler.

Comments on individual questions/sections

Task 1: Planning to carry out the investigation

AC1.1: Better candidates achieved Band 3 here giving clear descriptions of the variables along with how they were measured or, for the extraneous variables, how they were controlled, or their effect minimised. Weaker candidates often struggled to express measurable variables, or quote age and gender as the independent variable. There can only be one independent variable. Some candidates used ethnic groups or religion as their independent variable. Whilst these gave interesting data the analysis was difficult as there were so many groups to consider. To quote ‘attitudes’ as the dependent variable is too vague and there needs to be further description of what is being investigated. A few candidates were planning to measure the degree of immunity to flu as their dependent variable. This is not an ‘attitude’ and also impossible to measure using a questionnaire.

AC1.2: Whilst it is essential to quote the hypothesis for the investigation the marks are awarded for its justification. Candidates should consider why they have chosen to investigate this hypothesis and why the information produced might be valuable. Many candidates lost marks here by only referring to a one-tailed or two-tailed hypothesis.

AC1.3 and 1.4: These were generally well answered by most candidates. The better responses referred to how the data might be analysed, for example, by giving examples of questions which would generate data for graph drawing or may be used for a named statistical test. There is no requirement to discuss all the sampling techniques to achieve Band 3 for AC 1.3, just the reason for selecting the technique including the advantages and disadvantages of the sampling method.

Task 2: Collecting information

AC2.1: To award Band 3 the plan needs to be sufficiently detailed for it to be followed by a third party. For example, it is insufficient to say that the questionnaire will be handed out. How will it be handed out? A few candidates lost all the available marks here for not including a plan.

AC2.2: This was the first session for most centres to enter candidates using the 'Flu Jab' assessment and it was encouraging to see an overall improvement in the quality of the questionnaires as candidates were using their knowledge of issues surrounding vaccination during the covid pandemic. However, some still contain too many irrelevant questions. Consequently, far too much data is generated which does not link to the hypothesis making analysis difficult. It also resulted in investigations which were far too lengthy.

AC2.3: Most candidates achieved Band 3 here. Candidates should be encouraged to collate their raw data and present it in suitably labelled tables. This will also contribute towards AC5.1.

Task 3: Analyse the data

Throughout this task there should be evidence that the candidates understand and apply the terms used in data analysis. If a statistical test is used then terms such as degree of freedom, probability, critical value and parametric should be used and explained in the correct context. Many candidates use the correct terminology but fail to explain it, or just list and give definitions of the terms. This will not access any marks unless used in the context of the analysis.

Candidates should explain why they have chosen a statistical test using terms such as nominal, categoric or ordinal to describe their data. Other terms might include correlation, statistical difference, trend and normal distribution. If necessary, the null hypothesis should be stated before carrying out the test. Note that the null hypothesis should contain the phrase 'there is no significant difference between …'

A well set out and analysed statistical test will meet many of the assessment criteria including AC3.1, AC4.2 and AC4.4. It is acceptable to analyse the data by using an excel spread sheet, but if candidates show the stages of the calculation of the statistical test it will help them to access marks for both AC4.1 and AC4.2.

AC4.1: It is pleasing that more candidates are now correctly using a statistical test such as Chi-Square or Mann Whitney to analyse data. Many candidates still forget to say why they have chosen a specific test, losing marks for AC3.2. Some candidates are struggling to find suitable data for analysis. A Chi-Square test can be used to analyse simple yes/no answers to questions. Standard deviation used to measure the age range of the participants (the independent variable) is not a valid test in this context.

AC4.2: The best answers here are where the conclusions are clearly and logically linked to the evidence and to the null hypothesis. Many candidates stated they were going to accept/reject their hypothesis leaving the moderator to guess what their hypothesis was.

AC4.3: Requires candidates to evaluate their data and/or their procedures. Reference could be made here to the number of people in the sample, bias, reliability of the data collected along with any possible improvements.

AC4.4: The improved use of statistical tests has made this AC more accessible with many candidates using mathematical notation and significant figures correctly.

Task 5: Prepare a presentation

AC5.1: Requires candidates to present their data visually and suitable for an audience of scientists and non-scientists. All tables and graphs need to be correctly set out. Tables need to have clear column headings (link to AC2.3 and AC4.4) and graphs need to be fully labelled. Many graphs generated using excel spreadsheets did not have labelled axes. It is better to present categoric data as a bar chart rather than copying and pasting a pie chart from a google document.

AC5.2: Most candidates are submitting good quality presentations, usually using PowerPoint.

Summary of key points

A list of terminology and mathematical notation can be found in the Guidance for Teaching booklet.

Questionnaires should be relevant to the research hypothesis to avoid collecting irrelevant data.

A plan must be included to credit AC2.1 and some explanation of why certain statistical tests are used is needed for AC3.2.

Centres are reminded that exemplar work for this unit is available to view on the secure WJEC website.

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UNIT 4: MEDICINES AND TREATMENT OF DISEASE

General Comments

There was a significant increase in the number of centres that submitted work for this unit in this series compared to previous series. These additional centres submitted work for the first time for this unit.

Generally, the quality of work submitted by centres that have submitted previously was of a good standard, and the majority of the assessment decisions made by the centres were accurate and in agreement with the moderator's decision.

However, the quality of assessment from the centres that were submitting work for the first time varied greatly. Some centres had followed the guidance materials and produced work to a high standard that was fairly and accurately assessed. A large number of centres, however, were over-generous with their assessment decisions and had not followed either the guidance materials whilst assessing or the model assignment that is provided. This resulted in work for all candidates being re-assessed and marked accordingly.

It was clear that on some work comments had been made by assessors as to which grade candidates had attained and comments that suggested work had been returned to candidates for improvement. Centres are reminded that candidates are not allowed to improve work in any way after submission and due to the nature of the moderation process, centres should be careful with the feedback that is given as candidate marks are subject to change.

The majority of centres had submitted the correct administrative work, with authentication sheets signed by the candidates. Most centres had correctly completed the mark record sheet and there was annotation on candidate work in the majority of cases which was generally helpful during the moderation process.

Comments on individual questions/sections

Please refer to the model assignment for Unit 4 which can be found on the WJEC secure website for full details of the assessment

Task 1

Candidates are expected to work in groups, where possible, to complete two presentations to nursing staff.

The presentation materials that were submitted were to a high standard and it was clear where candidates had gained marks. Assessors had annotated where appropriate and completed the observation record in the vast majority of cases. Speaker's notes were also provided so that it was obvious which part each candidate had presented. This is good practise.

In completing their presentations, candidates are specifically asked to provide a reflective account of their contribution to team work (AC4.3). Whilst the assessor can and should comment on this in the observation record, the reflection is a specified piece of evidence as listed in the model assignment. It is expected, therefore that these reflective accounts are included with the candidate's presentation and speaker materials along with the observation record. Assessors should not credit any marks when the reflective account is absent.
It was found that many centres had omitted these reflective accounts this year but had still credited their candidates for their contributions. This resulted in this assessment criterion being overmarked by some centres. For future submissions please ensure that the appropriate reflective account is included if awarding any marks for this AC.

Task 2

Candidates are asked to produce information on four different medicines for task 2. These medicines should target three diseases/conditions which affect three of the body systems listed in the teacher guidance and the fourth medicine should be one that targets a causative agent e.g. bacteria, virus or fungi.

Centres should not use a vaccine as one of the medicines as this is a preventative measure and not a treatment. Neither should centres select medicines for body systems that are not listed in the specification/teacher guidance for this unit. There is plenty of scope to select interesting medicines within the listed body systems.

The quality of this task varied greatly. In some centres assessors awarded marks for work even though there was a complete lack of evidence for the particular assessment criterion. The method by which the assessment had been presented to candidates had resulted, in many instances, with candidates being unable to access all of the marks for the task.
Some centres also awarded marks when there was no evidence of the AC on each medicine information.

Centres are directed to the exemplar materials for this unit that can be found on the WJEC secure website in order to view layouts that are both suitable and will allow candidates to access all of the assessment criteria for this task.

Of course, many centres assessed candidate work appropriately and fairly and the medicines chosen were suitable. There were many examples of work that was presented to a high standard which was encouraging.

Specific points to consider.

AC 2.1: There was often a lack of detail in the explanations provided regarding the molecular basis of the action of a medicine - candidates must provide information about the drug-receptor interactions for each medicine and the possible ways in which the medicine works. These must be evident for all medicine information to award the top band. Marks should be reduced accordingly when parts have been omitted.

AC 2.2: Candidates should directly reference the body systems that the medication effects, and not just discuss an individual organ affected by the medicine. A comprehensive list of the body systems can be found in the specification and candidates would need to select three different body systems in order to access the top band marks.

AC 2.4: Often candidates did not provide a suitable or detailed enough explanation of why medicines can lose their effectiveness across all the medicines discussed. Candidates do need to provide this explanation across all medicines discussed in order to be awarded the top band marks (this clearly specifies medicines and examples). If the medicine that the candidate is studying does not lose effectiveness, then it is appropriate to state this on their medical information.

AC 2.5: Assessors awarded high marks this year for lists of drugs that interact with the medicine. This is not sufficient. There must be a comparison of the interaction of the medicines together, be that positive or negative effects.

AC 2.7: Candidates often failed to explain clearly **how** adverse reactions to medicines occur; instead, they only provided a list of possible adverse reactions. If only a list of adverse reactions/side effects is provided then candidates are limited to band 1, 2 marks maximum for this assessment criterion.

AC 4.2: This is the candidates' justification of their communication method for the medicine information. It should include a justification as to why they did not select a different method of communication if it is to be awarded band 3 marks. Again, as with AC 4.3, if this is not present in the work it should not be credited at all.

Task 3

Candidates are required to produce information about cancer for task 3.
The quality of this task was mostly very good with centres understanding the brief well and candidates producing work of a good standard.

Some centres did mark this task generously and they should exercise caution in future when awarding higher band marks for lack of detail.

AC 3.3: If candidates are to be award top band marks, then they must describe all five treatment options that are listed in the specification. When candidates have not described the full range to sufficient detail then they should be credited accordingly. Many centres were awarding 6 marks for information that lacked detail and that did not cover the full range of treatment options available.

AC 3.4: This assessment criterion was by far the most generously marked for this task. Many assessors awarded marks for descriptions of the different new treatment options for cancer. This is not what is required for this assessment criterion. Candidates must assess the impact of the new treatment as well as provide some information about each new treatment that is listed in the specification. When no assessment has been made, candidates should not be credited high marks.

AC 4.1: Marks are awarded here for the method of communication of the cancer information. Some centres award very high marks for work that would not be considered the most appropriate. This was allowed this year but please be careful about future submissions.

Summary of key points

Centres that followed the model assignment and assessment criteria whilst assessing, produced work that was fairly and consistently marked. Thank you.

Some centres were over-generous especially with task 2. Do not award marks when work had been omitted and refer to the specification, teacher guidance, model assignment and exemplar materials for this unit for future submissions.

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UNIT 5: CLINICAL LABORATORY TECHNIQUES

General Comments

This unit is externally assessed by an assignment provided by WJEC annually in September of each academic year. It is downloadable from the WJEC secure website and was this year based around post-mortem results.

There was a significant increase in centres submitting work for this unit in this series. The work submitted by the majority of centres was good, although candidates from a few centres had not completed all the tasks. The performance bands for this unit can be found in the specification and it may be worth sharing this with candidates before they begin the assignment, as some had not included all the required information.

Comments on individual questions/sections

Activity 1 - Use of Clinical Laboratory Techniques.

The mean marks, facility factors and % attempt rate for relevant ACs in this activity are as follows (note AC3.4 marks are taken from both activities):

AC2.1: Mean: 7.2/9; FF: 80.3; Attempt rate: 99.9%
AC2.2: Mean: 17.3/18; FF: 96.3; Attempt rate: 99.9%
AC2.3: Mean: 1.4/4; FF: 36.0; Attempt rate: 99.9%
AC3.4: Mean: 5.3/6; FF:88.2; Attempt rate: 99.9%

The tasks in this activity are linked with the candidates being expected to plan and carry out the investigation, collecting results which they then summarised in a separate report. Most candidates were able to gain marks in all assessment criteria. A.C 2.1 required candidates to plan three tests, it was expected that for the highest marks they would:

- say what each test was for
- write a brief, but accurate method which would work (e.g. not streak testing, as colony numbers had to be calculated)
- state the expected results.

It is not necessary that candidates test multiple sets of samples, the script requires them to test only one set.

The observation record, provided for the assessor to complete, must include the mark for the tests for AC 2.2.

When recording the data for AC 2.3, marks were lost due to a lack of explanation of what they needed to do in the calculation, poor use of precision, standard form and units.

Here AC 3.4 required a brief summary. Not complying with these instructions and writing about the practicals again, lost some candidates marks.

Word processing the work is not essential, it also sometimes leads to marks lost due to inaccuracy of e.g. spelling and standard form. It is definitely not useful for the candidates to research, hand-write and then word process their work, as was seen from several centres. The quantity of work produced must have made it very difficult to complete within the time allowed (4.5 hours).

Activity 2 – Clinical testing.

The mean marks, facility factors and % attempt rate for relevant ACs in this activity are as follows (note AC3.4 marks are taken from both activities):

AC1.1: Mean: 10.5/18; FF: 58.1; Attempt rate: 99.7%
AC1.2: Mean: 1.0/7; FF: 14.7; Attempt rate: 99.5%
AC3.1: Mean: 4.6/6; FF: 76.0; Attempt rate: 96.3%
AC3.2: Mean: 3.8; FF: 63.1; Attempt rate: 93.0%
AC3.3: Mean: 3.7/6; FF: 62.2; Attempt rate: 99.2%
AC3.4: Mean: 5.3/6; FF:88.2; Attempt rate: 99.9%

The tasks here were more discrete. The first task often lost candidates marks, with the second being done well by the majority.

Task 1 required candidates to produce information, which needed to be concise, relating to the principles of the three tests. Many candidates did not explain how the test actually worked. Details of what the candidates should have been taught is described on the specification and within the teacher guidance for A.C 1.1.

Very few candidates included detailed information for A.C 1.2 on the factors which would affect each of the three tests and this was a place where many candidates lost marks, with only a minority giving an accurate, detailed and coherent explanation showing detailed reasoning of the factors including how the results would be affected in each case. They cannot just write a generic paragraph but should explain why each factor limits the results of the stated tests.

Task 2 was an analysis of results the candidates had been given using the normative values supplied. The graph required for A.C 3.1 needed suitable scales and should be accurately drawn and labelled. Hand-drawn graphs tended to achieve the highest marks; electronic graphs disadvantage the candidates as they cannot meet all the marking criteria.

Means needed to be calculated for A.C 3.2 in order for the graph to be constructed. Most candidates did manage these calculations, but many failed to explain what they needed to do. The performance band requires calculations to be clearly and logically presented using consistent, accurate significant figures. Many candidates lost marks for these aspects.

The marks for A.C 3.3 tended to be good with most candidates able to analyse the data using all information provided. Again, there needs to be no diagnosis and the information should be brief.

Within A.C 3.4 it is important the candidate “uses and appropriate structure” in order that candidates do not lose marks here, it would be helpful if tasks were not divided.

Summary of key points

Overall, the majority of centres submitted work of a pleasing standard with many teachers giving candidates the skills to access the highest marks. Some work was annotated by teachers which is unnecessary here as the work is marked at WJEC. There were also scripts which contained aspects which were very similar and it should be noted that this work should be done individually, not as part of a group. Some candidates had done a huge amount of unrequired work and referenced this research. This is a waste of their time as they should have been taught all that they need to know to complete these tasks and having to complete this additional work in the time allowed must impact the quality of the required work.

Most centres correctly submitted the required administrative work; however folders and poly-pockets are unnecessary. The work should not amount to more than a few sheets, so stapling each candidate's work together is sufficient. It should be noted that is essential that the completed teacher observation record and a signed authentication sheet are attached to the candidates' work.

MEDICAL SCIENCE

Level 3 Diploma

Summer 2022

UNIT 6: MEDICAL CASE STUDY

Summary of key points

The questions in this paper were based on pre-release materials which were made available four weeks before the examination. The pre-release resource folder contained information about three medical conditions: Cystic Fibrosis, Hearing Loss and Mumps. Candidates were expected to study and research the information presented in the folder prior to the examination. This unit also required candidates to identify and use an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the course content. It was pleasing to see that most candidates attempted all the questions.

Comments on individual questions/sections

Questions 1-5 Case Study 1: Cystic Fibrosis

Mean: 10.4/25; FF: 41.5; Attempt rate: 100%.

Q.1 This question required candidates to describe the process of transcription. Many were able to achieve full marks, and most were able to apply the information in the diagram to achieve some of the available marks. However, there was a general confusion between transcription and translation.

Q.2 In parts (a) and (b) most candidates correctly identified the colour of the flame if sodium ions were present. However, many candidates thought the drug Pilocarpine was used to measure the concentration of salt in sweat, missing the link to sweat production. In part (c) (i) most candidates correctly calculated the mean value for colorimetric analysis and used significant figures correctly, but many lost the mark for chloride ion concentration by not reading the value correctly from the graph. Part (c) (ii) was well answered.

Q.3 This question required candidates to describe gel electrophoresis and then analyse a simple electrophoresis result.

(a) Most candidates achieved well here giving a clear description of the process although there was some confusion with the polymerase chain reaction.

(b) This was generally well answered but a few candidates tried to describe a genetic cross.

Q.4 This question related to the mode of action of two drugs mentioned in the pre-release material which candidates had the opportunity to research prior to the examination.

(a) Very few candidates were able to reference the role of CFTR channels in producing dilute mucus. Some candidates lost marks by mentioning water moving in and out of cells.

(b) Similarly, here, few candidates were able to reference the hydrolysis of DNA in mucus. Additionally, many candidates were not specific enough to gain a mark for the use of a nebuliser, referring only to the target organ rather than the lungs.

Q.5 This question proved to be quite challenging for many candidates. Describing the trends in a graph was only completed successfully and unambiguously by a minority of candidates. 'Describe' does not require any 'explanation'. Many candidates did not succeed in making it clear whether they were discussing the non-suffering or Cystic Fibrosis patients and therefore were unable to achieve marks.

Qu 6-11 Case Study 2: Hearing Loss

Mean: 12.0/25; FF: 48.0; Attempt rate: 99.9%.

Q.6 This question required candidates to have a knowledge of neurons and the nervous system and as in previous reports, this proved difficult for the majority of candidates.

(a) The function of the receptor cells and sensory neurons using appropriate scientific terminology could only be stated by a few candidates.

(b) The function of the parts of the neurone and the direction of travel of the nerve impulse was only completed successfully by the minority of candidates. Few candidates were able to identify the synapse in part (iii).

Q.7 The principle of the otoscope and two abnormal observations was completed well by the majority of candidates, although correct scientific terminology could have been used. The principle of tympanometry was less well known with many vague answers as to what is being measured. Only a few candidates were able to gain a mark by referring to the movement of the tympanic membrane in response to changes in pressure.

Q.8 This question required an understanding of pure-tone audiometry.

(a) It was disappointing that more candidates did not achieve full marks here for plotting a graph. A few candidates lost all the available for marks by not completing the graph and a few were unable to join the points with a suitable line. The line must be continuous and pass through the centre of the plotted points.

(b) As in question 5, many candidates struggled to describe the shape of the graph especially as reference to Figure 4 was necessary to link the threshold level to the degree of hearing loss.

Q.9 Most candidates were able to correctly identify corticosteroids as anti-inflammatory, and that their most suitable method of administration was orally.

Q.10 Most candidates were able to gain one of the two marks available here for correctly identifying exposure to loud noise as contributing to hearing loss. Only the better candidates could suggest a second reason.

Q.11 As in question 10, most candidates were able to gain one of the two available marks for suggesting a reason why ear protection is sometimes better than medication, referring to prevention of hearing loss being better than using medication. A few candidates correctly referred to cost or the side effects of medication.

Qu 12-14 Case Study 3: Mumps

Mean: 9.4/25; FF: 37.7; Attempt rate 99.9%.

Q.12 Very few candidates were able to give a comprehensive description of the specific immune response. Many candidates only gained credit for using the information in the graph to identify that more antibodies were produced in a shorter time period at the end of the secondary immune response. It was disappointing that so many candidates were able to write so much non-creditable information.

Q.13 Most candidates were able to state three ways in which paracetamol would improve symptoms, although some candidates gave ambiguous responses such as 'helping with pain' rather than 'reduces or relieves pain'. Part (b) proved to be more challenging with many candidates unable to select the three pieces of data required for the calculation. Part (c) (i) required a knowledge of Reye's syndrome, but only a few candidates could correctly identify the brain and liver as the two organs most affected by the syndrome. Better candidates were able to answer (c) (ii) correctly naming ulcers as a side effect of aspirin in the stomach.

Q.14 For part (a) there were good accounts of the link between the MMR vaccine and increased rates of autism. However, this was not the requirement of the question. Most candidates were able to gain at least one of the three available marks for identifying a reduction in the number of people vaccinated as being causative of the increase in the incidence of mumps. Better candidates were able to develop their ideas further to include a lack of herd immunity and increased detection of cases. Answers to part (b) were heavily influenced by the candidates' knowledge of the Covid pandemic and whilst some answers were relevant to mumps, many were not.

Summary of key points

The use of the pre-release material prior to sitting this examination is especially important.

Centres and candidates who perform best have read the pre-release and researched information about each case study especially:

- the prevalence and symptoms of the disease
- the named causes and the processes used in diagnosis
- named treatments
- the mode of action of any named drugs

The questions asked throughout the paper have a synoptic element. Therefore, it is essential that candidates have a knowledge and understanding of all the units studied throughout the course.

Candidates need an understanding of the command words used in the questions, such as, describe, explain, compare, list, and suggest.

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