1 Study Results & Discussion

Two sorts of data are presented within this chapter. Correlation statistics are presented which indicate the level of association between two variables at given data gathering points. They refer to the study sample as a whole – so for example actual B.M.I. found at data gathering point 2 can be compared with the reported level of distress at that point (again for the sample as a whole). As indicated earlier in this report, correlations may be positive or negative. Where statistical significance is not reached the results remain ambiguous and we cannot easily speculate on what is happening.

The second sort of data reported in this chapter refers to the patient profiles and describe changes in data over the three data gathering points. We are able to ascertain for example whether B.M.I. was increasing or decreasing, whether distress was rising or falling for individual patients. The purpose of this second sort of data is to offer possible assistance with the interpretation of correlations found or not found. For example, the discovery that there was no clear correlation between data a two different data gathering points could be reinforced as patient profile data showed patient changes remaining very individual indeed.

In interpreting the following data therefore it is necessary to acknowledge that the two data sets serve very different purposes. The correlation statistical data highlight strong associations at key data gathering points, whilst the patient profile data indicate what is

happening individually to patients. They may or may not convey a complementary picture of nutritional status and distress levels.

This chapter will summarise and analyse the findings related to the various variables, by patient, those associated with changes in nutritional status, those relating to whether they received nutritional support and that pertaining to reported levels of distress. Thereafter, an examination of possible correlations between nutritional status variables (actual/perceived and different status, underweight, normal, overweight and obese) and level of distress variables (low medium and high) will be considered. In addition other significant correlations were considered where they became apparent, for example between nutritional supplements used and distress levels at different points.

1.1 Analysis of Individual Patient Profile Data

Table 1 shows the demographic data of the patients. The patients are male (7/13) and female (6/13) and their ages vary between 19 and 77 years. This distribution of patients between the two sexes is typical of patients suffering the target tumours and undergoing chemotherapy in Malta when compared with the profile of patients treated in 2008.

Patient number	Age	Gender
1	23	Male
2	34	Male
3	19	Female
4	30	Female
5	69	Male
6	52	Male
7	77	Female
8	60	Female
9	65	Female
10	25	Male
11	50	Female
12	32	Male
13	70	Male

Table 1 - Age and gender distribution of patients

1.2 Analysis of Individual Patient Body Mass Index Data

This section will examine individual patient B.M.I.s at three data gathering points (points 1, 2 and 3).

Table 2 (on dissertation page 5) sets out the profile of B.M.I. change for each patient and notes whether they received nutritional supplements and were administered steroids. It is important for the reader to note at this point, that B.M.I. trends are described as the ‘same’ or ‘static’ where patients remained in the same nutritional category, ‘increased’ where they moved into a higher category (e.g. overweight from normal weight) and ‘decreased’ where

patient B.M.I. fell from a higher category (e.g. obese) to a lower one (e.g. normal weight). It is important to note that these trends are not associated here with values, for instance as 'good or bad weight loss'. The aim is identify any changes, while remaining objective and not entering into discussion as to whether these changes were desired by the patient (or carers) for any particular reason. One must keep in mind that the patients were never informed of their actual B.M.I. scores and the clinical implications which it might have had on them. Thus, even when, at a later stage, the patients' perceived nutritional statuses are discussed, it must be clear to the reader that I asked the patients for their opinion without giving them any indication of what their status was in reality. This was done not to compromise or influence the patients' responses or psychological distress in any way.

Patient No.	Data Collection Point 1		Data Collection Point 2		Data Collection Point 3			Nutritional supplementation Taken	Steroids taken
	B.M.I. (kg/m^2)	B.M.I. Explained	B.M.I. (kg/m^2)	B.M.I. Explained	B.M.I. (kg/m^2)	B.M.I. Explained	B.M.I. Trend		
1	29.9	Overweight	29.9	Overweight	29.9	Overweight	Same	No	Yes

2	21.9	Normal	21.9	Normal	21.9	Normal	Same	Yes	Yes
3	20.9	Normal	20.9	Normal	20.9	Normal	Same	Yes	Yes
4	25.4	Overweight	24.6	Normal	23.8	Normal	Decreased	Yes	Yes
5	24.2	Normal	24.2	Normal	24.2	Normal	Same	Yes	Yes
6	27.3	Overweight	25.4	Overweight	27.3	Overweight	Same	No	Yes
7	31.1	Obese	29.3	Overweight	29.3	Overweight	Decreased	No	No
8	23.4	Normal	24.2	Normal	24.2	Normal	Same	No	Yes
9	23.0	Normal	23.0	Normal	23.0	Normal	Same	Yes	Yes
10	26.4	Overweight	25.7	Overweight	25.0	Normal	Decreased	Yes	Yes
11	28.9	Overweight	31.1	Obese	31.1	Obese	Increased	Yes	No
12	33.1	Obese	34.9	Obese	36.7	Obese	Same	No	Yes
13	25.4	Overweight	26.0	Overweight	26.0	Overweight	Same	Yes	No

Table 2 - Table showing B.M.I. at different data collection points plus details of trend, nutritional supplementation and steroids taken

From Table 2 (dissertation page 5) one can observe that 9/13 patients maintained the same B.M.I.. Out of these, 5/9 (patients 2, 3, 5, 8, 9) started off with a normal B.M.I., 3/9 started off as overweight (patients 1, 6, 13) and one (patient 12) started off as obese. These results are surprising because first of all, and anecdotally cancer patients are expected to be underweight rather than normal, overweight or obese due to the effects of the illness, treatment and depression or distress that these cause. A surprising finding is the fact that none of the patients were underweight, at any point of their treatment. Nutritional supplements were therefore ordered to prevent patients becoming underweight, rather as a prophylactic measure than as a treatment of under-nutrition.

In this study, 3/13 patients (patients 4, 7, 10) showed a decrease in B.M.I. between data collection points 1 and 3. Two of these (4 and 10) were overweight at collection point 1 and patient 7 was obese before starting treatment. Their B.M.I. decrease was not profound either,

where it decreased by one level, falling by 1.4 in patient 10 and by 2.0 in patients 4 and 7. Possible reasons for these changes could be related to the patient's age, and the chemotherapy regimen which s/he received. Age of the patients varies between 20s and 70s and therefore, it is too varied to safely speculate about as a possible influence on falling B.M.I.

Scurr, Judson & Root (2005) describe how a chemotherapy regimen is usually calculated. First of all they state that combination therapy, i.e. using a combination of drugs rather than just one drug is more common as they increase malignant cell kill (Elion, Singer & Hitchings, 1954, cited in Scurr, Judson & Root, 2005, p.18; Skipper, Thomson & Bell, 1954, cited in Scurr, Judson & Root, 2005, p.18). Drug dosage is calculated using body surface area, where this is multiplied by a predefined drug dose. Some drugs have validated pharmacokinetic parameters whereby specific doses can be administered on the basis of body function. For example in certain drugs, such as Carboplatin, "dosage is correlated directly to glomerular filtration rate" (Calvert *et al.,* 1989, cited in Scurr, Judson & Root, 2005, p.22). Also, in order to achieve maximum tumour cell kill, chemotherapy should be given on a continuous basis (not in shots), with the number of cycles required by the patient depending on the reason for and the patient's response to the treatment. In Malta, the treatment cycles have a curative rather than a palliative aim and the regimens are therefore stronger and more aggressive. This therefore increases the intensity and frequency of the adverse effects and hence this would make food intake even more compromised.

The only patient who increased in B.M.I. is patient 11 (from 28.9 to 31.1). She is the only patient to have received Cyclophosphamide treatment. Rxlist.com (2009a) states that this drug causes lethargy, which might have caused the patient to use up less energy.

Chemocare.com (2009) specifies that the intensity of the symptoms depend on how much of this drug is given to the patients.

One factor which is designed to affect nutritional status is nutritional supplementation taken by the patients. At this hospital nutritional supplementation most often takes the form of sip feeds composed of complete nutritionally balanced drinks which are sipped from cans or similar containers. Flavours vary but the most popular among chemotherapy patients tend to be the stronger tastes like vanilla. The strong flavours help the patients to counter bad tastes that they associate with chemotherapy.

While all patients were offered nutritional supplementation, Table 2 shows the respondents that actually took the supplements. From those who took supplements, 5 maintained their B.M.I., 2 decreased their B.M.I. and 1 increased his B.M.I.. This is a mixed result suggesting that nutritional supplements alone do not invariably protect B.M.I. from the effects of the tumour and chemotherapy. The majority of patients, however, did sustain the same B.M.I. and one increased their B.M.I.. From the remainder of the patients who did not take supplementation, 4 maintained their B.M.I. and 1 showed a decreased B.M.I. score.

The results concerning nutritional supplementation are rather ambiguous. There is some evidence that they may have helped support patient B.M.I. (in 5 cases), but against this four other patients who did not take nutritional supplements also maintained their data point 1 B.M.I. status. Such ambiguities may be associated with the actual consumption of supplements, the standard diet taken by the patient, the nature of the tumour or reactions to

chemotherapy. However, considering that the aim of supplementation is to maintain or increase one's nutritional status these results suggest that in the short term the therapy may not be achieving all the goals that are sometimes set for it. The results for those taking nutritional supplements are not remarkably better than for patients who have not used a nutritional supplement. Whilst these findings do not relate directly to the central concern of this study (possible correlations between nutrition and levels of patient distress) they remain interesting given that nutritional supplements may have a psychological as well as a physical support role. Irrespective of the performance of supplements on B.M.I., they may be important in psychologically sustaining the patient during a time of adversity. This possible correlation is discussed later in this chapter.

As well as recording actual B.M.I. scores, patients in this study were invited to report their perceptions of nutritional status at data points 1 and 3. Respondents were asked to describe themselves as either underweight, normal weight, overweight or obese. None of the patients were purposefully advised of their actual B.M.I. scores or changes to the same (the weight and height data was routinely collected by clinicians and only discussed if patients sought an explanation of the same). Correlations between perceived nutritional status and distress may be more important than those between actual nutritional status (i.e. perhaps because perceived nutritional status is seen as a reserve against adversity). Table 3 (on dissertation page 9) sets out comparisons between actual and perceived nutritional status for each patient.

Patient Number	Patient Nutritional Status Data Collection Point 1		Patient Nutritional Status Data Collection Point 3		Perceptual accuracy
	Actual	Perceived	Actual	Perceived	
1	Overweight	Obese	Overweight	Overweight	improving
2	Normal	Underweight	Normal	Underweight	Inaccurate (underestimate)
3	Normal	Underweight	Normal	Underweight	Inaccurate (underestimate)
4	Overweight	Normal	Normal	Obese	Inaccurate (inconsistent)
5	Normal	Normal	Normal	Normal	Accurate
6	Overweight	Underweight	Overweight	Overweight	Improving
7	Obese	Normal	Overweight	Overweight	Improving
8	Normal	Underweight	Normal	Normal	Improving
9	Normal	Normal	Normal	Normal	Accurate
10	Overweight	Underweight	Normal	Normal	Improving
11	Overweight	Obese	Obese	Overweight	Inaccurate (inconsistent)
12	Obese	Obese	Obese	Obese	Accurate
13	Overweight	Normal	Overweight	Normal	Inaccurate (underestimate)

Table 3 - Actual and Perceived Nutritional Status of patients by Data Collection Point, comparing the patients' accuracy in perception[1].

At data collection point 1, 5/13 stated they were underweight, whereas none where in reality. Of these, 3/5 were in fact normal weight and 2/5 were overweight. At data collection point 3, two of these five still stated they were underweight, while 2 stated they became normal and one overweight. Underestimating nutritional status, especially at data point 1, might be important if patients also believe that they are then less well equipped to deal with the rigours

[1] Explanatory note: 'Improving' means that patient perceived nutritional status came closer to real nutritional status from data point 1 to 3; 'Inaccurate (underestimate)' means that they consistently underestimated their nutritional status; 'Inaccurate (inconsistent)' means they showed no consistency in their responses and 'Accurate' means that patient perceptions were always the same as their real actual measured nutritional status.

of chemotherapy. For that reason this chapter later examines possible correlations between underestimating body weight and high levels of patient distress. Conversely, we need to examine whether accurate estimates of body weight correlate positively with low levels of patient distress. One can also observe that, at collection point 1, 2/13 stated they were heavier than their actual status, 3/13 the same status and 8/13 stated having a lower nutritional status than they actually had. This could have been due to their expectation that they would have lost weight due to the cancer itself. At data collection point 3, 1/13 (patient 4) stated she was above her actual status, 8/13 the same status and 4/13 stated having a lower nutritional status than they actually had. Strangely, patient 4 stated a lower status before treatment and a higher status after treatment. A factor which could have influenced these results was what the patients understood by nutritional status, especially where it came to distinctions between what constituted being overweight and what constituted obesity. Although most people know that obese indicates a higher body weight than overweight, this could have confused patients during data collection, even though they were all given a simple explanation of the differences.

1.3 Analysis of Individual Patient Distress Data

In this section a distress level of up to 2.9 is assumed to equate to a low level of distress, 3.0 to 6.9 is assumed to be a medium level and 7.0 to 10.0 is assumed to be high level. Patient distress data was gathered at three data gathering points and information is set out in Table 4 below. The table indicates whether distress is low, medium or high and whether there is a trend in the data (for instance decreased as levels of distress fall over time). The term ‘modulating’ is used to describe distress scores that shift up and down without a clear direction. In examining this data it is necessary to note that all patients were visited by a

clinical psychologist who provided counselling support during the course of their treatment. No patients in this study refused this support.

Patient Number	Data Collection Point 1		Data Collection Point 2	Data Collection Point 3			Nutritional Supplemen-tation Taken	Steroids Taken
	Patient Distress Score	Patient Distress Score Explained	Patient Distress Score	Patient Distress Score	Patient Distress Score Explained	Patient Distress Score Trend		
1	3.0	Medium	3.0	2.0	Low	Decreased	No	Yes
2	3.0	Medium	2.0	3.5	Medium	Modulating	Yes	Yes
3	5.0	Medium	3.0	3.0	Medium	Decreased	Yes	Yes
4	5.0	Medium	5.0	5.0	Medium	Same	Yes	Yes
5	2.0	Low	2.0	2.0	Low	Same	Yes	Yes
6	5.0	Medium	6.0	5.0	Medium	Modulating	No	Yes
7	2.0	Low	2.0	2.0	Low	Same	No	No
8	9.0	High	2.0	2.0	Low	Decreased	No	Yes
9	1.0	Low	1.0	1.0	Low	Same	Yes	Yes
10	5.0	Medium	8.0	8.0	High	Increased	Yes	Yes
11	2.0	Low	8.5	8.5	High	Increased	Yes	No
12	5.0	Medium	8.0	10.0	High	Increased	No	Yes
13	8.0	High	9.0	9.0	High	Increased	Yes	No

Table 4 - Table showing Patient Distress Scores at different data collection points plus distress trend and use of nutritional supplements and steroids

Table 4 (on dissertation page 11) shows that out of the 13 participants of the study, 4 indicated that they experienced the same level of distress at data collection points 1, 2 and 3. It could be that these patients, who showed low to medium distress levels, had a good support

from the family or else cope with adversity in well rehearsed ways – either way, such matters must remain matters of speculation in a study such as this. Another reason could be the character traits of the individual patients who were either of the type who do not worry too much or accepted their situation and hoped for the best in their circumstances.

Four patients showed a steady increase in distress from collection point 1 to 3. In their case, it seems that their distress levels increased the more they went through the treatment process. In this case the side-effects of the chemotherapy might be the main reason why their distress increased so steadily. It might also be that their expectations with regards to their chance of curing the cancer faltered as time went by, and therefore their distress levels increased. Increasing distress might also be associated with the growing realisation of what the side effects really entailed. At data gathering point one side-effects were known as a description, but as treatment commenced they became real and remain at issue as the treatment cycle ended.

One patient (patient 6) shows a modulating distress score, where at data collection point 2 there is an increase from 5.0 to 6.0 and this decreases again to 5.0 at collection point 3. This increase in distress at point 2 could be due to the start of the chemotherapy symptoms that distressed the patient at that point in time, until he readjusted himself and reaccepted the symptoms. Another patient (patient 2) showed a modulating distress level where at data collection point 1 his distress level was 3.0; this decreased to 2.0 at point 2 and increased again to 3.5 at point 3. In this case, it might be that the patient was moderately distressed before treatment started because he had received the bad news and was adjusting to it. Then, once treatment started he started relaxing and calming down but once the side-effects started

manifesting themselves (between data collection point 2 and 3) his distress started increasing again. This patient was a young male (34 years old) who was very intelligent and was used to doing a lot of sports. He observed that the initial news of his diagnosis and treatment planned depressed him, as it limited his activities and stopped him from doing sports. At data collection point 2 he had been given explanations of the chemotherapy treatment he would receive and this would definitely calm him down, but his distress at the end of treatment increased again as he started to consider what would be the next step for him. In fact, he was one of the few patients who took Fludarabine – the other being patient 13, who also showed an increase in distress levels between collection point 1 and 2 to 3). According to Rxlist (2009b) this drug has various adverse effects which can affect most of the body systems and hence is very distressing to patients. In the case of patient 2, however, although his levels increased again, they always remained quite moderate, rising to a maximum of 3.5.

Three patients showed a decrease in distress levels from data collection points 1 to 3. One patient, patient 8, showed a very drastic decrease from collection point 1 (distress levels 9.0) to collection points 2 and 3 (distress level 2.0). This patient was a 60-year old female who had a very positive outlook towards life. Nursing staff said that she had been very distressed initially due to the bad news of the cancer but then adapted to the treatment and accepted her situation, turning to her husband and religion for consolation and support. Religion is a very strong support system and forms an integral part of many people's lives, in Malta, especially elderly people, and this woman was particularly religious. She had also been seriously ill in the past and this might have influenced the way she dealt with these situations and might have helped her adapt to her illness more easily.

If one were to observe the distress levels more in detail, one would notice that at data collection point 1 only 2/13 patients declared they felt high distress levels. At data collection points 2 and 3, the number of high distress levels rose to 4/13. Therefore the patients showed an overall low to medium distress. As already discussed before in this chapter, this could be related to high degrees of family and other types of support, which is a strong characteristic of the Maltese population. Religion was also mentioned by the patients themselves, as a means of support for the patients. A number of influences could confound what nurses anecdotally expect in cancer sufferers (high levels of distress) and hence these comments.

1.4 Examination of Correlational Data

The table below (Table 5, on dissertation page 15) shows the correlation statistics between actual B.M.I. at data collection points 1, 2 and 3 and distress levels at data collection points 1, 2 and 3. The shaded squares are those where the statistical software used identified important correlations between variables. Those marked with one asterisk (*) imply a correlation which is significant to a 0.05 significance level, while two asterisks (**) imply a correlation which is significant to a 0.01 significance level. Table 8 and Table 10 show the relationships between independent groups of variables using the ANOVA test. The statistical software used for statistical data analysis was the P.A.S.W.® (Predictive Analysis Software) Statistics version 17.02 (formerly known as S.P.S.S.® Statistics (SPSS, 2009). All the data was entered into this software and correlation statistics provided by this software, as seen in the table below. This shows correlations (P-values) and hence shows whether a statistical significant relationship could exist between actual B.M.I. and distress levels at the three data collection points.

		Actual B.M.I. at data collection point 1	Actual B.M.I. at data collection point 2	Actual B.M.I. at data collection point 3	Distress Level at data collection point 1	Distress Level at data collection point 2	Distress Level at data collection point 3
Actual B.M.I. at data collection point 1	Pearson Correlation	1	.955**	.947**	-.153	.438	.429
	P-value		.000	.000	.309	.067	.072
Actual B.M.I. at data collection point 2	Pearson Correlation	.955**	1	.986**	-.107	.508*	.529*
	P-value	.000		.000	.364	.038	.031
Actual B.M.I. at data collection point 3	Pearson Correlation	.947**	.986**	1	-.084	.502*	.528*
	P-value	.000	.000		.393	.040	.032
Distress Level at data collection point 1	Pearson Correlation	-.153	-.107	-.084	1	.346	.326
	P-value	.309	.364	.393		.124	.139
Distress Level at data collection point 2	Pearson Correlation	.438	.508*	.502*	.346	1	.966**
	P-value	.067	.038	.040	.124		.000
Distress Level at data collection point 3	Pearson Correlation	.429	.529*	.528*	.326	.966**	1
	P-value	.072	.031	.032	.139	.000	

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 5 - Correlations between Patients' Actual Body Mass Index (nutritional status) and Distress Levels.

In the following text I examine particular correlations and explore whether patient profile data help us to speculate carefully about significant findings. Data was input into the statistical software and examined for correlation. ANOVA testing was performed on various variables looking for any possible relationships which could emerge from the data. This was done with the help of a qualified statistician who made sure that none of the data was manipulated or altered and that the statistical analysis was done and interpreted accurately.

Table 5 shows that at data collection point 1 there was no significant correlation between actual B.M.I. and distress level. The Pearson correlation relating distress scores and B.M.I. at

data collection point 1 is -0.153 (see Table 5, on dissertation page 15). Since the p-value (0.309) exceeds the 0.05 level of significance we deduce that this correlation is not significantly different from 0 and hence there is no relationship between the 2 variables. Conversely, the Pearson correlations relating distress scores and actual B.M.I. at data collection points 2 and 3 are positive (0.508 and 0.528 respectively), indicating that BMI and distress scores at these points are closely associated. Since the p-values are less than the 0.05 level of significance (0.038 and 0.032 respectively), we deduce that these relationships are significant – i.e. at data collection points 2 and 3 when actual B.M.I. increases distress levels increase) and this is not attributed to chance (L.Camilleri (statistician), personal communication, 13 July 2009).

A positive correlation at these data gathering points suggests that the heavier the patient is (the higher their B.M.I.) the more this is associated with cancer/chemotherapy related distress. This is important as nurses and others identify which patients might require more psychological support, but it remains open to conjecture as to why this is. It is possible that patients who have higher B.M.I.s are already prone to anxiety and that the treatment event prompts greater distress. Patients for example who comfort eat and have a higher B.M.I. may also be more prone to distress associated with cancer chemotherapy. The finding runs counter to some opening speculations that patients with a high B.M.I. would be better insulated against the distress associated with chemotherapy. The theory that a body weight reserve might in some way help the patient limit distress levels doesn't at this stage seem one worthy of further investigation.

B.M.I. Trend	**Patient Distress Trend**	**Number of participants**
Static	Decreasing	3

Static	Modulating	2
Decreasing	Static	2
Static	Static	2
Decreasing	Increasing	1
Static	Increasing	2
Increasing	Increasing	1

Table 6 - Number of participants showing B.M.I. and Distress trends compared

Table 6 compares the number of patients showing different trends of B.M.I. and patient distress. 3/13 participants showed a similar trend in B.M.I. and Distress levels, 2 of them maintaining a static B.M.I. and distress level, and one (patient 11), showing an increase in both.

1/13 showed an inverse relationship trend between these variables, where B.M.I. decreased and distress increased. The remainder (9/13) showed that while one of the variables remained the same, the other varied. This data does not suggest any trend, although, in certain cases the decrease or increase in B.M.I. and/or distress level was minimal.

A curious fact is that patient profile data and those of the statistical analysis do not appear to agree. The difference is that the statistical software (as stated by the statistician (L.Camilleri (statistician), personal communication, 13 July 2009) compares the variables at the three data collection points, checking for relationships at each individual collection point. The tables (i.e. Table 6, Table 8 and Table 10) compare trends across all three data collection points and hence show trends of B.M.I. in comparison with patient distress levels, which are very individual to each patient. This means that it does not make the software any difference which patient scored highest or lowest at each particular point, but what trend the overall data

showed. The statistical software bases its analyses on averages of the data and compares these to obtain possible relationships. Now, the main difference between data collection point 1 and 2 was that at point 2, the patients had started to feel the side-effects of the chemotherapy. At data collection point 2, actual B.M.I. and distress scores started to show a relationship which was statistically significant (P-value 0.508, i.e. above 0.05), and this increased to 0.528 at data collection point 3. This means that the statistical analysis identified an even stronger correlation at data collection point 3, which (according to the statistician) was even generalisable to a whole population of patients suffering from the same cancer and treated in the same conditions as the ones investigated. The statistical software therefore demonstrated that as a whole, irrespective of individual ups and downs of patients, correlation was found between patient nutritional status and distress levels, after they started experiencing the side-effects of the chemotherapy (from data collection point 2 onwards). Even more, the statistician remarked that the statistical software assumes that the sample size is infinite, and hence the significant relationship would still exist if the sample had been smaller or larger. A longer-term study, researching the same patients for a longer period of time even after treatment ended, and possibly even at second and third treatment cycles, would be worthwhile to confirm these results even further. The limitations of this study, above all the time-constraints, made this impossible to carry out.

Zainal *et al.* (2007) used the same Distress Thermometer used in this dissertation, to measure distress levels in cancer patients undergoing chemotherapy. They found that while the mean distress level was 3.6, 51% of patients indicated levels of 4 or more. Although the mean distress level in this study was similar (3.96), mean distress level was above 4 before the start of treatment (4.23) and at the end of treatment (4.69). At data collection point 2 (4 to 6 days of treatment), the average level was as low as 2.98. In Zainal's (*et al.*, 2007) study the mean

age of the patients was of 50 years while in this study it was 46.6 years (which is very similar). These authors found a significant correlation between age and distress (r=-0.21, P=0.007). Hussain *et al.* (2004) also found that in their study, consisting of patients with similar diagnoses as in this dissertation, older patients (aged >=47 years) had significantly greater spiritual distress but better emotional well being, when compared to younger patients.

1.4.1 Possible associations of Body Mass Index and various variables

1.4.1.1 Body Mass Index Data and Patients Taking Nutritional Supplements

All the patients studied were offered nutritional supplements in the form of complete balanced sip feeds, which they took as and if they wished or felt able to take. Table 7 shows the frequency of the patients' B.M.I. trends together with whether or not they took any nutritional supplements.

B.M.I. Trend	Nutritional Supplementation Taken	Number
Same	No	3
Same	Yes	5
Decreasing	Yes	2
Decreasing	No	1
Increasing	No	1
Increasing	Yes	1

Table 7 - Number of participants showing B.M.I. trends compared with whether they took nutritional supplementation

As can be seen from Table 7, where nutritional supplements are involved there is no obvious consistent relationship between patients who took supplements and those who showed a

stable, increasing or decreasing B.M.I. from data collection point 1 to 3. At this point one should speculate that whilst nutritional supplements were taken by patients, they were left free to decide how much they consumed. This could serve to influence the power of supplements to mediate changes in B.M.I., supporting this as normal or above in the face of tumour and chemotherapy during the treatment period. It is not clear from the study data why obese patients were offered nutritional supplementation. We might speculate that staff believed that eventually tumour and treatment would undermine the patient's B.M.I. and that supplements would prove useful in the longer term. Supplements are not only given to supply nutrients but in a form that assists with nutritional intake- they are easier to consume. This could be important when other nutritional intake (that required chewing) was more difficult. Data collection point 3, which was at the end of treatment, could have been too early to capture in that the long-term B.M.I. effects of the chemotherapy, such as a loss of body weight and some side-effects, might not have reached full intensity as yet. This could prompt the need for a longer-term longitudinal study, following patients from before treatment till two to six months after treatment.

Table 8 (on dissertation page 21) tabulates the P-values comparing the relationship between actual patient B.M.I. and various variables studied in this dissertation. The one-way ANOVA test is used to compare the mean scores between several independent groups (such as B.M.I. and Taking Nutritional Supplements). Where nutritional supplements are involved, when carrying out an ANOVA test comparing their use with actual patient B.M.I., Table 8 demonstrates that there is a significant relationship between them (P-value less than 0.05) at data collection points 1 and 3. This makes no clear sense when it comes examining the influence of nutritional supplementation on patients' nutritional status and does not clarify the results of the study. Besides all this, we might know what supplements the patients took but

we cannot be sure (because we have not monitored it) what other oral nutritional intake the patients took. From this study we cannot therefore assume, as one may think, that nutritional supplements have a distinctive relationship with B.M.I. status study.

	Taking Nutritional Supplements	Chemo Strength	Patient Perception Inaccuracy	Taking Steroids	Perceived Patient Nutritional Status
Actual B.M.I. at data collection point 1	0.027	0.449	0.429	0.247	0.027
Actual B.M.I. at data collection point 2	0.071	0.467	0.665	0.219	N/A
Actual B.M.I. at data collection point 3	0.039	0.542	0.578	0.300	0.041

Table 8 - Table showing significance of relationships (P-values) between actual B.M.I. and various variables by ANOVA statistical analysis

1.4.1.2 Body Mass Index Data with steroids taken by patients

B.M.I. Trend	Steroid Treatment Received	Number

Same	No	1
Same	Yes	8
Decreasing	Yes	2
Decreasing	No	1
Increasing	No	1

Table 9 - Number of participants showing B.M.I. trends compared with whether they received steroid treatment

Another factor which could affect nutritional status is the steroids which were administered routinely to the patients together with the chemotherapy. If one were to examine Table 9 one would observe that the majority (8/13) of patients receiving steroid treatment maintained a stable B.M.I. from data collection point 1 to 3. This is not what one would expect, because steroids are known to increase a person's water retention and hence his weight and therefore B.M.I. would be expected to increase rather than remain the same. In reality, 2 patients receiving steroid treatment showed a decrease in B.M.I. from overweight to normal (patients 4 and 10). The three patients who did not receive steroid treatment showed varied trends in their B.M.I. and therefore, here again, we cannot claim that steroids had any particular close association with the nutritional status of the patients, at least, in this study and up to the end of their treatment cycle.

When one examines Table 8 one confirms that no relationship exists between B.M.I. and steroid treatment of patients, as all the P-values at the three data gathering points are above 0.05. Here no relationship can be seen between actual nutritional status and the use of steroids and hence it would seem appropriate to conduct further research to investigate whether there would be any differences in these results after 1, 2 or 3 months after treatment has ended, assuming that certain effects of the treatment might take more time to become manifested and leave effects.

1.4.1.3 Body Mass Index Data with Perceived Nutritional Status

In Table 8 perceived patient nutritional status shows a statistical positive relationship with actual nutritional status at data collection points 1 and 3 (P-values 0.027 and 0.041 respectively). On the contrary, patient profile data (Table 3) (comparing individual data rather than group averages) does not indicate a clear relationship. It would have been interesting to see what the results would show if we had collected perceived nutritional status at data collection point 2 also. This finding would be worthy of investigation in a further study which could examine the opinion and the accuracy of the patients when reporting their own nutritional status in comparison with their actual nutritional status as measured by validated tools, such as the B.M.I..

1.4.1.4 Body Mass Index Data with other variables

When studying Table 8 we can see that other variables which we have not yet examined, such as the inaccuracy of the patients when reporting their own nutritional status and the strength of the chemotherapy taken showed no relationship with the actual nutritional status of the patients, as proven by their B.M.I. scores. This means that these variables did most probably not affect the patients' B.M.I. and hence neither the results of the study.

1.4.2 Possible associations of Distress Level Data and various variables

Table 10 (on dissertation page 24) shows the P-values demonstrated by ANOVA testing between patient-reported distress and various other variables not yet discussed. None of

these variables shows a P-value of less than 0.05 and hence none of them have a statistically significant relationship with distress.

	Taking Nutritional Supplements	Chemo Strength	Patient Perception Inaccuracy	Taking Steroids	Perceived Patient Nutritional Status
Distress scores at data collection point 1	0.520	0.641	0.467	0.858	0.407
Distress scores at data collection point 2	0.733	0.631	0.692	0.212	N/A
Distress scores at data collection point 3	0.676	0.849	0.631	0.276	0.613

Table 10 - Table showing significance of relationships (P-values) between patient distress and various variables by ANOVA statistical analysis

1.4.2.1 Distress Level Data with nutritional supplements taken by patients

If one were to examine Table 4 (- Table showing Patient Distress Scores at different data collection points plus distress trend and use of nutritional supplements and steroids, on dissertation page 11) one would notice that out of the 8 patients who took nutritional supplements, 3 remained at the same distress levels, 4 showed increased distress levels and 1 showed a decreased distress. This means that there seems to be no clear association between distress levels and whether patients took nutritional supplements or not, as is also confirmed by the statistical analyses shown in Table 10.

1.4.2.2 Distress Level Data with steroids taken by patients

Ten out of thirteen patients were given steroids as part of their treatment. Out of these patients, 3/10 maintained the same distress levels, 2/10 showed increased distress levels, 2/10 showed modulating distress levels and 3 showed decreased distress levels from data collection points 1 to 2 to 3. This shows no clear relationship between these variables, and neither do the statistical analyses carried out (as shown in Table 10). Therefore here we remain unclear whether the administration of steroids might serve to increase distress or moderate it. Further research is needed to examine how patients perceive steroids and understand their purpose in treatment and possible contributions to well being.

1.4.2.3 Distress Level Data and perceived B.M.I.

Table 3 (- Actual and Perceived Nutritional Status of patients by Data Collection Point, comparing the patients' accuracy in perception., on dissertation page 9)shows that although none were actually underweight, 38% (n=5) of patients stated they were underweight before treatment and 15% (n=2) stated that they remained so after treatment (patients 2 and 3). Most patients can also be seen to have underestimated their weight (n=8, 62%) before treatment, while their perceptions became more realistic after treatment. Besides, if one were to examine Table 8 one would realise that before the start of treatment (data collection point 1), patients who underestimated their nutritional status (n=7) had an average distress level of 4.8, while the two patients who overestimated their nutritional status (n=2) had an average distress level of 2.5. What is interesting to note is that in the questionnaire presented to patients at this stage most are unhappy with their nutritional status, while they agree that it

helps their morale and feel well informed about what they should eat. After treatment (data collection point 3) the average distress level of those patients who underestimated their nutritional status (n=4) was 6, while that of those patients who overestimated their nutritional status was 5 (n=1). What this might mean is that the treatment affected the patients' physical and mental condition and hence patients' perceptions towards their bodies. In the questionnaires administered at data collection point 3, the majority of patients (62-69%) stated that they were less anxious about their treatment side-effects because of their appetite and the balanced diet that they were eating and that eating a healthy balanced diet had a beneficial effect on their treatment and the side-effects, even helping them to cope with the latter better. This probably means that they felt that, although they were more distressed than on admission, they felt that the healthy diet made things better for them and helped them cope better with the side-effects.

When compared using ANOVA statistical testing to see whether a relationship existed between perceived nutritional status and distress (as demonstrated in Table 10), the analysis showed no significant correlation.