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EDITORIAL

Editorial

MMJ publication delays: a plea and an apology

Simon Attard Montalto

Both authors and readers of the Malta Medical Journal would have noticed that the editorial process has been unduly slow over the past few months. Unfortunately, this observation is correct and, unusually, this delay is not entirely all due to repercussions from COVID! There have been numerous issues that have contributed to a slowing down in manuscript turnover, most beyond the control of the editorial Board.

Paradoxically, the first reason follows a positive development in that the MMJ is receiving many more submissions for possible acceptance for publication. All manuscripts are required to go through the editorial process, although a minority do not proceed beyond an initial vetting exercise at editorial level. These would include, for example, those papers found to bear an unacceptable 'likeness' to other previously published work after scrutiny by *Turnitin* (NB: ALL submitted papers are screened for plagiarism), non-exceptional case reports, or papers with little reference to the local scene. This weeding out process eliminates only a small percentage of submissions not exceeding 25%, and means that the vast majority of papers are sent out to referees. The increased number of submissions adds extra pressure on the editorial team. The latter is a finite group of volunteers who, without exception, all have other full and/or part-time jobs, and dedicate time to the MMJ *oltre* these commitments. Furthermore, the editorial team has not expanded to cater for this increased workload: indeed, unforeseen constraints on some staff members have, if anything, decreased their availability to the MMJ.

The increased number of submissions translates into a greater demand for referees, invariably the bottle neck of the editorial process and the greatest determinant of manuscript delays. A recent open call from the MMJ for motivated colleagues to submit their willingness to act as referees was encouraging, and increased the referee bank by 28 individuals. This is nowhere near enough and still leaves some

Cover Picture:

'Sqaq biswiet Misrah San Frangisk, Qormi'

Watercolours

By Christian Camilleri

Christian Camilleri is an anaesthetist who began painting in childhood. His preferred medium and subject consist of watercolour figures, portraits, rural and battle scenes. He derives inspiration from both Baroque and early 20th Century sources.

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particularly problematic specialties without any names on the MMJ's list of potential referees. Delays for papers submitted within these specialties are now facing turnaround times of well over twelve months. Pleas to their respective academic Heads of Department are generally unheeded and written requests left unanswered. Authors submitting such papers are being informed about severe delays within their specialty, rather akin to Public Health warnings on tobacco advertising and, in some instances, have been asked to name potential referees for their paper.

Presently, the MMJ has overcome or, at least, ameliorated some of the problems mentioned above and work to clear the backlog has picked up. Nevertheless, the group of papers currently at the end of the editorial process and virtually 'ready to go' still surpasses three full issues of the MMJ, thereby condemning those further down the line and any new submissions to a lengthy timeline before they may appear in print!

Potential authors are very eager to get their work published and generally don't hold back to badger members of the editorial board for 'updates'. I would encourage that, if asked to contribute from the other side of the fence and review a paper, they should apply the same level of eagerness, pull out the stops and go that extra mile to support the MMJ. A decent review will take around an hour to an hour and a half to complete and, at most, such requests will materialise a few times per year. Surely this is not a massive 'ask' and should not be beyond the capabilities of most academics.

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ORIGINAL ARTICLE

Validation of the post-traumatic stress disorder checklist for DSM-V (PCL-5) in the Maltese perinatal population

Rachel Buhagiar, Catherine Dimech, Ethel Felice

Background

Perinatal post-traumatic stress disorder (PPTSD) is a stress-induced mental health condition, occurring in pregnancy and/or following childbirth. Left untreated, PPTSD can result in negative consequences for the entire family unit. This paper reports the validation of the self-report Post-Traumatic Checklist for DSM-V (PCL-5) questionnaire against the gold standard Clinician-Administered PTSD Scale for DSM-V (CAPS-5) diagnostic interview in the Maltese perinatal population.

Methods

The original English version of the PCL-5 was translated into Maltese and culturally adapted for use in this population. A total of 175 pregnant and/or post-partum mothers were recruited and self-completed the PCL-5 questionnaire. 28 mothers met criteria for CAPS-5 assessment which was performed by one of two trained professionals, following inter-rater reliability assessment.

Results

A strong, positive correlation between the Maltese and English-version of the PCL-5 was obtained (Kendall's tau-b 0.812; p-value <0.001). The internal consistency of the PCL-5 was high (Cronbach alpha=0.935) and the instrument showed a good validity (Pearson Correlation=0.710; p-value 0.004). The suggested PCL-5 cut off point for a provisional PPTSD diagnosis is 36. The prevalence of PPTSD for Malta ranges between 0% and 3.63%. This figure needs to be interpreted with caution given the relatively small sample size.

Conclusion

The Maltese-language version of PCL-5 has good reliability and validity, confirming its diagnostic utility as a screening instrument in the early and timely detection of PPTSD sufferers.

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Background

Recent developments in the field of perinatal mental health have given rise to a renewed interest in perinatal posttraumatic stress disorder (PPTSD). This common and debilitating stress-induced mental disorder[1] can occur in pregnancy or in the first twelve months after delivery, as a result of an "exposure to actual or threated death, serious injury or sexual violation".[2] Whilst pregnancy and transition to parenthood are often portrayed to be positive maternal experiences, some women perceive these events as negative and traumatic. Difficult childbirth processes, pregnancy-related complications and adverse post-partum events can lead to the development of partial or full symptoms of PTSD.[3-7] Additionally, other lifetime non-perinatal stressors can also contribute to the development of this disorder.[8-9] Indeed, a lifetime trauma history can increase the individual's risk of experiencing further traumas substantially. Similarly, routine obstetric care and/or other invasive interventions can trigger PTSD in women with a history of sexual abuse. Therefore, screening measures for PPTSD need to include any life-time traumatic experience/s. In addition to the presence of a "stressor", other diagnostic criteria for PPTSD include symptoms of 'intrusion', 'avoidance', 'negative alterations in mood and cognitions', and 'alterations in arousal and reactivity' which cause significant distress and/or impair the individual's functionality.[2]

In a descriptive phenomenological study by Beck (2004), mothers with a personal lived experience of PPTSD related to traumatic birth events described intense negative emotional feelings, infant estrangement and even suicidal thoughts. Indeed, people with unresolved trauma often find it difficult to feel secure.[10-11] PPTSD has also been linked to lower birth weights and breastfeeding[12] and possibly negative parent-infant interactions and developmental outcomes, resulting in increased morbidity, mortality and healthcare costs.[13] According to Yildiz, Ayers and Phillips (2017), PPTSD is common enough to be a public health concern and is known affect 3.3% and 4% of pregnant and post-partum mothers, respectively.[12] Over recent years, the perinatal period has been associated with higher rates of PTSD, possibly indicating increased vulnerability of women in this period.[14] However, to-date, the prevalence of PPTSD on the Maltese Islands, an archipelago at the center of the Mediterranean with an estimate total population of 460,000 occupants[15] remains unknown.

Furthermore, research evidence indicates that PPTSD remains largely undetected.[16] However, the need to introduce PTSD screening as part of routine assessments is being increasingly recognized, especially in the presence of a previous traumatic history and/or co-existing mood or anxiety disorder.[7] The lack of readily available validated measures for the assessment of trauma symptoms and PTSD may be one contributing factor to this gap in service provision.[6] These instruments would be valuable in the early and timely detection of these mothers[12, 17] helping them re-build a meaningful life and embrace again the possibility of recovery and well-being.[11]

Whilst clinical interviews are the gold standard in the diagnosis of PTSD, self-report measures may be the first step to assessment given the reported similar prevalence rates to the former.[18] Additionally, self-report questionnaires are more economical and do not require training.[17] Another advantage is the added privacy for respondents which decreases the likelihood of information and interviewer biases.[19] At the same time, whilst self-report measures can assist clinicians in their everyday assessments,[20] they cannot be used as

stand-alone tools or replace more comprehensive assessments.[21] Such questionnaires can also be a source of anxiety for service users,[22] therefore their proper administration needs to be ensured, as well as ascertaining that adequate referral pathways and protocols are in place prior to their implementation.[12]

Developed at the National Centre for PTSD, the Posttraumatic Stress Disorders Checklist for DSM-V (PCL-5) *(Appendix I)* is one of the most commonly used self-report tools for detection of PTSD.[23] This instrument is readily available and accessible online. Whilst it is widely used in the general adult population, to-date only few studies have attempted to validate this questionnaire within the perinatal setting,[18, 24] but many lack methodological rigour. In the context of these limitations, as well as the lack of a PSTD self-report tool in the Maltese language, this new and novel project was conducted. The primary objective was to translate the PCL-5 into Maltese and to culturally adapted the tool to reflect the nation's values, beliefs and customs,[25] whilst ensuring the "equivalence between the original source and the target language".[26] Another objective was to validate it for use within Maltese pregnant and post-partum mothers. As a secondary objective, the best PCL-5 cut off point for a provisional PPTSD diagnosis was determined. Whilst authors recommend a cut-off value of 33,[21] a range of other values between 28 to 60 have been identified in different PCL-5 validation studies.[24] Besides, authors state that the "goals of the assessment and the population being assessed" should be considered when determining the cut-off value.[23] Finally, this project will allow for an estimate prevalence of PPTSD in Malta to ascertain whether further healthcare investments need to be targeted to this field.[27]

Methods

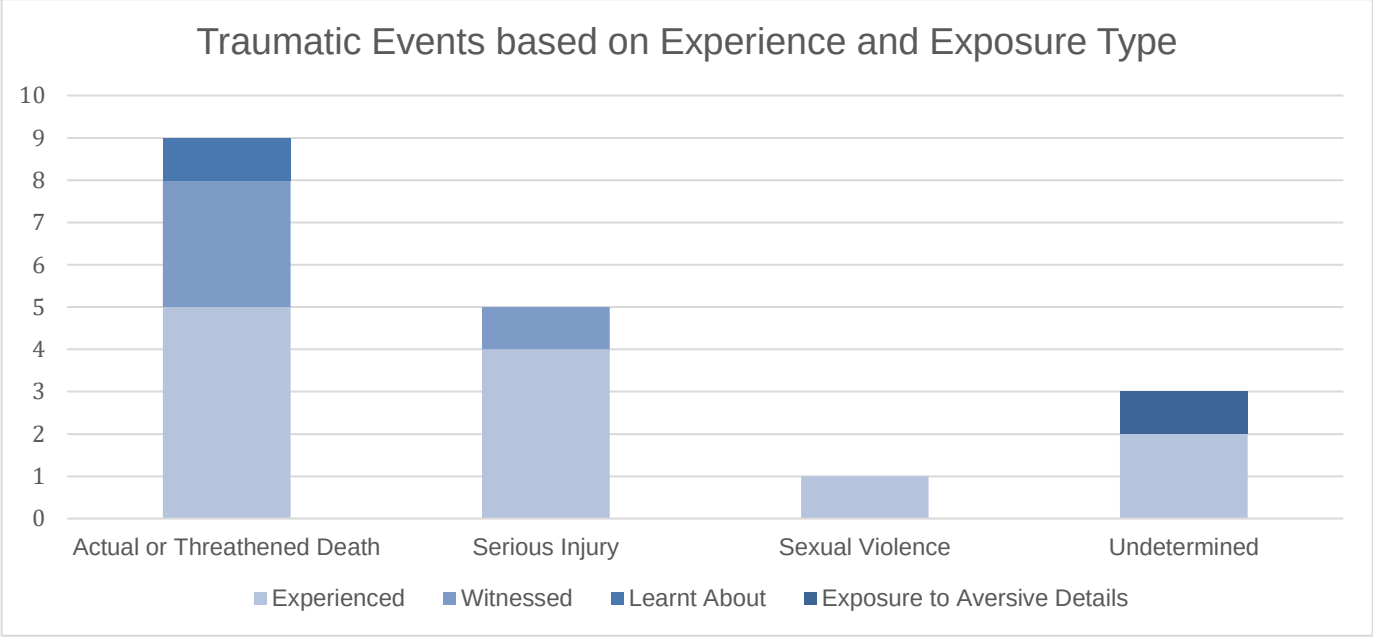
This study was approved by the Health Ethics Committee as part of the Directorate for Health Information and Research in Malta (Reference HEC02/18). The original English-version of the PCL-5 was translated into Maltese by two independent qualified translators and any discrepancies were discussed and resolved. The Maltese version of the PCL-5 was then back-translated into English by a team of ten independent bilingual individuals which included mental health service providers, service users and back-translators with no awareness of the intended concepts measured in the PCL-5 to avoid bias.[28] Each statement and word (content and semantic equivalence) were studied to ensure that the meaning remained unchanged in the Maltese language and idiom as the English version. Modifications for any identified discrepancies ensued until the back-translated scale was equivalent to the original English version.

This translated scale was subsequently piloted tested in a sample representative of the main study group to assess its comprehensibility, clarity and legibility, and ensure its wording, length and sequencing[29] reflected participants' educational level and culture. In this way, interpretation bias was minimized.[19] The lack of a readily available reading ease test in Maltese was one limitation here. Following this process, as part of the reliability assessment,[17] a group of twelve bilingual individuals completed both language versions of the questionnaire at two different time points.

In the next stage, a random sample of 175 pregnant and/or mothers who had delivered in the previous 6 months were recruited from the Obstetrics Department, Antenatal Classes and Breast-Feeding Clinic at Mater Dei Hospital in Malta on two designated days per week between August 2018 and February 2019 *(Figure 1).* There were no specific

exclusion criteria, except for participants needing to have a good command and understanding of both the English and Maltese language and being able to give informed consent. Recruited mothers self-completed the PCL-5 questionnaire and the Life Events Checklist for DSM-5 (LEC-5). The latter identified the index traumatic event which was subsequently used as the basis for symptom inquiry in the diagnostic interview. Basic demographics details were recorded. Those 28 participants who scored 20 or above in the PCL-5 questionnaire were invited for the CAPS-5 diagnostic interview. The CAPS-5 is the gold standard tool in the diagnosis of PTSD.[23] This assessment was carried out in-person or over the telephone by one of two trained interviewers, both holding a medical degree and significant post-graduate experience in mental health. The inter-rater reliability for both interviewers was measured. Given that the PCL-5 questionnaire focuses on symptomatology over the previous month, the CAPS-5 interview was performed within one month of completion of the PCL-5.

Figure 1 Traumatic events based on experience and exposure type for CAPS-5 participants



Results & Statistical Analysis

The SPSS version 25 was used in the data analysis process.

Participant Characteristics

A total of 175 mothers between the ages of seventeen and forty-five years were recruited *(Table 1).* At the time of participation, most of the mothers were pregnant with the majority of them being in their third trimester. Only seven out of the 175 recruited participants (4%) were new mothers who had recently given birth. The majority were married and/or living with partner, employed and with at least twelve years of education. Most of the mothers had previous pregnancy experiences. The current pregnancy was planned for nearly 75% of the participants (*n*=131). Less than 10% of subjects (15/175) had a previous history of abuse during their lifetime.

Table 1 Characteristics of the Study Population

Characteristic	All Participants (N=175)		CAPS-5 Interview (N=18)		PCL-5 Screening Only (N=157)	
	n	%	n	%	n	%
Antenatal Mothers	168	96	15	83.3	153	97.4
Gestational Age (Weeks)						
<10	2	1.1	0	0	2	1.3
10-19	34	19.4	3	16.7	31	19.7
20-29	34	19.4	5	27.8	29	18.5
30-40	83	47.4	7	38.9	82	52.2
40+	10	5.7	0	0	4	2.5
Unknown	5	2.6			5	3.2
Postpartum Mothers	7	4	3	16.7	4	2.5
Age Group (Years)						
<20	5	2.9	0	0	5	3.2
20-29	64	36.6	4	22.2	60	38.2
30-39	100	57.1	13	72.2	87	55.4
40+	6	3.4	1	5.6	5	3.2
Educational Level (Years)						
<6	2	1.1	0	0	2	1.3
6-12	14	8	0	0	14	8.9
>12	149	85.1	18	100	131	83.4
Unknown	10	5.7	0	0	10	6.4
Married/Living with Partner						
Yes	162	92.6	17	94.4	145	92.3
No	10	5.7	0	0	10	6.4
Unknown	3	1.7	1	5.6	2	1.3
Employed						
Yes	138	78.9	15	83.3	123	78.3
No	37	21.1	3	16.7	34	21.7
Any other Pregnancies						
Yes	71	40.6	11	61.1	60	38.2
No	98	56	7	38.9	91	58.0
Unknown	6	3.4	0	0	6	3.8
Planned Pregnancy						
Yes	131	74.9	12	66.7	119	75.8
No	43	24.6	6	33.3	37	23.6
Unknown	1	0.6	0	0	1	0.6
Any Past History of Abuse						
Yes	15	8.6	3	16.7	12	7.6
No	158	90.2	15	83.3	143	91.1
Unknown	2	1.1	0	0	2	1.3

Life-Events Checklist for DSM-V (LEC-5)

Figure 1 summarizes the traumatic events according to the type of experience and form of exposure for the eighteen participants completing the CAPS-5 diagnostic interview. Criterion A, or the presence of a stressor, was met for most of the mothers (n=15/18; 83%). Actual/threatened death to self/others was the commonest form of stressor, followed by serious injury and sexual violence. Most mothers had direct exposure to the traumatic event. Four out of the eighteen participants (22%) had pregnancy-related stressor events, namely pregnancy losses and unwanted pregnancies in the context of abuse.

Reliability & Validity, Cut-Off Point & Prevalence

Reliability was assessed across three areas: over time (test-retest), across interviewers (inter-rater) and across items of the questionnaire (internal consistency). A p-value of <0.05 was taken to represent a statistically significant result.

Test-retest reliability for the Maltese and English language variants of the PCL-5 questionnaire was evaluated using Kendall's tau-b coefficient. Table 2 shows the rating responses for question 4 of the English and Maltese-versions of the PCL-5 for the 12 participants. This question was selected randomly for the purpose of this exercise. The p-value obtained (approximately 0) (Table 3) indicates consistent responses between the two language variants. A similar compliance was seen for the remaining 19 questions.

Table 2 Kendall-tau for Question 4 of Maltese and English Versions of the PCL-5

		Question 4 (English)				
		Not at all	**A little bit**	**Moderately**	**Quite a bit**	**Extremely**
Question 4 (Maltese)	**Not at all**	4	0	0	0	0
	A little bit	0	1	0	0	0
	Moderately	1	2	2	0	0
	Quite a bit	0	0	0	0	0
	Extremely	0	0	0	0	0

Table 3 The Kendall's tau-b correlation and p-value for question 4 of the PCL-5

		Value	Standard Error	Approximate T	P-value
Ordinal by Ordinal	Kendall's tau-b	0.812	0.111	5.495	0.000
N of Valid Cases		12			

The Kendall's Tau-b Coefficient was also applied to determine the inter-rater reliability. Similarly, both interviewers gave consistent independent estimates as evidenced in the Kendall-Tau p-values which were less than the 0.05 level of significance *(Table 4 and 5)* indicating satisfactory reliability. For the internal consistency of the PCL-5, the Cronbach's alpha (*Table 6*) was calculated for the four symptom clusters (*Table 7 and 8*), individually and combined. The values obtained ranged between 0.764 and 0.934 showing satisfactory to excellent reliability. The inter-item correlation across all 20 questions was also analyzed *(Table 8).*

Table 4 & 5 Kendall's tau-b and p-value for inter-rater reliability

		Recurrent involuntary and intrusive distressing memories of traumatic event		
		Absent	Mild	Severe
Recurrent involuntary and intrusive distressing memories of traumatic event	Absent	2	0	0
	Mild	0	1	0
	Severe	0	0	2

		Value	Standard Error	Approximate T	P-value
Ordinal by Ordinal	Kendall's tau-b	1.000	0.000	8.944	0.000

Table 6 Internal Consistency for Cronbach's Alpha

Cronbach's Alpha	Internal Consistency
0.9-1.0	Excellent
0.8-0.9	Good
0.7-0.8	Acceptable
0.6-0.7	Questionable
0.5-0.6	Weak
Less than 0.5	Unacceptable

Table 7 Cronbach's Alpha for the individual and combined symptom clusters of intrusion, avoidance, cognition and mood, and arousal and reactivity

All variables combined		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.934	.935	20
Intrusion symptoms		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.873	.880	5
Avoidance symptoms		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.764	.766	2
Cognition and mood symptoms		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.846	.848	7
Arousal and reactivity symptoms		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.813	.823	6

Table 8 Inter-Item Correlation Matrix

	q1	q2	q3	q4	q5
q1	1.000	.683	.711	.694	.592
q2	.683	1.000	.569	.494	.535
q3	.711	.569	1.000	.601	.505
q4	.694	.494	.601	1.000	.557
q5	.592	.535	.505	.557	1.000

	q6	q7
q6	1.000	.621
q7	.621	1.000

	q8	q9	q10	q11	q12	q13	q14
q8	1.000	.481	.284	.400	.355	.378	.295
q9	.481	1.000	.656	.654	.429	.403	.440
q10	.284	.656	1.000	.595	.360	.345	.466
q11	.400	.654	.595	1.000	.455	.320	.350
q12	.355	.429	.360	.455	1.000	.553	.488
q13	.378	.403	.345	.320	.553	1.000	.610
q14	.295	.440	.466	.350	.488	.610	1.000

	q15	q16	q17	q18	q19	q20
q15	1.000	.550	.387	.371	.506	.362
q16	.550	1.000	.206	.374	.419	.363
q17	.387	.206	1.000	.559	.469	.447
q18	.371	.374	.559	1.000	.570	.411
q19	.506	.419	.469	.570	1.000	.567
q20	.362	.363	.447	.411	.567	1.000

In the validity process, Pearson's Correlation Coefficient was used to analyze the total PCL-5 and the CAPS-5 scores. The Pearson Correlation coefficient (0.710) was statistically significant (p-value 0.004) *(Table 9),* meaning that the two scales complement each other. Therefore, participants scoring high on one scale tend to score high on the other and vice versa *(Figure 2).*

The logistic regression model was then applied to determine the best PCL-5 cut-off point for a provisional diagnosis of PPTSD. This model *(Table 10)* identifies the total PCL-5 score as a significant predictor of the PTSD diagnosis (p-value <0.005). Moreover, this one predictor model explains 59.1% of the total variation in the PTSD diagnosis outcomes (Nagelkerke Pseudo-R Square Value of 0.591). Also, the odds ratio *(Table 11)* indicates that for every unit increase in the total PCL-5 score, the odds of having a PPTSD diagnosis increases by 36.8%. The scatter plot *(Figure 3)* displays two logistic curves, showing the probability of having or not having a PTSD diagnosis. The two curves meet when the PCL-5 score is 36, implying that individuals with a total PCL-5 score equal or greater than 36 are more likely to suffer from this disorder.

The prevalence of PPTSD in the Maltese population according to the CAPS-5 diagnostic interview, based on a 95% confidence limit, ranges between 0% to 3.63% (*n*=3/175). However, only 18 out of the 28 participants (64%) scoring above the PCL-5 cut-off point were assessed using the CAPS-5 *(Figure 4).*

Table 9 Pearson Correlation and the corresponding p-value for PCL-5 and CAPS-5

PCL-5	Pearson Correlation	0.710
	P-value	0.004

Figure 2 The relationship between total PCL-5 scores and total CAPS-5 scores

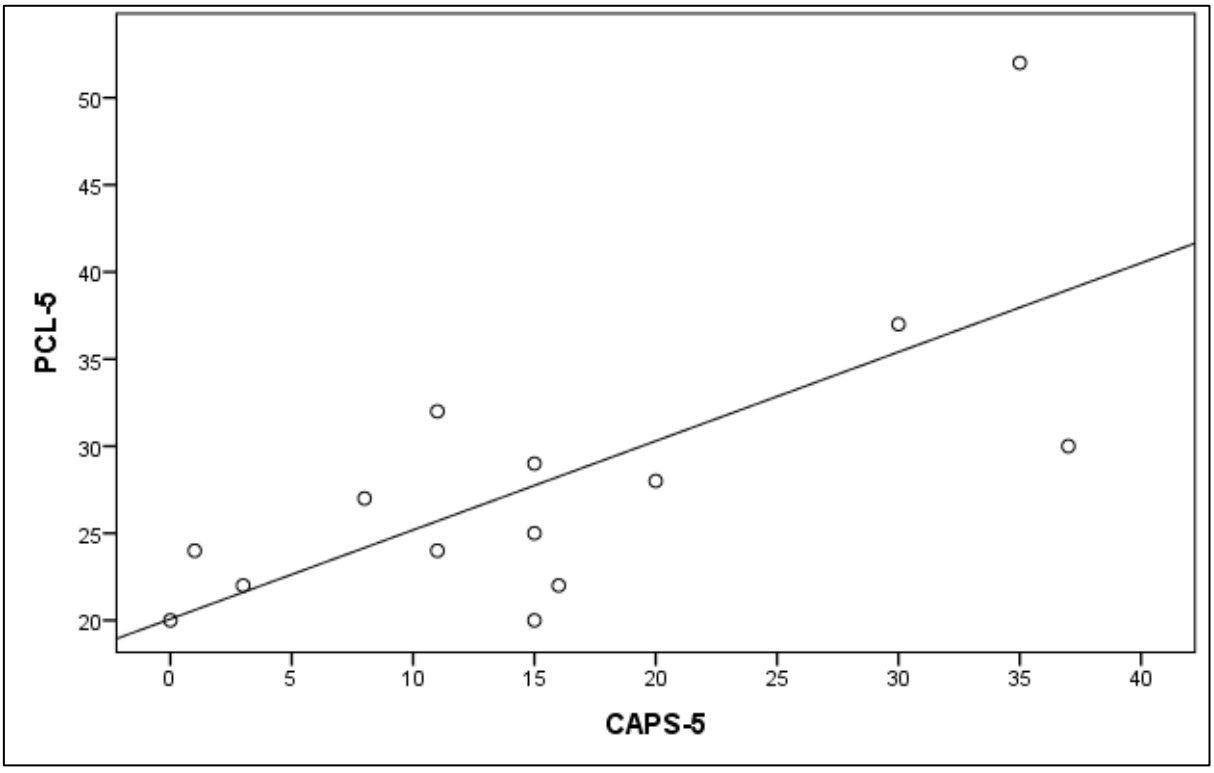


Table 10 Logistic regression model

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	P-value
Intercept	17.226	11.567	1	0.001
Total PCL-5 Score	13.448	7.788	1	0.005

Table 11 Odds Ratio

		B	Std. Error	Wald	df	P-value	Odds Ratio
PTSD = Yes	Intercept	-11.290	5.930	3.624	1	.057	
	Total PCL-5 Score	.313	.183	2.943	1	.086	1.368

The reference category is: No.

Figure 3 Scatter plot showing cut-off point of 36 for provisional PPTSD diagnosis

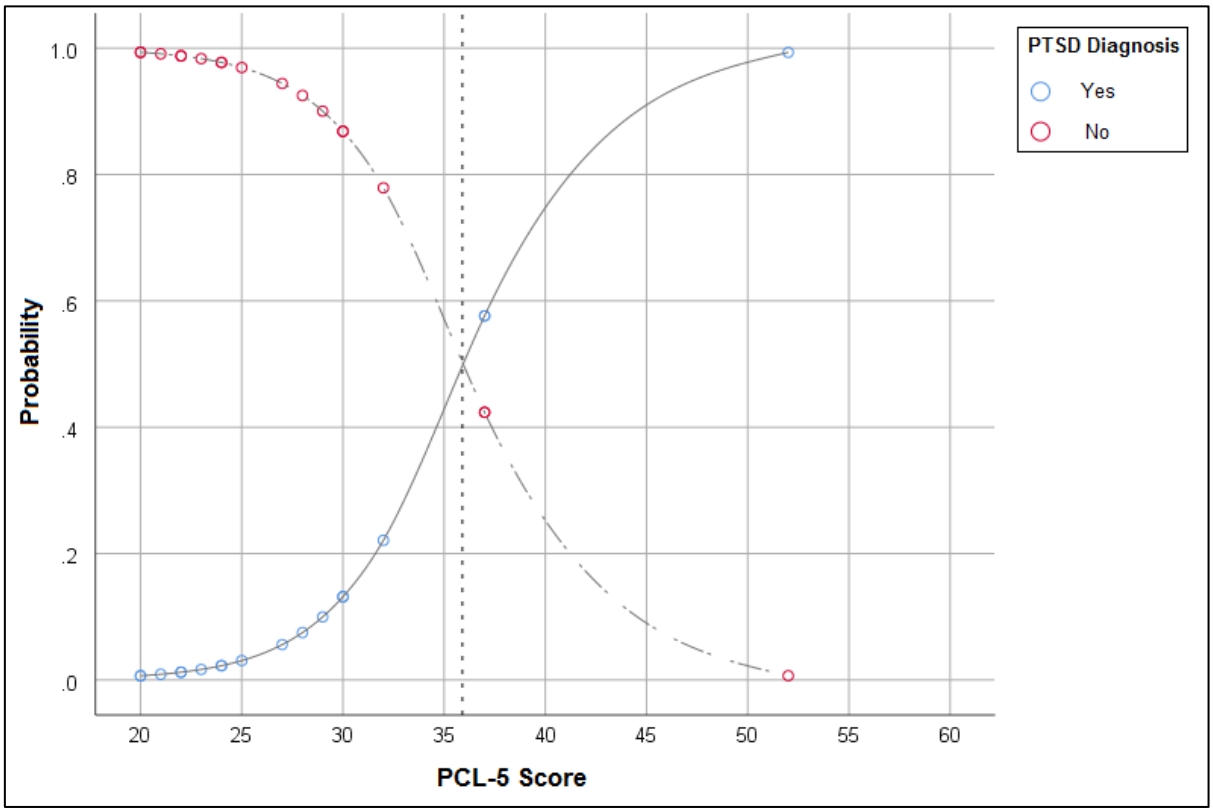
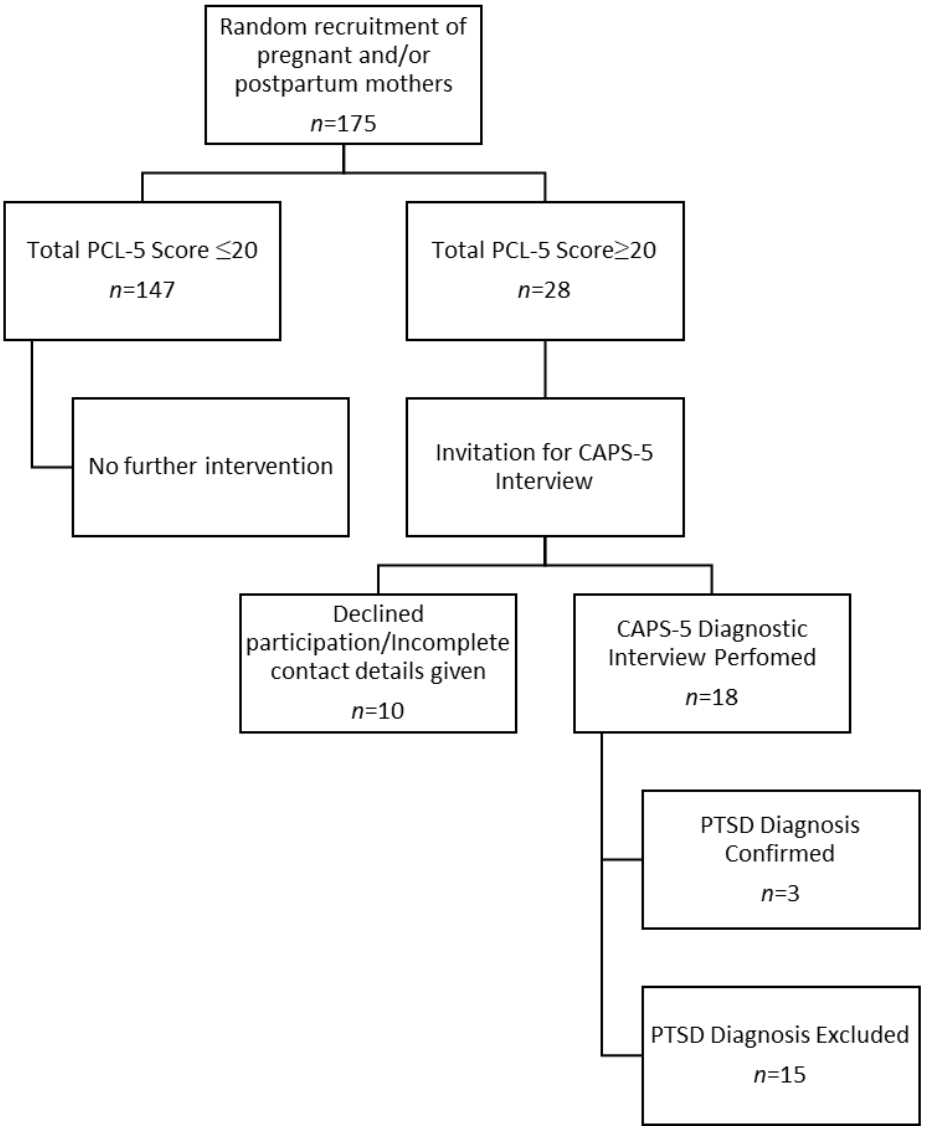


Figure 4 Flowchart of recruited participants and their outcome



Discussion & Limitations

To our knowledge, this is the first study to translate and validate the PCL-5 for use within the Maltese perinatal population. Prior to the conduction of the project, educational sessions about PPTSD and the study itself were organized for healthcare providers and service users to create an effective teamwork with a "collective identity and shared responsibility".[30] Every individual was empowered to contribute, share ideas, and raise any questions. In this way, "societal acceptance and local ownership"[31] was ensured. This collaborative approach characterized by open dialogue,[32] workforce development and planning, and partnership with communities[11] is in keeping with the recovery model. At the same time, the translation, cultural adaptation and validation of the tool was specifically targeted for use within Maltese perinatal women and failed to consider other female residents in Malta, such as those from refugee and immigrant background in Malta. The latter would have necessitated a separate ethical application, as well as the establishment of inter-professional partnership with healthcare providers serving this particular population and with service

users' representative of this sample. Furthermore, another key aspect is that given that this study did not include women residing in Gozo, the results obtained cannot be really generalized to this cohort.

Amongst the strengths of this study is the design and delivery of a multi-stage translation process based on guidelines[28] and the assessment of inter-rater reliability for research interviewers. In the test-retest reliability exercise, a two-week period was the selected time period between the administration of the two language variants of the PCL-5 to participants. There is paucity of literature data on the best timeframe for this assessment[28]; however, research evidence shows that if the duration is too short or too long, inaccurate results may be achieved. Another strength was the use of the LEC-5 trauma index tool for the identification of any lifetime traumatic events which extend beyond perinatal experiences. The use of the CAPS-5 gold standard interview in the validation process was another positive point. A total PCL-5 score of 20 or above was the determining factor for CAPS-5 evaluation, as opposed to a value of 33 which is the recommended cut-off point for a provisional diagnosis of PTSD. Nonetheless, this follows authors' recommendation of using a lower score when using the tool for research purposes.[21] Blinding of interviewers to the total PCL-5 score was also ensured throughout this stage. The CAPS-5 interview was conducted over the telephone for most participants. Apart from enhancing compliance and minimizing drop-out rates, phone interviews were found to be a more reliable method of interviewing when assessing patients for PTSD.[33] Furthermore, in the absence of face-to-face contact, participants had added privacy when answering personal questions.[24]

Failure to base sample size on a pre-study consideration of statistical power was one limitation. A sample size of 175 participants was selected because of the unexpected increased difficulty in recruitment. Whilst a larger sample size may have yielded stronger and more accurate results, "there are no absolute rules for the sample size needed for the validation of a questionnaire".[28, 34] Additionally, Comrey and Lee (2013) state that a sample of 200 participants is considered "fair" for validation processes.[35] Another area for improvement is evaluation for any potential confounding factors, such as co-morbid mental health difficulties. People experiencing PTSD are commonly found to have other co-existing difficulties[5] with the vast majority meeting criteria for at least one other mental health disorder.[36] In a systematic review by Agius et al. (2016), it was found that triple co-morbidity consisting of depression, anxiety and PTSD occurs in 2 to 3% of post-partum mothers.[37] Furthermore, women from Gozo were not included in this study, and therefore, the inclusion of this cohort might have yielded different results.

Based on the study results, the suggested PCL-5 cut-off point for a provisional PPTSD diagnosis in the Maltese population is 36. This is similar to the cut-off point of 33 recommended by the authors.[21] Also, this study identifies the prevalence of PPTSD in Malta to be in the range of 0% to 3.63%, lower than international figures.[18] More supportive networks and the still prevalent religious background of our target population might be possible explanatory factors for this difference.[38-39] Despite this finding, the slowly changing demographic characteristics of our population are likely to alter this identified prevalence over time, towards an increased rate. However, this area requires further exploration before any definite conclusions can be drawn. Moreover, in this study, ten out of the twenty-eight participants (35%) who scored above the PCL-5 cut-off point for CAPS-5 diagnostic interview failed to

provide contact details and/or refused participation in this assessment. Possible reasons for this non-engagement could be fear of being stigmatised and/or judged and having limited time availability due to motherhood demands. Such barriers to care need further exploration, especially when developing screening methods and treatment pathways for this population. These non-respondents were not accounted for in the final prevalence estimate, possibly limiting the accuracy of the result obtained.

Conclusion

In conclusion, PCL-5 may be used as a screening tool in Maltese perinatal mothers given its good reliability and validity. A cut-off value of 36 is recommended for a provisional diagnosis of PPTSD, however further assessment is recommended before confirming or refuting a diagnosis. Furthermore, the relatively high trauma rate (10%; *n*=18/175) identified within our study sample reinforces the need to consider the possibility of unresolved trauma and/or PTSD within all healthcare settings, including perinatal services, and to ensure the provision of trauma-informed care.[11] Implementation of the PCL-5 instrument within local healthcare services can therefore ensue to allow for the early and timely detection of PPTSD sufferers and assist clinicians in their routine assessments without extra effort, training or financial costs.

Summary Box

What is already known about the subject?

- Perinatal PTSD is a significant complication of pregnancy and the post-partum period. Left untreated this condition, can have devastating implications for the entire family unit.
- This condition is not routinely screened for, mainly as a result of lack of validated measures, with the dire consequence that perinatal PTSD sufferers remain undetected and untreated.
- The Post-Traumatic Stress Disorder Checklist for DSM-V (PCL-5) is a widely used screening tool for PTSD; however little is known about its validity in the perinatal population, more especially for expectant women or new mothers of Maltese origin.

What are the new findings?

- The PCL-5 may be used as a screening tool in Maltese perinatal women given its good reliability and validity.
- The recommended cut-off point for a provisional diagnosis of perinatal PTSD is 36.
- However, following the use of this tool, clinical assessment is still recommended before confirming or refuting a diagnosis of perinatal PTSD.
- The prevalence of PPTSD in the Maltese population according to the CAPS-5 diagnostic interview, based on a 95% confidence limit, ranges between 0% to 3.63%.

REFERENCES

1. Zhang D, Zhang J, Gan Q, Wang Q, Fan N, Zhang R, et al. Validating the psychometric characteristics of the perinatal posttraumatic stress disorder questionnaire (PPQ) in a Chinese context. Arch Psychiatr Nurs. 2018;32(1):57-61.
2. American Psychiatric Association (APA). Posttraumatic stress disorder [Internet]. APA: America, 2013 [cited 2019 Nov 13]. Available from: https://webcache.googleusercontent.com/search?q=cache:l9aSuAMLuIIJ:https://www.psychiatry.org/File%2520Library/Psychiatrists/Practice/DSM/APA_DSM-5-PTSD.pdf+&cd=4&hl=en&ct=clnk&gl=uk&client=safari
3. Forray A, Mayes LC, Magriples U, Eperson CN. Prevalence of post-traumatic stress disorder in pregnant women with prior pregnancy complications. J Matern-Fetal and Neonatal Med. 2014;22:522-527.
4. Farren J, Jalmbrant M, Ameye L, Joash K, Mitchell-Jones N, Tapp S, et al. Post-traumatic stress, anxiety and depression following miscarriage or ectopic pregnancy: a prospective cohort study. BMJ Open. 2016;6(11):1-9.
5. The Australian Government. The perinatal period: trauma and families [Internet]. Australian Government: Australia, n.d. [cited 2019 Nov 20]. Available from: http://earlytraumagrief.anu.edu.au/files/Trauma%20in%20the%20perinatal%20period.pdf
6. Dekel S, Stuebe C, Dishy G. Childbirth induced posttraumatic stress syndrome: a systematic review of prevalence and risk factors. Front Psychol. 2017;8:1-10.
7. Geller PA, Stasko EC. Effect of previous posttraumatic stress in the perinatal period. J Obstet Gynaecol Neonatal Nurs. 2017;46:912-922.
8. Grekin R, O'Hara MW. Prevalence and risk factors of postpartum stress disorder: A meta-analysis. Clin Psychol. 2014;34:389-401.
9. Cohen MM, Ansara D, Schel B, Stuckless N, Stewart DE. Posttraumatic stress disorder after pregnancy, labor, and delivery. J Womens Health. 2014;13:315-324.
10. Beck CT. Mothers with post-traumatic stress disorder after traumatic childbirth struggled to survive and experienced nightmares, flashbacks, anger, anxiety, depression, and isolation. Evid Based Nurs. 2004;53:216-224.
11. Commonwealth of Australia. A national framework for recovery-oriented mental health services: Guide for practitioners and provider [Internet]. Commonwealth of Australia, Australia, 2013 [cited 2019 Nov 15]. Available from: https://www1.health.gov.au/internet/main/publishing.nsf/Content/67D17065514CF8E8CA257C1D00017A90/$File/recovgde.pdf
12. Cook N, Ayers S, Horsh A. Maternal post-traumatic stress disorder during the perinatal period and child outcomes: A systematic review. J Affect Disord. 2018;225:18-31.
13. Vignato J, Georges JM, Bush RA, Connelly D. Post-traumatic stress disorder in the perinatal period: A concept analysis. J Clin Nurs. 2017;1-10.
14. Seng JS, Rauch SA, Resnick H, Reed CD, Kind A, Low LK, et al. Exploring post-traumatic stress disorder symptom profile among pregnant women. J Psychosom Obstet Gynaecol. 2010 Sep;31:176-187.
15. National Statistics Office (NSO). World population day: 2019 [Internet]. NSO: Malta, 2019 [cited 2019 Nov 12]. Available from: https://nso.gov.mt/en/Pages/NSO-Home.aspx.
16. Muzik M, Cameron HG, Fezzet A, Rosenblum KL. Motherhood in the face of trauma: PTSD in the childbearing year [Internet]. 2009 [cited 2019 Nov 11]. Available from: https://www.researchgate.net/publication/234773167_Motherhood_in_the_Face_of_Trauma_PTSD_in_the_Childbearing_Year
17. Dementrious C, Ozer BU, Essau CA. Self-report questionnaires. The Encyclopedia of Clinical Psychology. 2015;1-6.
18. Yildiz PD, Ayers S, Phillips L. The presence of posttraumatic stress disorder in pregnancy and after birth: A systematic review and meta-analysis. J Affect Disord. 2017;208:634-645.
19. Kazi AM, Khalid W. Questionnaire designing and validation. JPMA. 2012;62:514-516.
20. Jensen-Doss A, Hawley KM. Understanding barriers to evidence-based assessment: clinician attitudes toward standardized assessment tools. J Clin Child Adolesc Psychol. 2010;39:885-896.

21. Weathers FW, Blake DD, Schnurr PP et al. The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). 2013a [cited 2019 Nov 19]. Available from: www.ptsd.va.gov

22. The Editor. Screening for perinatal depression: a missed opportunity. The Lancet. 2016;387:505.

23. Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, Schnurr PP. The PTSD Checklist for DSM-5 (PCL-5). 2013b [cited 2019 Nov 20]. Available from: www.ptsd.va.gov.

24. Gelaye B, Zheng Y, Medina-Mora ME, Rondon MB, Sanchez SE, Williams MA. Validity of the post-traumatic stress disorders (PTSD) checklist in pregnant women. BMC Psychiatry. 2017;17:179.

25. Al Maskari TS, Melville CA, Willis DS. Systematic review: cultural adaptation and feasibility of screening for autism in non-English speaking countries. Int J Ment Health Syst. 2018;12:22.

26. Fregnani CM, Fregnani JH, Paiva CE, Barroso EM, de Camargos MG, Tsunoda AT, et al. Translation and cultural adaptation of the Functional Assessment of Chronic Illness Therapy- Cervical Dysplasia (FACIT-CD) to evaluate quality of life in women with cervical intraepithelial neoplasia. Einstein. 2017;15:155-161.

27. Noordzij M, Dekker FW, Zoccoli C, Jager KJ. Measures of disease frequency: prevalence and incidence. Nephron Clin Prac. 2010;115:c17-c20.

28. Tsang S, Royse CF, Sulieman Terkawi A. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. Saudi J Anaesth. 2017;11:S80-S89.

29. Jain S, Dubey S, Jain S. Designing and validation of questionnaire. IDMJAR. 2016; 2:1-3.

30. Golom FD, Schreck JS. The journey to interprofessional collaborative practice. Pediatr Clin N Am. 2018;65:1-12.

31. Lynge E, Tomber S, von Karsa L, Segnan N, van Delden JJM. Determinants of successful implementation of population-based cancer screening programmes. Eur J Cancer. 2012;48:743-748.

32. Gehart DR. The mental health recovery movement and family therapy, part II: a collaborative, appreciative approach for supporting mental health recovery. J Marital Fam Ther. 2012;28:443-457.

33. Aziz MA, Kenford S. Comparability of telephone and face-to-face interviews in assessing patients with posttraumatic stress disorder. J Psychiatr Pract. 2004;10:307-313.

34. Antoine E, Moret L, Regnault A, Sebille V, Hardouin JB. Sample size used to validate a scale: a review of publications on newly developed patient reported outcomes measures. Health Qual Life Outcomes. 2014;12:2.

35. Comrey AL, Lee HB. A first course in factor analysis. Lawrence Erlbaum Associates: Hillsdale, 1992.

36. Brady KT, Killeen TK, Brewerton T, Lucerini S. Comorbidity of psychiatric disorders and posttraumatic stress disorder. J Clin Psychiatry. 2000;7:22-32.

37. Agius A, Xuereb RB, Carrick-Sen D, Sultana R, Rankin J. The co-existence of depression, anxiety and post-traumatic stress symptoms in the perinatal period: a systematic review. Midwifery. 2016;36:70-79.

38. Shi L, Wang L, Jia X, Li Z, Mu H, Liu X et al. Prevalence and correlates of symptoms of post-traumatic stress disorder among Chinese healthcare workers exposed to physical violence: a cross-sectional study. BMJ open. 2017; 7(7):e016810.

39. Tran CT, Kuhn E, Walser RD, Drescher KD. The relationship between religiosity, PTSD, and depressive symptoms in veterans in PTSD residential treatment. Journal of Psychology and Theology. 2012;40(4):313-22.

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ORIGINAL ARTICLE

Cyberbullying and mental health of adolescents

Faye Grech, Mary Anne Lauri

Background

For most adolescents cyberbullying can be very devastating, resulting in both physical and psychological symptoms. Young people who are victims of cyberbullying experience mild to severe mental health issues.

Methods

This study investigates the incidence and effects of cyberbullying among a sample of 367 adolescents between the ages of 13 and 16. The data was collected through a questionnaire which was adapted from the EU Kids Online European study. Motivations for cyberbullying include revenge, jealousy, power and a minority do it for fun.

Results

One-third of cyber victims experience anger, sadness, fear and humiliation. They also feel unsafe, helpless and excluded. Results also show that 18% of those who were cyberbullied resorted to self-harm while 30% experienced suicidal ideation.

Conclusion

Cyberbullying needs to be given more importance in the training of health professionals since it has a negative effect on wellbeing and mental health.

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Introduction

Technological advances have made informational access and exchange easier and more rapid.[1] Digital Media have changed the way we live and the way we communicate. As with most things, there is the negative side of using technology. Using social media to harass others can cause physical and psychological distress and affects wellbeing of cybervictims.

Cyberbullying, cyber harassment, electronic bullying and cyberaggression all refer to a phenomenon which has been receiving increasing attention in the press, in academia and in schools.[2] The emotional and psychological harm that can culminate from cyberbullying is significant, leaving adolescents scared and distressed.[3-4] Cyberbullies and cyber victims often experience negative outcomes such as school avoidance and failure, depression, and low self-esteem.[4-5] Research on the topic shows that even cyberstanders are negatively impacted.[6]

Online risks for adolescents can take the form of content risks (adolescent as recipient), contact risk (adolescent as participant) or conduct risk (adolescent as actor).[7-8] This study focuses on conduct risk, particularly the risk of initiating the cyberbullying and contact risks particularly the risk of being cyberbullied.

Adolescent as actor or cyberbully

Cyberbullying is defined as an intentional and repeated aggressive act in an electronic context (e.g., email, blogs, chatrooms, social media, text messages, instant messages, online games, or websites) against a person who cannot easily defend oneself.[4-5,9] It is deliberate and repeated.[9] Cyberbullying acts are done purposefully to hurt, in contrast to accidents or harmless teasing.[10] It can take the form of sending offending text or images, mocking, spreading false rumours and being excluded from a chat group. In the online context, bullying messages travel faster, and the audience is much larger.[11-12]

Motivations for electronic aggression include revenge, jealousy, fun or entertainment.[13] Low self-control or impulsivity is found to be a characteristic of cyberaggressors.[14-15] A high score on impulsivity, or a low score on self-control, is associated with bullying others.[16-17]

The cyberbully's anonymity gives the bully a sense of power and control.[3] Different to face-to-face bullying, the cyberbully does not have to witness the effects of the bullying on the victim, thus blurring the empathic interchange.[11] The online disinhibition effect makes bullies do and say hurtful things more than they would face-to-face.[18]

There is a link between being a cyberbully and a being a cybervictim. Some cyberbullies admit that they themselves were bullied at a particular time.[14]

Cybervictims

Targets of cyberbullying have several characteristics in common. They are more likely to be seeking acceptance and to be noticed online, they are often not savvy users and may not have been made aware of internet safety. Often, they did not get opportunities to develop resilience when dealing with adverse situations and have less access to caregiver support. Lastly they are less likely to report an unsafe cyber situation to an adult.[19] Studies report that approximately half of adolescents experience cyberbullying while more than half report witnessing frequent online bullying with most students failing to report it.[20]

Long-term consequences of cyberbullying include hyperactivity, conduct issues, low pro-social behaviours, smoking, intoxication, and psychosomatic symptoms such as headaches.[21]

Lodge, found that those who have experienced consistent cyberbullying are more likely to engage in criminal behaviour later on in life.[22] Adolescents who are cyber victims are more likely to have suicidal thoughts.[23-26]

What can victims do?

Cybervictims and cyberstanders can take action against cyberbullying, including printing complete emails, taking screenshots and making a report. The National Association of School Psychologists (NASP)[27] suggests eight steps to be taken by victims and their parents. First, the cyberbully should be asked to stop the harassment and delete any belligerent messages. This step should be done carefuly but firmly to ensure that it does not transpire into retaliation. This is a crucial step since it defuses the cycle of attack and retaliation. Following this the vitim should be asked to ignore or block any communications, to ensure that the bullying is not continued or perpetrated. The third step should be of making a hard copy of the abusive material and showing it to the cyberbully's caregivers to gain their support in halting this behaviour. In this way, parents can become collaborators who work together to help adolescents to deal with this negative situation. Adolescents should then clean up contact lists and reduce other's access to the victim's accounts. Should the situation persist or escalate, the issue should be reported to the website, internet service provider or company. Parents and adolescents should also ask for support from the school psychologist, counsellor or administrative staff. Finally, if less radical steps are unsuccessful, one should report to the Cyber Crime Unit.

Programs such as Brave and BeSmartOnline! give children and adolescents information on how to deal with the cyberbullying. In Malta this programme includes talks delivered to educators and students in schools. BeSmartOnline! is working to raise awareness, educate and empower students, parents, and educators on how to use the internet safely. They also strive to promote the website www.childwebalert.gov.mt, which provides a site for reporting illegal and abusive online content.

The Maltese context

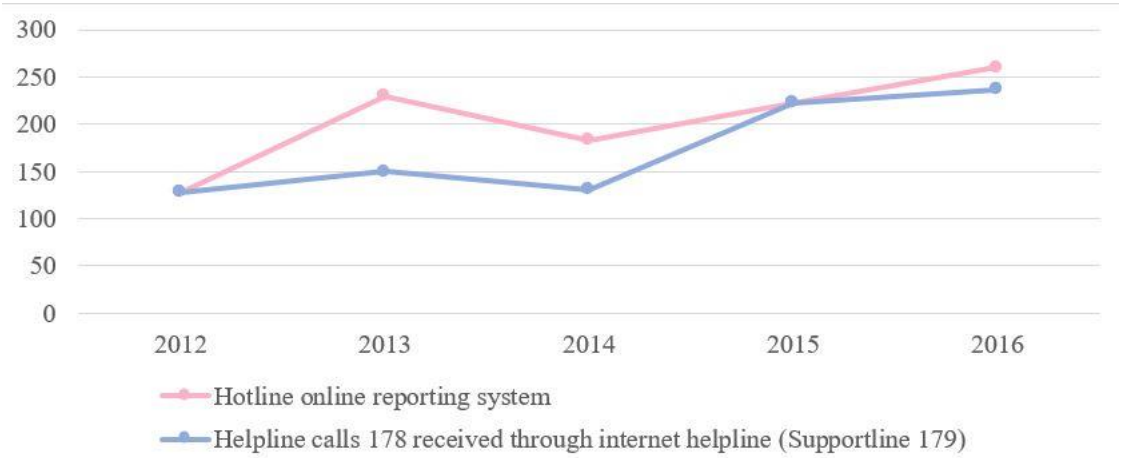
Cyberbullying is reported to be one of the most common issues faced by students who seek support from a Maltese online support service. The reports received by BeSmartOnline! Hotline and Helpline are on the increase as shown in Figure 1. In 2017, the national support line 179 operated by FSWS - Aġenzija Appoġġ received a total of 104 reports related to cyberbullying.[28]

According to a Maltese study by the Lauri and Farrugia, among participants aged between 9 and 16 years, 36.6% of students have been bothered online and 12.7% have seen hateful messages being directed at others. One fourth of the participants in this study preferred not talk to anyone about it.[29] From those students who sought help about this problem, many (42%) refer to a parent for help. Talking to peers (39%) is the second most common way of seeking help. Only a few (9%) talk to a teacher or educator about it. Statistics gathered by the Cyber Crime Unit, a specialized section within the Malta Police Force, indicated a general increase in cases involving the Unit. Figure 1 shows the increase in the reports received by the cybercrime unit between 2012 and 2016.

According to the Cyber Crime unit consequences of cyberbullying primarily include fear, which stems from (i) the fact that the audience is unknown, and (ii) the internet's digital permanence which makes it possible for the victim to read and reread the content. The Cyber Crime Unit expressed the need

for more community outreach and awareness about cybercrime and especially cyberbullying. Many children and parents refer to schools for information about internet-related safety.[29] When bullying is affecting a young person's mental health especially when the person suffers from additional health problems, doctors can work with school psychologists and educators to provide the necessary support.

Figure 1: Graph representing the number of reports received by BeSmartOnline Hotline and Helpline between 2012-2016



Materials and Methods

The aim of this study was to find out the incidence of cyberbullying as well as its effects. Based on the literature the following the research questions were formulated:

- What is the incidence of cyberbullying amongst Maltese adolescents aged between 13 and 16 who took part in this study?
- What possible effects does cyberbullying have on the victims?

Participants

For this study, classes of students aged between 13 and 16 from five schools were recruited. These were two State schools, two Church schools and one was an Independent school. Table 1 gives the population of students in State, Church and Independent schools and the corresponding sample numbers. Although the schools were not randomly chosen, they were selected to reflect different types of schools. Approval was obtained from the Faculty Research Ethics Committee. School administrators acted as gatekeepers and made initial contacts. They were responsible for the management of parental consent forms to maintain anonymity.

Table 1 Student Population and student samples- state, church and independent schools

	Student Population between 14-16 (ISCED 3 Level)	Sample
State Schools	4,414	153
Church Schools	2,940	137
Independent schools	875	77
Total	8,229	367

Questionnaire

The questionnaire used was based on a section of the EUKids Online questionnaire which was used in 27 countries in Europe in 2018. It was administered to a sample of 367 adolescents, during a Personal Social and Career Development lesson. The data collected was analysed quantitatively using Statistical Package for the Social Sciences (SPSS).

Results

Out of the 367 participating students, 80% (*n*=293) of the participants identified as Maltese and 20% identified as 'other'.With regards to gender, 52% were female, 46% were male, and 2% indicated 'other' or did not answer.

One in four participating, 24.5% (*n*=90) reported having experienced cyberbullying. In this study, of the 90 participants who experienced cyberbullying, 67, that is 74.4% also experienced face-to-face bullying. The relationship between those experiencing cyberbullying and being hurt also face-to-face was significant ($\chi 2=3.869$, df=1, $p<0.05$).

Table 2 gives the forms of cyberbullying, the percentages of participants who were victims of cyberbullying and the percentages who carried out bullying online.

Respondents described how they felt when they experienced cyberbullying. Figure 2 shows that anger was the most common feeling. Anger may cloud one's vision and impulsive

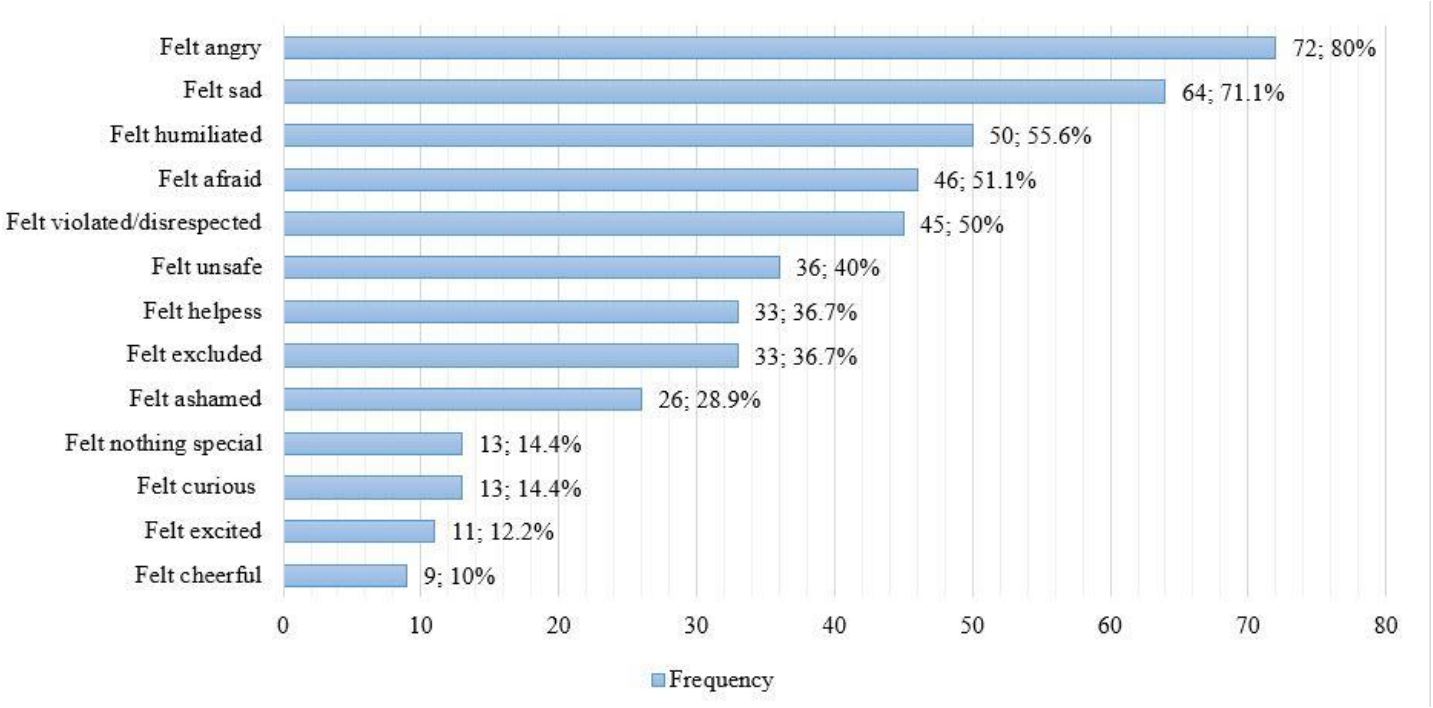
responses may ensue leading to retaliation. Retaliation would mean that the victim becomes the bully.

The adolescents may experience sadness and humiliation. They also feel humiliated because the bullying is being viewed by many other people especially when screenshots of chats are taken and forwarded to others. Victims also reported being afraid. Feeling unsafe has effects on wellbeing. The results show a significant difference in the mean life satisfaction score between those who were bullied and those who were not (t=-2.366, df=353, $p<0.02$), with those who experienced cyberbullying indicating a lower score for life satisfaction and wellbeing. Other studies also report this finding.[30-31]

Table 2 Experiences of cyberbullying and cybervictimization

Experience	Valid percentage of participants who selected:			
	I did it	**Done to me**	**Seen it happening**	**Never**
Sending nasty/hurtful messages	23.2	28.3	40.3	27.7
Passing around/posting nasty/hurtful messages where everyone could see	7	10.9	37.4	49.2
Leaving out/excluding someone from a group/activity online	24.9	26.6	31.6	29.1
Rumouring online	9.8	11.2	42.6	37.8
Using nicknames on the internet in a disturbing way	14.9	10.1	35.5	46.5
Using offensive symbols online	24.1	10.2	39.7	36.5
Mocking on the internet	18.8	12.8	38.2	40.2
Making fun of shared information on the internet	28.5	8.2	37.9	32.8
Writing offensive comments on websites	8.1	3.7	34.8	54.5
Using humiliating expressions on the internet	10.2	6.8	32.7	52.8
Using someone's identity without their permission online	6.8	6.5	26.5	61.1
Hiding identity on the internet	19.5	4.2	22.9	56.7
Entering someone's private page without permission	9.8	7.0	18.2	67.5
Hacking someone's private page without permission	2.5	4.7	15.9	74.6
Sharing/threatening to share videos online without permission	5.9	7.3	29.9	58.0
Sharing photos online without permission	15.9	14.2	29.9	47.5
Using personal information in a way which the person does not like	7.1	11.3	30.0	54.4
Editing photos in an offensive manner on the internet	10.4	8.1	34.2	47.6
Using abusive/insulting language in e-mails	2.8	4.5	18.4	73.1
Using the internet as a slandering tool (making false and damaging statements)	1.7	6.5	28.1	62.2
Using passwords to access someone's information or pretend to be someone	7.6	5.9	22.4	63.6
Finding out where someone is by tracking their phone/device	13.4	3.7	16.0	66.9

Figure 2 Cybervictims' feelings in relation to cyberbullying experiences by frequency



Effects of cyberbullying

Victims of cyberbullying reported feeling distressed, experienced suicidal thoughts, self harmed, and some said that they did not want to go to school (see Figures 3a-e). Some students reported that their academic performance suffered. These results are in line with other studies.[32]

Approximately 1 in 3 participants (*n*=131) admitted to having instigated cyberbullying. Often, belligerent messages were sent via messaging, through for example, Facebook, Whatsapp and other social networking sites. Cyberbullies reported that the motivations for bullying include retaliation or revenge, jealousy and sometimes teasing. Figure 4 shows the motivations behind cyberbullying as described by the participants of this study.

In line with cyberbullying research with adolescents[13] results of this study suggest a high correlation between victimization and perpetration. Those who instigated cyberbullying are more likely to have been victims (59% cyberbully-victims, 41% cyberbully only) ($\chi 2=4.350$, df=1, $p<0.05$). The fast-paced online world blurs the line between bully and victim in that it does not allow time for the victim to consider their response. Often the exchange of bully and victim roles occurs frequently and spontaneously. Figure 5 describes the dynamics between the instigator, the victim and the bystander. There are instances when the cyberbully and the cybervictim change roles rapidly. The cyberworld is carried in our pockets, with immediate and quick access, and posting without much consideration is an easy feat. Instigation and retaliation are easy behaviours in the online world.

Figure 3 Effects of cyberbullying

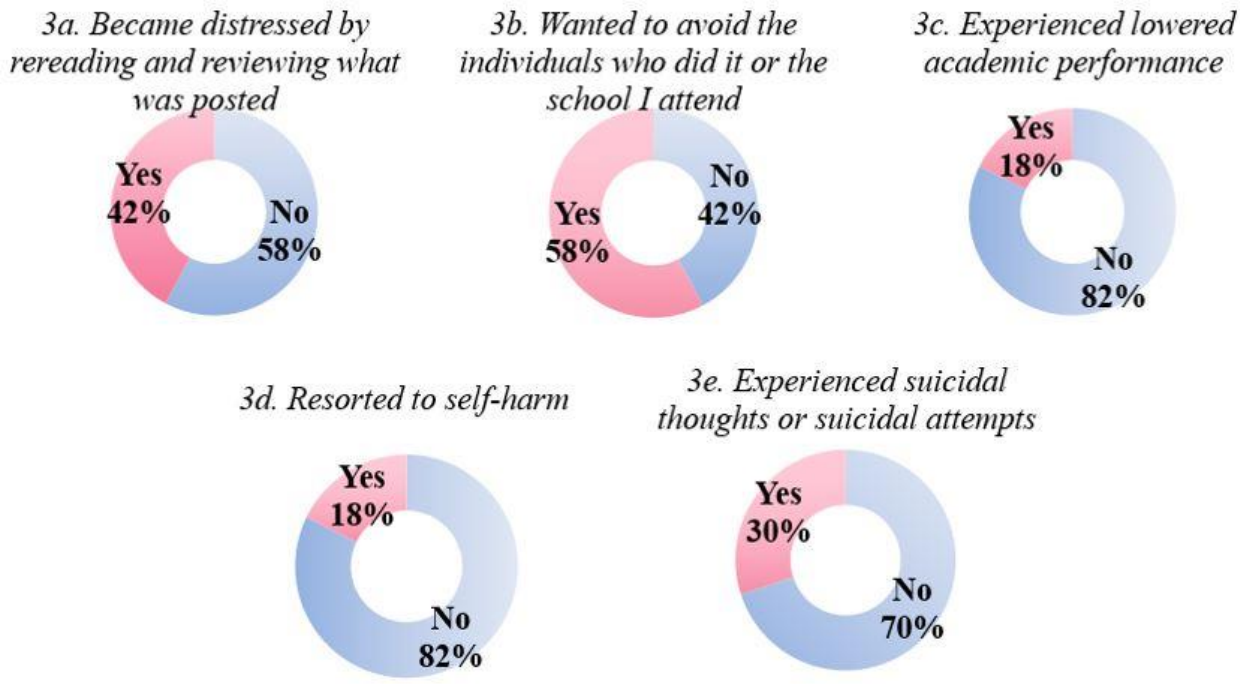


Figure 4 Motivations for cyberbullying

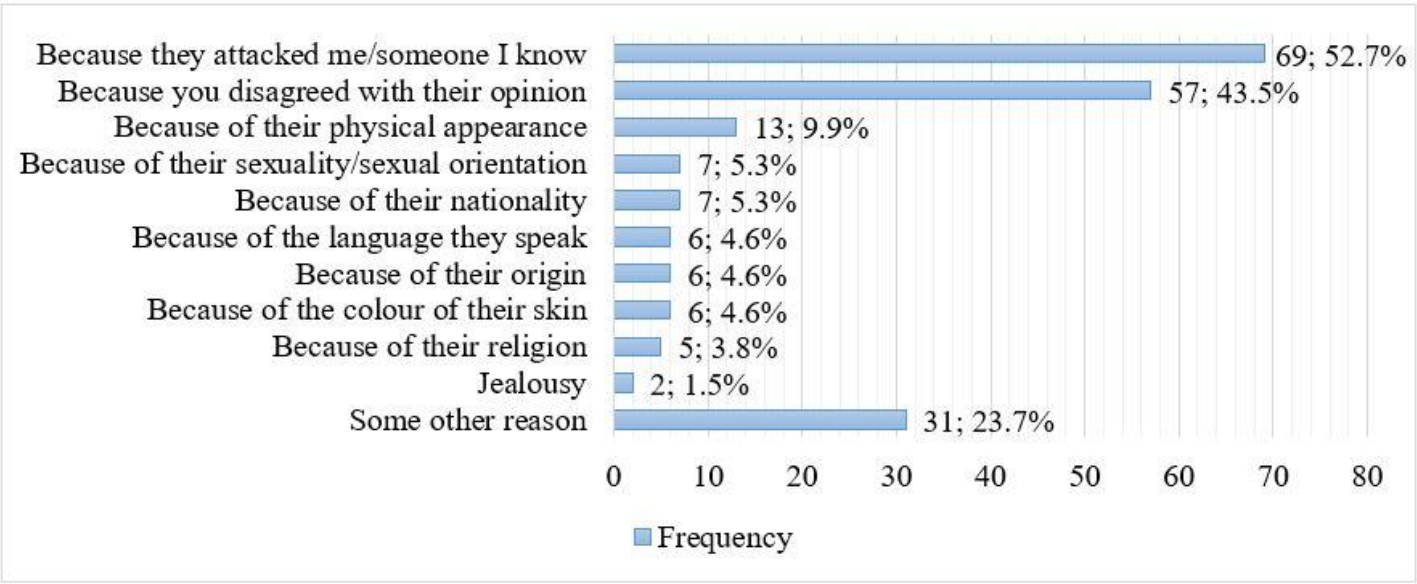
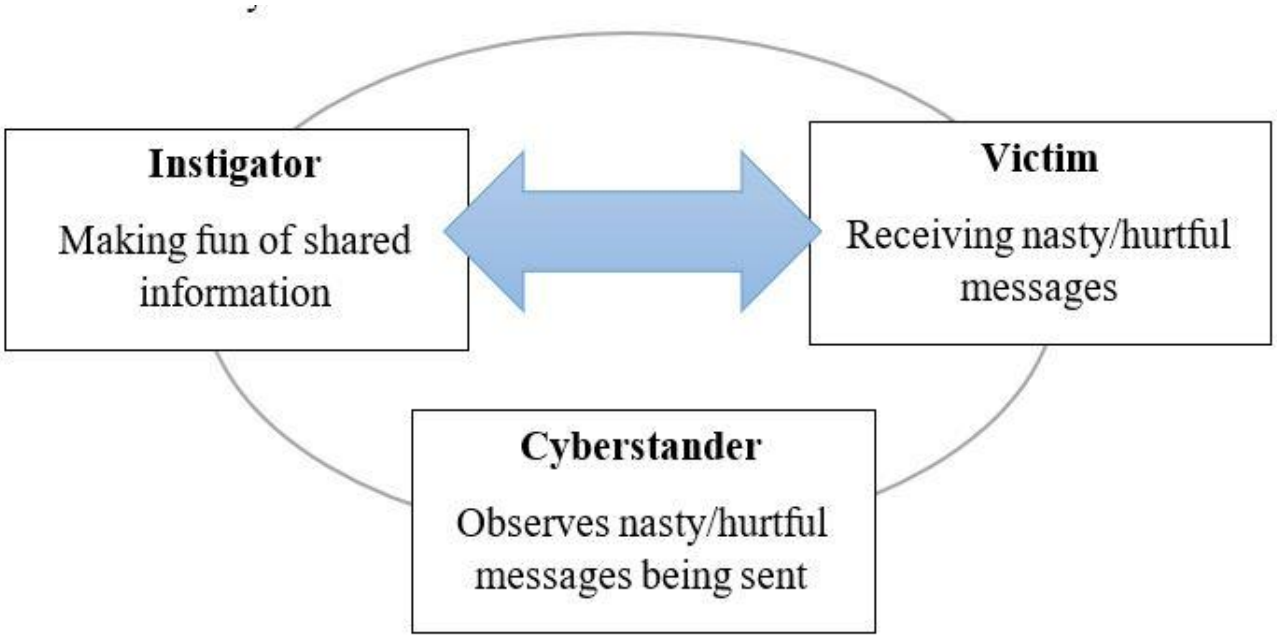


Figure 5 Dynamics between instigator, victim and cyberstander



Discussion

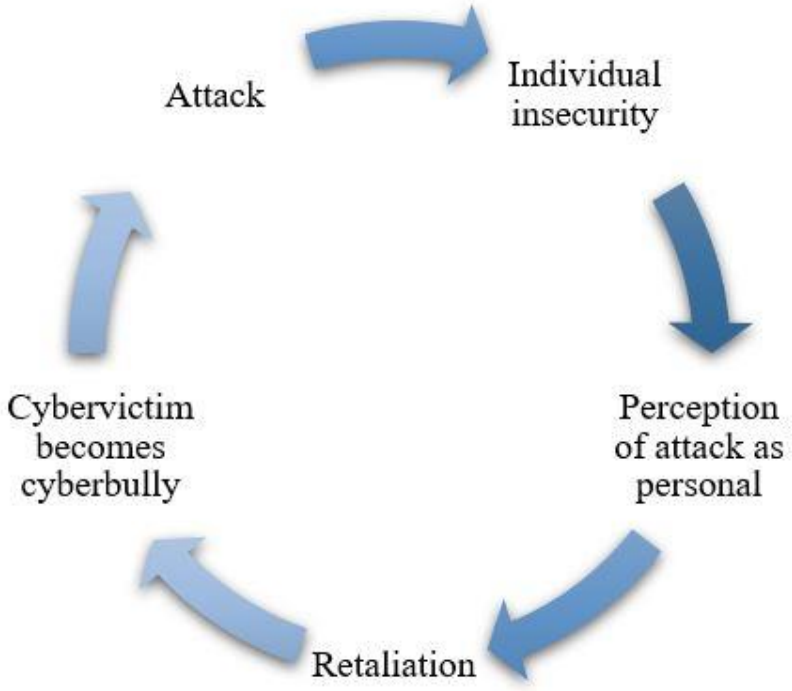
Not all young people react the same when they receive hurtful messages. Some participants suffer in silence, others take it in their stride to do something about it while others still perceive it to be acceptable to retaliate. In this scenario the victim may become the bully and the bully becomes victim as explained in Figure 6.

In the context of the fast-paced, rapid and ever-changing electronic envionment, this change of roles occurs all too quickly. Impulsivity and lack of self-control are the cogwheels which power the cycle.

In light of the results in this study as well as others carried out on a larger sample,[29] Maltese adolescents are experiencing, perpetrating or witnessing cyberbullying regularly. This is a significant problem which needs a holistic approach in order to be addressed adequately. A national policy targeting cyberbullying is needed since addressing traditional bullying differs from that of cyberbullying. This phenomenon needs to be given more importance through a transdisciplinary approach.

Research supports the 'Stop, Block and Tell' strategy, where children are urged to take four steps for managing the situation: (1) stop and calm down to avoid adverse reactions, (2) block the cyberbully, (3) limit communication to a friend list and (4) report to a trusted adult.[33]

Figure 6 Cycle of cyberbullying: attack and retaliation



Conclusion

For professionals in training working with children and young people, awareness of incidences of cyberbullying and its consequences are important. Education about the cycle of attack and retaliation is essential to understand conflict as a maintaining factor of online cycles of cyberbullying. The feeling of disinhibition and invisibility in the online context should be targeted through teaching 'cyberethics', 'cybercitizenship' and 'netiquette'. The 'steeling effect' suggested by Rutter is a result of teaching self-control, reflection, and self-regulation to overcome the effect of impulsivity on the continuation of the cycle. It is possible that adverse and challenging experiences are transformed into opportunities of learning and growth preparing them to become healthy and productive members of society.[34]

Summary Box

Cyberbullying gives rise to symptoms such as hyperactivity, conduct issues, anger, sadness,

fear and shame. European data shows that cyberbullying is on the increase.

* Maltese data shows that 1 in 4 of adolescents who are experiencing cyberbullying may

self-harm and 1 in 3 may have suicidal ideation.

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References

1. Tarafdar M, Gupta A, Turel O. The dark side of information technology use. Info Systems J. 2013 May;23(3):269–275.
2. Kowalski RM, Limber SP, Agatston PW. Cyberbullying: bullying in the digital age. Oxford: Wiley-Blackwell. 2012;
3. Cannard L. Cyberbullying: A TAFE Perspective. Youth Studies Australia. 2009 Jun;28(2):41–49.
4. Feinberg T, Robey N. Cyberbullying: Intervention and prevention strategies. National Association of School …. 2009;
5. Moreno MA. Cyberbullying. JAMA Pediatr. 2014 May;168(5):500.
6. Bastiaensens S, Vandebosch H, Poels K, Van Cleemput K, DeSmet A, De Bourdeaudhuij I. Cyberbullying on social network sites. An experimental study into bystanders' behavioural intentions to help the victim or reinforce the bully. Comput Human Behav. 2014 Feb;31(31):259–271.
7. Livingstone S, Mascheroni G, Ólafsson K, Haddon L.) Children'sonline risks and opportunities: comparative findings from EU Kids Online andNet Children Go Mobile. London: London School of Economics and Polical Science. 2014;
8. Hasebrink U, Livingstone S, Haddon L, Ólafsson K. Comparing children's online opportunities and risks across Europe: cross-national comparisons for EU Kids Online [Internet]. 2009 [cited 2020 Dec 27]. Available from: http://eprints.lse.ac.uk/21656/
9. Lee EB. Cyberbullying. J Black Stud. 2017 Jan;48(1):57–73.
10. Slee P. School Bullying: Teachers helping students cope. New York: Routledge, 2017.: Routledge; 2016.
11. Bauman S. Cyberbullying: a virtual menace. National Coalition against Bullying National …. 2007;
12. Campbell MA. Cyber bullying: an old problem in a new guise?. Aust j guid couns. 2005 Jul;15(01):68–76.
13. Kellerman I, Margolin G, Borofsky LA, Baucom BR, Iturralde E. Electronic aggression among emerging adults. Emerging Adulthood. 2013 Dec;1(4):293–304.
14. Bayraktar F, Machackova H, Dedkova L, Cerna A, Ševčíková A. Cyberbullying: The Discriminant Factors Among Cyberbullies, Cybervictims, and Cyberbully-Victims in a Czech Adolescent Sample. J Interpers Violence. 2015 Nov;30(18):3192–3216.
15. Erreygers S, Pabian S, Vandebosch H, Baillien E. Helping behavior among adolescent bystanders of cyberbullying: The role of impulsivity. Learn Individ Differ. 2016 May;48:61–67.
16. Pabian S, Vandebosch H. (Cyber)bullying perpetration as an impulsive, angry reaction following (cyber)bullying victimization? 2016;
17. Jenkins LN, Demaray MK, Fredrick SS, Summers KH. Associations Among Middle School Students' Bullying Roles and Social Skills. J Sch Violence. 2016 Jul 2;15(3):259–78.
18. Joinson AN. Disinhibition and the Internet. In J. Gackenbach(Ed.), Psychology and the Internet: Intrapersonal, interpersonal, and transpersonalimplications. 2nd ed. 2007.
19. Willard NE. Cyberbullying and cyberthreats: Responding to the challenge of online social aggression, threats, and distress. Research Press.; 2007.
20. Smahel D, Machackova H, Mascheroni G, Dedkova L, Hasebrink U. EU Kids Online 2020: Survey results from 19 countries. 2020 Feb 11;
21. Sourander A, Brunstein Klomek A, Ikonen M, Lindroos J, Luntamo T, Koskelainen M, et al. Psychosocial risk factors associated with cyberbullying among adolescents: a population-based study. Arch Gen Psychiatry. 2010 Jul;67(7):720–728.
22. Lodge J. The bully/victim continuum: Stability of peer victimisation in schooland patterns of Internalising and externalising problems in early adulthood. . Eleventh Australian Institute of Family Studies Conference, Melbourne. 2010;
23. Chadwick S. Impacts of cyberbullying, building social and emotional resilience in schools. Cham: Springer International Publishing; 2014.

24. Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N. Cyberbullying: its nature and impact in secondary school pupils. J Child Psychol Psychiatry. 2008 Apr;49(4):376–385.

25. Hinduja S, Patchin JW. Cyberbullying: An Exploratory Analysis of Factors Related to Offending and Victimization. Deviant Behav. 2008 Jan 22;29(2):129–156.

26. Cross D, Shaw T, Hearn L, Monks H, Epstein M. Australian Covert Bullying Prevalence' ' Study. Edith Cowan University Publications. 2009;

27. Feinberg T. Cyberbullying: Intervention and Prevention Strategies. , National Association of School Psychologists. 2009 Dec;

28. Lauri MA, Farrugia L, . Internet Safety, Safer Internet for Children, Online safety. Malta Communications Authority; 2015.

29. Lauri MA. Children's Internet Use and Parents' Perceptions of their Childre's Online Experiences. Malta Communications Authority. 2015;

30. Bilić V, Buljan Flander G, Rafajac B. Life Satisfaction and School Performance of Children Exposed to Classic and Cyber Peer Bullying. Collegium antropologicum. 2014 Mar 31;

31. Inzunza JA. Guzmán, J., Alfaro, J., & Varela, J. (2018) Sense of Community and Life Satisfaction in Chilean Adolescents. Applied Research in Quality of Life, 1-13.

32. Dittrick CJ. Psychological Impact of Cyber-Bullying: Implications for School Counsellors. Canadian Journal of Counselling and Psychotherapy. 2013;47(3):383–402.

33. Diamanduros T, Downs E, Jenkins SJ. The role of school psychologists in the assessment, prevention, and intervention of cyberbullying. Psychol Sch. 2008 Sep;45(8):693–704.

34. Ungar M. The Social Ecology of Resilience A Handbook of Theory and Practice. 2012.

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ORIGINAL ARTICLE

The aetiology of acute gastroenteritis in children in Malta and the use of empirical antibiotics in its management

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Background

Rotavirus is the leading cause of gastroenteritis in Europe. No specific clinical feature differentiates bacterial from viral gastroenteritis. Acute gastroenteritis self-resolves without antibiotics in the majority of healthy children regardless of the aetiology. Empirical antibiotics should only be prescribed for specific indications, as stated in the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) / European Society for Pediatrics Infectious Diseases (ESPID) Evidence – Based Guidelines for the Management of Acute Gastroenteritis in Children in Europe. This audit aimed to assess the prevalence of the different pathogens causing acute gastroenteritis in children in Malta and to establish whether empirical antibiotics are being prescribed according to the aforementioned guidelines.

Method

All children admitted to Mater Dei Hospital between 1st September 2019 and 29th February 2020 with acute gastroenteritis were included. The data was collected retrospectively from iSOFT Clinical Manager and medical records. The results were compared to the aforementioned guidelines.

Results

Rotavirus was the most commonly identified pathogen accounting for 37.9% of all cases. Non-typhoid *Salmonella* was the commonest bacterial cause. Empirical antibiotics were prescribed in 20.3% of all cases but were indicated in just 8.4%. Furthermore, empirical antibiotics were only indicated in 37.9% of the patients who received them. The commonest indicator was severe toxaemia.

Conclusion

Acute gastroenteritis in children in Malta is mainly viral, *Rotavirus* being the most common pathogen. There is significant over-prescription of empirical antibiotics in acute gastroenteritis. Measures need to be introduced to reduce antibiotic overuse and its risks.

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Introduction

Acute gastroenteritis is a major reason for hospitalisation in paediatric patients both locally and abroad, and the incidence of diarrhoea in Europe in children aged less than 3 years is 0.5 to 2 episodes per child per year. In a retrospective age-stratified cross-sectional study carried out in Malta in 2007 by Gauci. C. et al, the observed standardized monthly prevalence of infectious intestinal disease was 3.18% with 0.421 episodes of infectious diarrhoea per person per year. The greatest prevalence was found in the < 5 year age group.[1]

Rotavirus is the most common cause of acute gastroenteritis in children in all European countries. However, *Norovirus* is fast becoming a leading cause of gastroenteritis in countries which have a high rotavirus vaccine coverage and is currently the cause for hospitalisation in 10 – 15% of paediatric patients admitted to hospital with acute gastroenteritis in Europe. The most common bacterial agent causing acute gastroenteritis is either *Campylobacter* or *Salmonella* depending on the country.

There is no specific clinical feature that can differentiate a bacterial from a viral cause for acute gastroenteritis. However, a high fever (> 40ºC), overt faecal blood, accompanying abdominal pain and febrile seizures are each suggestive of a bacterial pathogen. Vomiting and respiratory symptoms are associated with viral gastroenteritis.

Acute gastroenteritis in a child without any significant underlying disease is usually self-limiting regardless of whether the aetiology is viral or bacterial. In the vast majority of cases clinical recovery occurs within a few days and the causative microbe is cleared within a few days or weeks without any specific antimicrobial therapy. Complications are rare.

Antibiotic therapy should hence not be given routinely for acute bacterial gastroenteritis, and is only recommended for specific pathogens and in specific clinical settings. The aetiology of sporadic acute gastroenteritis is usually not known at the onset of symptoms. According to the ESPGHAN / ESPID Evidence – Based Guidelines for the Management of Acute Gastroenteritis in Children in Europe (updated in 2014), empirical antibiotics for acute gastroenteritis should only be prescribed when specific indicators are present, as shown in Table 1.[2]

Table 1 Indicators for Empirical Antibiotic Therapy in Acute Gastroenteritis according to the ESPGHAN/ESPID Guidelines.

Indicators for Empirical Antibiotic Therapy in Acute Gastroenteritis
Patients with underlying immunodeficiency who have acute gastroenteritis with fever
Severe toxaemia / suspected or confirmed bacteraemia
Neonates and infants aged < 3 months with fever (following sepsis work-up)
Invasive / inflammatory diarrhoea - acute onset of bloody/mucous diarrhoea with high fever (> 38.5°C)
Non-invasive (watery) diarrhoea in a patient who has recently travelled or who may have been exposed to cholera
Bloody diarrhoea with no/low fever if shigellosis is suspected or confirmed

The primary aim of this audit was to assess the prevalence of the different causative viral and bacterial pathogens in paediatric patients requiring admission to Mater Dei Hospital with acute gastroenteritis. The secondary aim was to assess whether empirical antibiotics were prescribed according to the recommendations of the ESPGHAN / ESPID guidelines in these patients.

Materials and Methods

Approval for the audit was obtained from the Data Protection Act Committee. All patients up to the age of 16 years admitted to the paediatric wards at Mater Dei Hospital with acute gastroenteritis, over a six - month period between 1st September 2019 up to 29th February 2020, were included in this audit.

The data was collected retrospectively from iSOFT Clinical Manager and the patients' medical records and the results were compared to the aforementioned ESPGHAN / ESPID Guidelines.

For the purpose of this audit, a diagnosis of acute gastroenteritis was defined as a decrease in the consistency of the stools to loose or liquid and / or an increase in the frequency of evacuations (3 or more in 24 hours) with or without fever or vomiting, lasting less than 7 days and not more than 14 days.

Patients were only included in this audit if they fitted the aforementioned definition of acute gastroenteritis. Those already started on empirical antibiotics by their general practitioner were included in the data collection. Patients admitted directly to the Neonatal and Paediatric Intensive Care Unit from Accident and Emergency were excluded from the audit.

Stool Polymerase Chain Reaction (PCR), stool culture and respiratory screen results were used to identify the causative organisms. At Mater Dei Hospital, stool cultures are only processed if an organism is detected on stool PCR testing. A respiratory screen is a swab taken from the nasal mucosa which allows detection of the most common respiratory pathogens, some of which may also cause acute gastroenteritis, by means of PCR testing.

Results

Out of a total of 143 patients with a documented diagnosis of acute gastroenteritis, samples for stool PCR, with or without cultures, were only obtained in 95 patients (66.4%). A respiratory screen was only taken in 37 patients (25.9%), and a proportion of these also had a stool PCR and / or culture result. From these samples, the aetiological organism was only confirmed in 66 cases (46.2%). Out of these 66 cases, 48 (72.7%) were confirmed to be of viral aetiology on stool PCR, cultures and / or respiratory screen, whilst 18 (27.3%) were confirmed to be bacterial. No cause could be ascertained in 77 cases (53.8% of the study cohort) and, of those, 76 were clinically viral and 1 case was clinically bacterial in nature. When considering those cases where the aetiology was confirmed both by investigations and the clinical picture, 124 patients (86.7% of the total cohort) had viral gastroenteritis and 19 patients (13.3%) had bacterial gastroenteritis.

Overall, *Rotavirus* was the most commonly identified organism, accounting for 37.9% of all cases in which the aetiological organism was confirmed by investigations, and 52.1% out of all confirmed viral cases. Non-typhoid *Salmonella* was the second most commonly identified organism, accounting for 16.7% of cases in which the organism was confirmed.

Respiratory Syncytial Virus (RSV) and *Adenovirus* were the next most frequently identified viral causes after *Rotavirus*. *Salmonella* was the most commonly identified bacterial cause, accounting for

61.1% of bacterial cases, whilst *Campylobacter* accounted for the rest of the bacterial cases (38.9%) (Refer to Table 2).

Empirical antibiotics were prescribed in 29 out of 143 cases (20.3%), yet according to the guidelines, antibiotics were only indicated in 12 cases (8.4%). Furthermore, empirical antibiotics were only indicated in 11 (37.9%) out of the 29 patients who received them. There was only 1 case in which empirical antibiotics were indicated but were not prescribed.

The most common indicators for prescribing empirical antibiotics are shown in Table 3. None of the patients had any of the other indicators shown in Table 1.

Table 2 The viral and bacterial pathogens identified by investigations as the aetiology of acute gastroenteritis shown in order of their frequency.

Aetiology	Pathogen	Number of Isolates	Percentage of Total Isolates
Viral	***Rotavirus***	25	37.9%
	Respiratory Syncytial Virus	8	12.1%
	Adenovirus	7	10.6%
	Enterovirus	3	4.5%
	Human Coronavirus OC43	1	1.5%
	Human Parainfluenza Virus 1	1	1.5%
	Norovirus	0	0%
	≥ 2 viral pathogens identified	3	4.5%
Bacterial	***Salmonella***	11	16.7%
	Campylobacter	7	10.6%
	Escherichia coli	0	0%
	Shigella	0	0%
	Vibrio cholerae	0	0%
Total Number of Isolates		**66**	**100%**

Table 3 The number of patients in whom empirical antibiotics were indicated and their specific indicators shown in order of their frequency.

Indicator for Prescription of Empirical Antibiotics	Number of Patients
Severe toxaemia / suspected or confirmed bacteraemia	7
Invasive / inflammatory diarrhoea – acute onset of bloody / mucous diarrhoea with high fever (>38.5°C)	3
Neonates and infants aged < 3 months with fever (following sepsis work-up)	2
Total Number of Patients for whom Empirical Antibiotics were Indicated	**12**

Discussion

The results of this audit demonstrate that the majority of paediatric patients requiring admission to Mater Dei Hospital with acute gastroenteritis have a viral aetiology. Although microbiological investigations are not helpful in the majority of cases of acute gastroenteritis, they should be taken in children with underlying chronic conditions (such as inflammatory bowel disease or oncological conditions), suspected toxaemia, prolonged symptoms, or during outbreaks where public health officials need to identify the pathogen and its source. Children with severe bloody diarrhoea or a history of travel to at risk areas should also have stool cultures taken. Microbiological investigations are useful in establishing the most prevalent organisms that cause acute gastroenteritis in a specific country.[2]

In this study, the causative organism was not identified in 53.8% of cases, either because stool PCR / cultures and / or a respiratory screen were not taken or because many viral pathogens were not specifically tested for on stool PCR. In the majority of cases, the only viral test requested on stool PCR was for *Rotavirus*. Stool cultures were not taken in 33.6% of patients, usually because they were not requested by the clinicians, or because the diarrhoea had resolved at the time of admission to hospital. The patients in the latter category were usually admitted for intravenous rehydration due to persistent vomiting and inability to tolerate oral fluids.

Rotavirus was the most common pathogen identified, and many international studies have shown that *Rotavirus* is the leading cause of acute gastroenteritis worldwide, followed by *Adenovirus* and *Norovirus*.[3-5] However, in countries where there is a high level of *Rotavirus* vaccination, *Norovirus* is becoming the leading cause worldwide.[2] This has not been shown in the results of this audit, as *Norovirus* was only identified in 2 patients, and in both cases it was not the only viral pathogen identified. This could be due to the small number of requests by clinicians to test specifically for *Norovirus* on stool PCRs, or perhaps due to a relatively low level of *Rotavirus* vaccination in Malta where, to – date, this vaccine is only available in the private sector. However, further studies would be necessary to confirm this, since currently there is no

published data available on the percentage of Maltese children who have received the *Rotavirus* vaccine.

The most commonly identified bacterial organism was non-typhoid *Salmonella*, followed by *Campylobacter*. No cases of *Shigella, Escherichia coli* or *Vibrio cholerae* gastroenteritis were identified in this audit. *Salmonella* and *Campylobacter* have been shown to be the most common bacterial agents causing acute gastroenteritis in various studies.[3,6] However, which of these bacteria is most prevalent varies depending on the country and also on the season. In a study by Gülhadiye A. et al (2016) carried out at the Pediatric Emergency Department of Ege, Turkey, *Campylobacter* was identified as the most common bacterial pathogen, isolated all through the year with a slight increase in frequency in spring, whilst *Salmonella* and *Shigella* were the most common bacterial agents identified in summer.[6] In a study by Wiegering V. et al (2011), carried out at the children's hospital of the University of Würzburg, Germany, the most common bacterial agent identified was *Salmonella* and its peak incidence was in the summer months. Viral gastroenteritis was noted to be more common in the winter months.[3]

Overall, the vast majority of patients (114 patients, 79.7%) included in this audit were not prescribed empirical antibiotics for treatment of acute gastroenteritis, in keeping with the current recommendations of the ESPGHAN/ESPID guidelines. However, although only 29 patients (20.3% of the total cohort) included in this audit received empirical antibiotics, these were only indicated in 11 (37.9%) of these patients.

In a study by Udoh E.E and Meremikwu M.M (2016) which assessed the prescription of antibiotics in the management of children aged less than five years with acute watery diarrhoea in health facilities in Cross River State, Nigeria, antibiotics were not indicated in any of the 370 cases included. However, antibiotics were prescribed in 291 patients (78.6% of the total cohort). Furthermore, out of these, 45.7% received one antibiotic, whilst 33% received two antibiotics, indicating a high degree of unnecessary antibiotic prescription.[7]

A meta-analysis of data sets from 30 countries in Sub-Saharan Africa, carried out by Auta A. et al (2018), showed that the pooled prevalence of antibiotic use in children less than 5 years of age presenting with non-bloody diarrhoea was 23.1%, demonstrating a high degree of antibiotic overuse.[8]

When compared to these foreign studies, prescription of empirical antibiotics for acute gastroenteritis in children is significantly less in Malta according to the results of this study, especially considering that the meta-analysis by Auta A. et al[8] did not include patients presenting with bloody diarrhoea in whom antibiotics are even more likely to be prescribed. However, the fact that 62.1% of the prescribed empirical antibiotics in this audit were not indicated, confirms local over-prescription of empirical antibiotics. Hence there is still room for improvement in line with established guidelines.

Consideration of antibiotic therapy should be carefully weighed against the risk of unintentional and potentially harmful side effects, especially as acute gastroenteritis is usually self-limiting.[9] Moreover, antimicrobials may have decreased efficacy in acute gastroenteritis due to impaired intestinal absorption and increased intestinal motility.[10] Studies have shown that patients admitted to hospital with acute gastroenteritis who receive empirical antibiotics do not have a shorter length of stay in hospital than patients who only receive fluids and supportive therapy, and are in fact

at greater risk of having protracted diarrhoea.[11] When prescribing empirical antibiotics, knowledge of the local patterns of antibiotic resistance is important so as to avoid treatment failure.[9]

The over-prescription of antibiotics should be avoided for a number of reasons. Antibiotic overuse encourages the development of microbial antibiotic resistance and can lead to adverse events. It also leads to unnecessary financial costs.[9,12] Meta-analyses have confirmed that antibiotic therapy does not shorten the length of illness in healthy patients with mild to moderate non-typhoid *Salmonella* gastroenteritis.[9,11] Moreover, antibiotic use in *Salmonella* gastroenteritis has been shown to prolong the faecal excretion of *Salmonella*, hence increasing its duration of infectivity.[9] Several studies have shown an increased risk of Haemolytic Uraemic Syndrome and acute renal failure in patients with shiga-toxin producing strains of *Shigella* and *Escherichia coli* who receive antibiotic treatment.[9,10] Prolongation of diarrhoea and potentially life-threatening *Clostridium difficile* colitis can also occur secondary to antibiotic overuse due to the disruption that antibiotics cause to the normal bowel flora.[10,11] The prescription of empirical antibiotics should therefore be restricted to cases where they are truly indicated and the management of acute gastroenteritis should focus on ensuring adequate hydration and supportive treatment.

The main limitation of this audit was the small sample size and the fact that a significant proportion of the patients included did not have stool PCR, stool cultures or a respiratory screen taken. The audit was carried out retrospectively and hence depended on clear documentation by the caring clinicians in the patients' medical records. Indeed, the reason for starting empirical antibiotics was not always documented in the medical records.

Conclusion

The results of this audit demonstrate that acute gastroenteritis in paediatric patients in Malta is largely of viral aetiology, proving that empirical antibiotics are unhelpful in the vast majority of cases. Despite this, there is still a significant element of antibiotic over-prescription in acute gastroenteritis, and given the risks associated with antibiotic overuse, there needs to be a greater effort by local clinicians to limit the use of empirical antibiotics to cases where they are truly indicated.

In order to achieve this, there needs to be improved clinician knowledge of the most common pathogens causing acute gastroenteritis locally, increased familiarity with the ESPGHAN/ESPID guidelines, and greater awareness of the risks associated with empirical antibiotic overuse in the management of acute gastroenteritis.

These aims can be achieved by having multiple educational sessions on the subject during which familiarity with the guidelines is improved. Development of a local guideline may also improve compliance by leading to clinician 'ownership' of the guideline. Introduction of a Clinical Decision Support System (CDSS) should also be considered. Clinicians must also be encouraged to exercise more resistance against parental pressure to prescribe antibiotics and should educate parents on the reason/s why an antibiotic is not indicated and may actually do more harm than good.

Summary Box

The facts

1. Acute gastroenteritis in children has a viral aetiology in the vast majority of cases.
2. *Rotavirus* is the most common pathogen causing acute gastroenteritis in Europe.

3. Acute gastroenteritis in a healthy child is usually self-limiting regardless of aetiology.
4. Empirical antibiotics for acute gastroenteritis should only be prescribed when specific indicators are present.

What's new?

1. The most common pathogen causing acute gastroenteritis in children in Malta is *Rotavirus*.
2. There is local over-prescription of empirical antibiotics in children with acute gastroenteritis.
3. Antibiotic use that is not truly indicated can do more harm than good.
4. Educational sessions for clinicians, development of a local guideline and introduction of a CDSS may help to reduce unnecessary antibiotic prescription and its associated risk.

REFERENCES

1. Gauci C, Gilles H, O'Brien S et al. The magnitude and distribution of infectious intestinal disease in Malta: a population-based study. Epidemiol. Infect. 2007; 135: 1282-9
2. Guarino A, Ashkenazi S, Gendrel D, Lo Vecchio A, Shamir R, Szajewska H. European Society for Pediatric Gastroenterology, Hepatology, and Nutrition/European Society for Pediatric Infectious Diseases Evidence-Based Guidelines for the Management of Acute Gastroenteritis in Children in Europe: Update 2014. JPGN 2014; 59:132-52
3. Wiegering V, Kaiser J, Tappe D, Weißbrich B, Morbach H, Girschick HJ. Gastroenteritis in childhood: a retrospective study of 650 hospitalized pediatric patients. International Journal of Infectious Diseases 2011; 15: 401-7
4. Rosenfeldt V, Vesikari T, Pang LX, Zeng QS, Tvede M, Paerregaard A. Viral Etiology and Incidence of Acute Gastroenteritis in Young Children Attending Day-Care Centers. The Pediatric Infectious Disease Journal 2005; 24: 962-965
5. Friesema IHM, de Boer RF, Duizer E et al. Etiology of acute gastroenteritis in children requiring hospitalization in the Netherlands. Eur J Clin Microbiol Infect Dis 2012; 31: 405-15
6. Gülhadiye A, Zümrüt BS, Eylem SU, Şöhret A, Fadıl V. Prevalence of Bacterial Agents in Children with Acute Gastroenteritis in the Pediatric Emergency Department of Ege University School of Medicine. J Pediatr Inf 2016; 10: 49-53
7. Ekong EU, Meremikwu MM. Antibiotic prescriptions in the case management of acute watery diarrhea in under fives. International Journal of Contemporary Paediatrics 2017; 4 (3): 691-5
8. Auta A, O Ogbonna B, O Adewuyi E, Adeloye D, Strickland-Hodge B. Prevalence and factors associated with the use of antibiotics in non-bloody diarrhoea in children under 5 years of age in sub-Saharan Africa. Arch Dis Child 2019; 104: 518-21
9. Zollner S, Krause R. Therapy of acute gastroenteritis: role of antibiotics. Clin Microbiol Infect 2015; 21: 744-9
10. Diniz-Santos DR, Silva LR, Silva N. Antibiotics for the Empirical Treatment of Acute Infectious Diarrhea in Children. The Brazilian Journal of Infectious Diseases 2006; 10: 217-27
11. Maher H, Bhanu S, Muaataz A et al. Antibiotic therapy in acute gastroenteritis: a single-center retrospective cohort study. Annals of Gastroenterology 2019; 32: 565-9
12. Bruzzese E, Giannattasio A, Guarino A. Antibiotic treatment of acute gastroenteritis in children. F1000Research 2018; 7: 193

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ORIGINAL ARTICLE

The impact and management SARS-CoV-2 in a psychiatric hospital setting

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Background

During the months of August and September 2020, an outbreak of SARS-CoV-2 took root in Mount Carmel Hospital and affected 29 elderly female chronic psychiatric inpatients, representing a significant clinical undertaking within the context of this low-resource healthcare setting.

Methods

An emergency isolation ward was set up to contend with the outbreak, while a medical response team comprised of two psychiatric doctors and five extended foundation trainees was established in order to care for this vulnerable patient cohort. Close liaison with the Infectious Diseases team at Mater Dei Hospital fostered an effective therapeutic setting within which these patients could be treated. This represented a unique approach in an environment where literature on SARS-CoV-2 is scarce – the psychiatric inpatient setting.

Results

All 29 of our patients recovered from SARS-CoV-2 during the course of this period as a result of close clinical observation, a system of twice-daily patient review, early identification of patient deterioration and effective cross-speciality communication.

Conclusion

An outbreak of SARS-CoV-2 within the mental health inpatient setting represents a number of unique clinical, managerial and interpersonal challenges, though straightforward clinical measures and effective patient monitoring can greatly aid the response to viral outbreaks in low-resource healthcare settings.

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INTRODUCTION

During the months of August and September 2020, as cases of SARS-CoV-2 in Malta had experienced a recrudescence in earnest, an outbreak of the virus took place at Mount Carmel Hospital, our main psychiatric inpatient facility. At the time, confirmed cases of SARS-CoV-2 had totaled over 29 million worldwide. The highest rates of infection fatality have been observed in elderly populations, and the UK Office for National Statistics reports that those over 65 account for 90.6% of deaths, with those aged 80 to 84 representing the highest proportion (20.8%).[1] In Malta, as of September 14th, 2,405 cases of SARS-CoV-2 had been identified, and there had been 16 confirmed deaths.[2]

Main routes of transmission of the virus are through respiratory droplet and contact spread, as well as through indirect spread via fomites. Airborne transmission may also be possible in specific circumstances, with particles potentially remaining suspended in the air for long periods of time.[3] These characteristics make the presence of SARS-CoV-2 in long-term care facilities particularly perilous.[4] In the US, up to one-third of all SARS-CoV-2 deaths until mid-May occurred in nursing home residents and workers.[5] High rates of infection (40%) and mortality (26%) have also been well studied in one outbreak investigation of UK nursing homes. A concerning finding was that 60% of residents had either atypical symptoms or were entirely asymptomatic.[6]

The impact of the pandemic and lockdowns on mental health has received healthy consideration. In August, the CDC recognized disproportionately elevated mental health outcomes associated with SARS-CoV-2 in US adults. 31% of respondents described symptoms of anxiety/depression, 13% reported starting or increasing their use of illicit substances and 25% of young adults reported having seriously considered suicide.[7] This burden only compounds the limitations in the implementation of adequate medical inpatient care and infection control which already exist in the setting of a psychiatric hospital.

While the toll on mental wellbeing has rightly been widely discussed in the literature and in the media, limited research presently exists on outbreaks of the virus within a psychiatric hospital, nor on the obstacles one faces in managing SARS-CoV-2 infection in patients with chronic mental illness. Interestingly, these challenges were identified as early as February in Wuhan, in Hubei province, China, after 323 psychiatric patients and 30 mental health professionals contracted the virus. Nation-wide psychiatric understaffing; an overreliance on hospital-centric rather than community-based services; patient crowding and group-interaction were notable areas of concern.[8]

The psychiatry ward presents a number of unique obstacles in the adherence to proper infection control policies. Patients with mental illness may not cooperate with isolation instructions. They often require close supervision and physical contact for the administration of treatment and within the context of physical or chemical restraint. Furthermore, the presence of severe mental illness is associated with significantly higher odds of medical comorbidity.[9] The majority of psychogeriatric admissions (91.5%) have at least one concurrent medical comorbidity.[10] Advanced age and comorbidity are well-documented predictors of increased case fatality rates in SARS-CoV-2.[11,12]

The outbreak which occurred in Mount Carmel Hospital, affected two inpatient wards of long-term, largely psychogeriatric patients. A cumulative total of 29 patients, all female, contracted the virus over a four-week period. A medical response team was

established to contend with this outbreak. This represented a unique logistical challenge and we believe that the model followed which led to the positive outcomes we experienced is something which can be replicated in inpatient psychiatry and other potential low-resource healthcare settings.

MATERIALS AND METHODS

Hospital Outbreak

The outbreak of the virus affected two chronic inpatient wards at Mount Carmel Hospital. The two involved wards catered to female psycho-geriatric and rehabilitation patients, and shall henceforth be referred to as Ward A and Ward B. While Ward A forms part of the central hospital complex, Ward B is detached from the main building, having its own separate entrance. Infection control policies in place prior to this outbreak included a mandatory 14-day period of quarantine in a separate ward that patients were required to fulfil prior to transfer to either ward. It was noted that simple measures such as hand hygiene and the use of personal protective equipment (PPE) were not being adhered to strictly in view of under-resourcing and a lack of clear guidance and training. Shortened visiting times were still being observed for patient relatives.

The majority of patients had complex needs in keeping with high medical and psychiatric illness burden. In keeping with this, both wards would regularly see high turnover rates of healthcare staff.

Screening of patients commenced following the identification of typical (cough, fever and/or breathlessness) and/or atypical (diarrhoea, vomiting and other URTI symptoms) in patients. Hospital procedure dictates that symptomatic patients be transferred to a temporary isolation ward to undergo SARS-CoV-2 nasopharyngeal swab testing, and then either to return to the ward should the test return negative, or be transferred to another isolation ward for positive patients should they be diagnosed as positive. All patients in Wards A and B underwent regular screening following the identification of positive patients. The incidence of infection in Wards A and B is displayed in *figures 1* and *2*.

Figure 1 SARS-CoV-2 Incidence

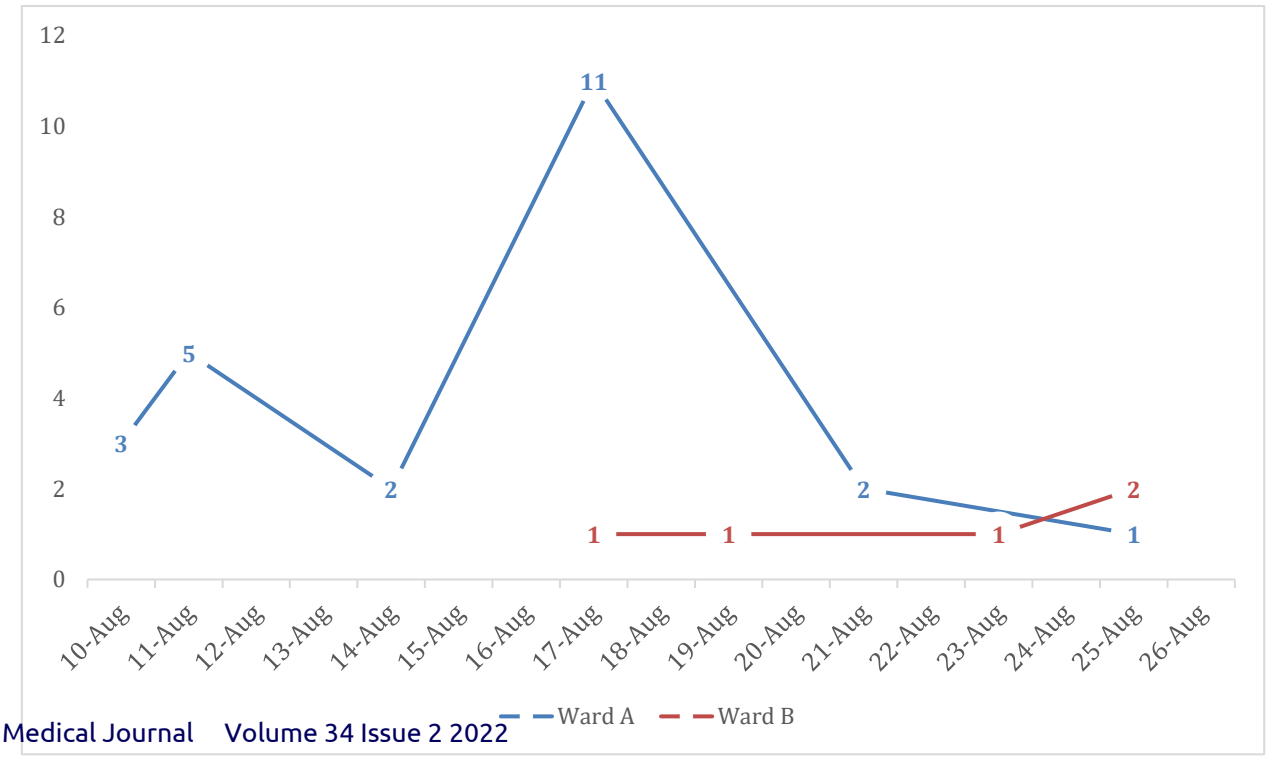
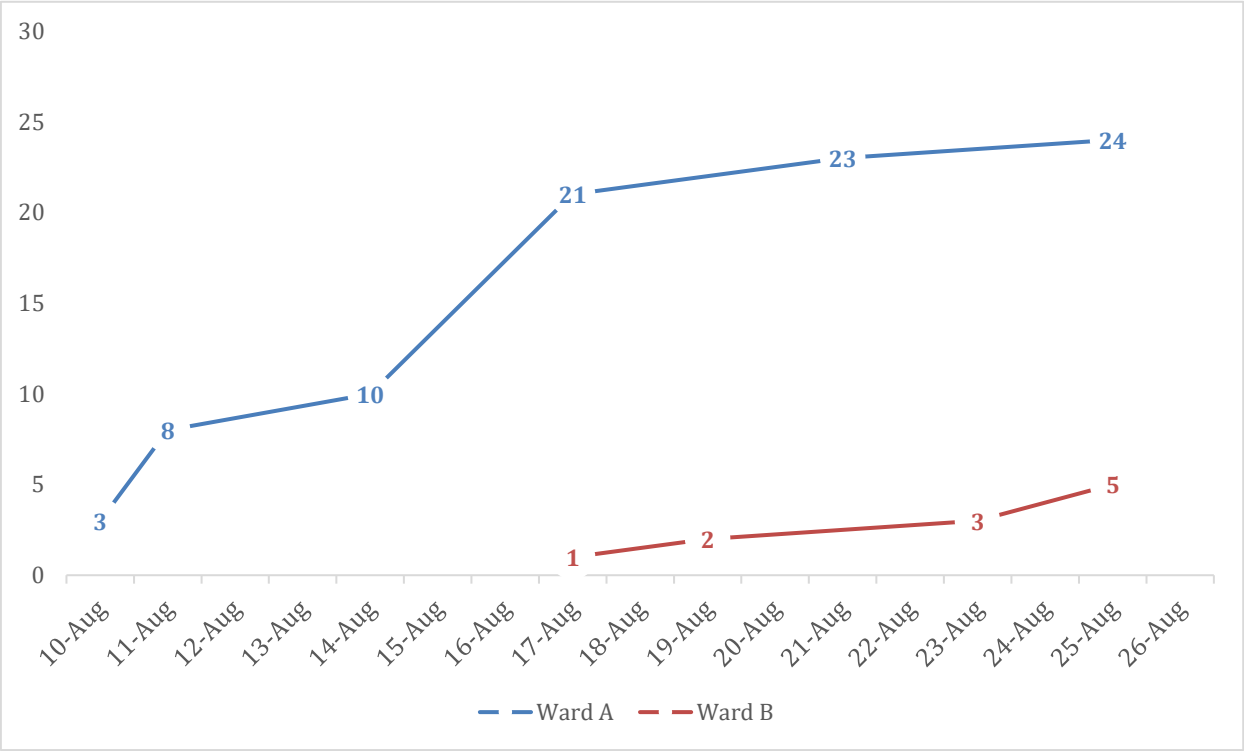


Figure 2 SARS-CoV-2 cumulative incidence



The first positive patients were identified on the 10th and 17th of August in Wards A and B respectively. Of note, the affected patients identified in Ward B all shared the same dormitory, and were some of the more physically dependent patients. Furthermore, the source of infection was later realized as an infected healthcare worker assigned to the care of these patients during their shift, highlighting the risks of healthcare workers representing potential vectors of infection in these vulnerable patient groups.

The first positive patient in Ward A was identified in view of fever noted on routine parameter-charting. Likely contributing to the spread of the virus in this ward was the fact that this patient was fully independent and enjoyed spending time and conversing with other patients on the ward. Group meal times and ward activities may have further compounded this risk.

Outbreak Containment

The cohort of positive patients were transferred incrementally to an isolation ward. Favourable characteristics of the isolation ward were independent ward access which averted the need to bypass other areas of the hospital, and negative pressure rooms which had been set up prior to the outbreak.

The ward was comprised of two 8-bedded rooms, and one 12-bedded room; one of the two 8-bedded having pre-established oxygen supply. This structure allowed for the seamless isolation of patients who would later be retested negative. Contaminated and non-contaminated areas were clearly demarcated and, where necessary, this distinction was marked by a border of adhesive tape along the floor. This allowed for separate paths for exposed and nonexposed staff within the context of a low-resource setting underprepared for such a scenario. Visiting hours for relatives were

suspended for the duration of the outbreak and beyond, as part of a hospital-wide policy.

Patient Demographics

In total, 29 patients were isolated during our hospital's wave of infections over a two-week period. The patients' demographic data was compiled from medical files and online databases which are shared with Mater Dei Hospital.

The patient cohort ranged in age from 45 to 87 – age group distribution is represented in *figure 3*. The mean age was 69.93. All of these patients were residing at Mount Carmel Hospital for psycho-geriatric care. The most common psychiatric comorbidity was schizophrenia, which was found in 8 patients. Of note, 4 patients were known cases of Huntington's Disease, including the youngest patient in the cohort (*table 1*). Seven patients suffered from 2 psychiatric comorbidities concomitantly.

There was a mean number of 2.14 medical comorbidities per patient (*table 2)*. The commonest were cardiovascular disease, diabetes mellitus and dyslipidemia, findings not entirely unexpected given the metabolic risk profiles of long-term psychiatric inpatients, and the age of this patient cohort. Research has shown that comorbid cardiovascular disease and diabetes mellitus are strong predictors of hospital admission.[15] Compounding medical illness, was the fact that 16 (55.17%) patients were entirely dependent in their activities of daily living (ADLs), while 6 (20.68%) were only semi-independent, requiring assistance with mobilization and toileting. Only 7 (24.14%) patients from the cohort were fully independent.

Figure 3 Age groups

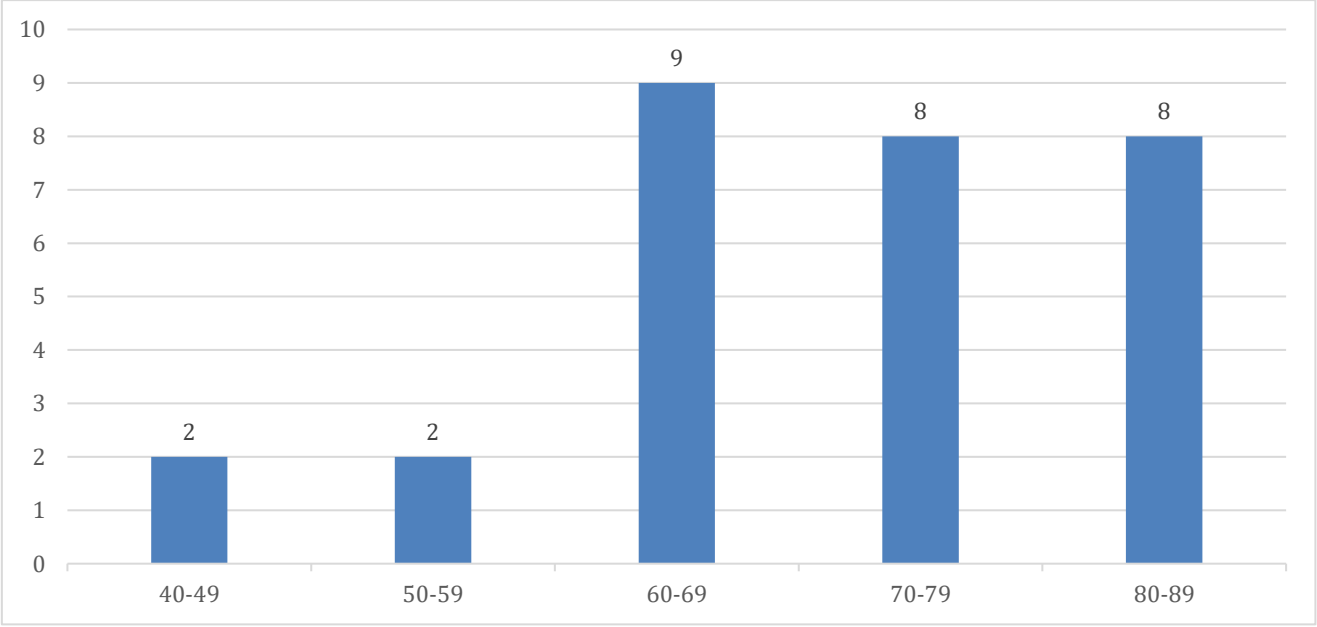


Table 1 Frequency of psychiatric comorbidities in patient cohort

Psychiatric Diagnosis	Frequency
Huntington's Disease	4
Bipolar affective disorder	3
Dementia	5
Depression	7
Schizophrenia	8
Schizoaffective Disorder	4
Anxiety	1
Multiple Sclerosis	1
Learning disability	2
Unspecified	1

Table 2 Frequency of medical comorbidities in patient cohort

Medical Comorbidity	Frequency
Cardiovascular Disease*	13
Diabetes Mellitus (type 2)	10
Dyslipidaemia	11
Neurological Conditions**	7
Hypothyroidism	7
Cerebrovascular Accident	3
Chronic Kidney Disease	2
Visual Impairment	2
Hearing Impairment	1
Respiratory Disease***	2
Metastatic Disease	1
Glaucoma	1
Gout	1
Darier's Disease	1

*Including Hypertension
**Includes Epilepsy, Parkinson's Disease and Multiple Sclerosis
***Includes Asthma & Chronic Obstructive Pulmonary Disease (COPD)

Patient and Ward Management

The patient cohort was incrementally transferred to the isolation ward as described. Two separate entrances rendered contaminated and non-contaminated pathways into and out of the ward feasible. Donning and doffing stations were established in appropriate areas in the ward. The structural layout of the ward did not allow for the use of an anteroom. To circumvent this issue, all PPE besides the N95 mask was doffed in a contaminated area, before the mask itself was disposed of in a clean area.

Close liaison with Infectious Diseases physicians at Mater Dei hospital played a key role in the set-up and care of our patients. The ward was visited by the team during the early stages of the outbreak, and daily patient logs outlaying the clinical status of our patients were relayed to them. The advice of the team was sought to contend with any patient deterioration requiring specialist input and in order to augment the infection control policy of the ward. This alliance also allowed for smooth and appropriate escalation of care where hospital-to-hospital transfer was necessary.

The medical response team which was established was comprised of 7 doctors. Clinical duties were carried out during twice-daily shifts, where a comprehensive morning ward round preceded a more targeted evening review. All patients were inspected clinically during the morning assessment, with any focused clinical examination dependent on the emergence of worrying signs, symptoms or investigation results. To limit infection risk, clinical parameter charting formed the mainstay of patient observation. During the evening review, assessment of parameter trends; investigation results; and nursing feedback was carried out. Only those patients who raised concern were then examined clinically during the evening. The care of any hospital inpatients outside of the isolation ward did not fall within the remit of the response team.

The team was later joined by a physiotherapist and speech and language pathologist (SLP).

Straightforward non-invasive devices formed the mainstay of the equipment used for patient monitoring. Both ear- and finger-probe pulse-oximeters were made use of for monitoring patient oxygen saturations. Ear probes proved essential in those patients with poor peripheral perfusion in whom clear readings could not be taken using finger-probes. Separate monitoring sets, which included non-contact infrared thermometers, were provided in each room.

In light of the risks of venous thromboembolism in SARS-CoV-2 patients, all patients were started on low-molecular-weight heparin upon diagnosis.[16] Patients were started on a daily dose of either 20mg or 40mg depending on baseline characteristics, comorbidity and drug history, in accordance with routine medical practice.

In terms of PPE, N95 masks were utilized, with FFP2 masks being made use of when N95 masks were not available. Medical clogs were provided for use in any designated contaminated area, being removed as part of the doffing process once clinical duties had been completed.

A fundamental aspect to our duties during this period was communication. In this low-resource setting, simple hospital pagers were used as the team divided to conduct ward rounds and carry out other clinical tasks. Team-members entering the contaminated area were able to relay clinical findings to, as well as receive the results of laboratory investigations from, those team members who remained in the non-contaminated area. This latter group was also tasked with documentation of ward-round findings.

A second important consideration with regards communication, was that with relatives. More specifically, that between patient and relative, and that between relative and doctor. The pager system was relied upon almost entirely for the contacting of patients by their relatives. Furthermore, the delivery of information regarding the wellbeing of patients to their relatives, as well as their involvement for strategic clinical decision-making, were also tackled via telephone call.

Viral polymerase chain reaction (PCR) testing was performed via nasopharyngeal swabbing. Patients were swabbed 14 days after being first identified as positive for SARS-CoV-2 as per our local Public Health guidance. Patient recovery was identified by a negative swab result taken after this allotted time period in conjunction with the absence of signs or symptoms of illness. Swab testing was repeated every 7 days in those patients who remained positive for the viral PCR test. Recovered patients were isolated from SARS-CoV-2-positive patients within the isolation ward, prior to being transferred back to their original wards.

RESULTS

Clinical Presentation

13 (44.83%) patients were entirely asymptomatic at the time of SARS-CoV-2 diagnosis, and remained so throughout the course of illness. Typical symptoms were identified in another 13 patients, with 8 (27.59%) being identified with fever, 3 (10.34%) reporting cough and 2 (6.90%) complaining of shortness of breath. 6 patients (20.69%) presented with atypical symptoms initially; 3 (10.34%) with diarrhoea, and the remaining 3 with vomiting, sore throat and myalgia.

Patient Outcomes

All 29 of our patients recovered from SARS-CoV-2 using the management system we implemented. 28 (96.55%) of patients were asymptomatic and swabbed negative two weeks after being diagnosed. Only 1 (3.45%) patient retested positive. She had remained asymptomatic throughout her course of illness, and was then swabbed negative after one further week.

In total, 13 (44.82%) patients required added oxygen supplementation during their course of illness, a demand which was met by one eight-bedded room with pre-installed oxygen supply, and oxygen cylinders for all remaining patients. One patient with low baseline oxygen saturations within the context of suspected Obesity Hypoventilation Syndrome (OHSS) refused oxygen supplementation as she was asymptomatic. Another, with a past medical history of COPD, was already receiving long-term oxygen therapy (LTOT), and experienced no increase in her oxygen demands. She was therefore not included in the portion of patients with increased requirements.

The patients required a mean duration of 8.85 days of oxygen therapy. It is worth noting that four of these oxygen-dependent patients were started on antibiotic therapy in view of suspected bacterial pneumoniae, which were identified by productive coughs and more persistent fever.

The age ranges for the patients requiring oxygen are displayed in *figure 4*. Interestingly, the 50-59-year and 60-69-year age groups had greater proportionate oxygen demands than those of the 70-79-year age group. Both individuals in the 50-59 group required new oxygen prescription (100%), while 44.44% of the 60-69-year age group needed oxygen. 62.5% of the 80-89-year age group had increased demands. The 70-79-year age group had the lowest proportionate requirements (12.50%). These percentages are represented in *table 3*.

Figure 4 Hypoxia across age groups

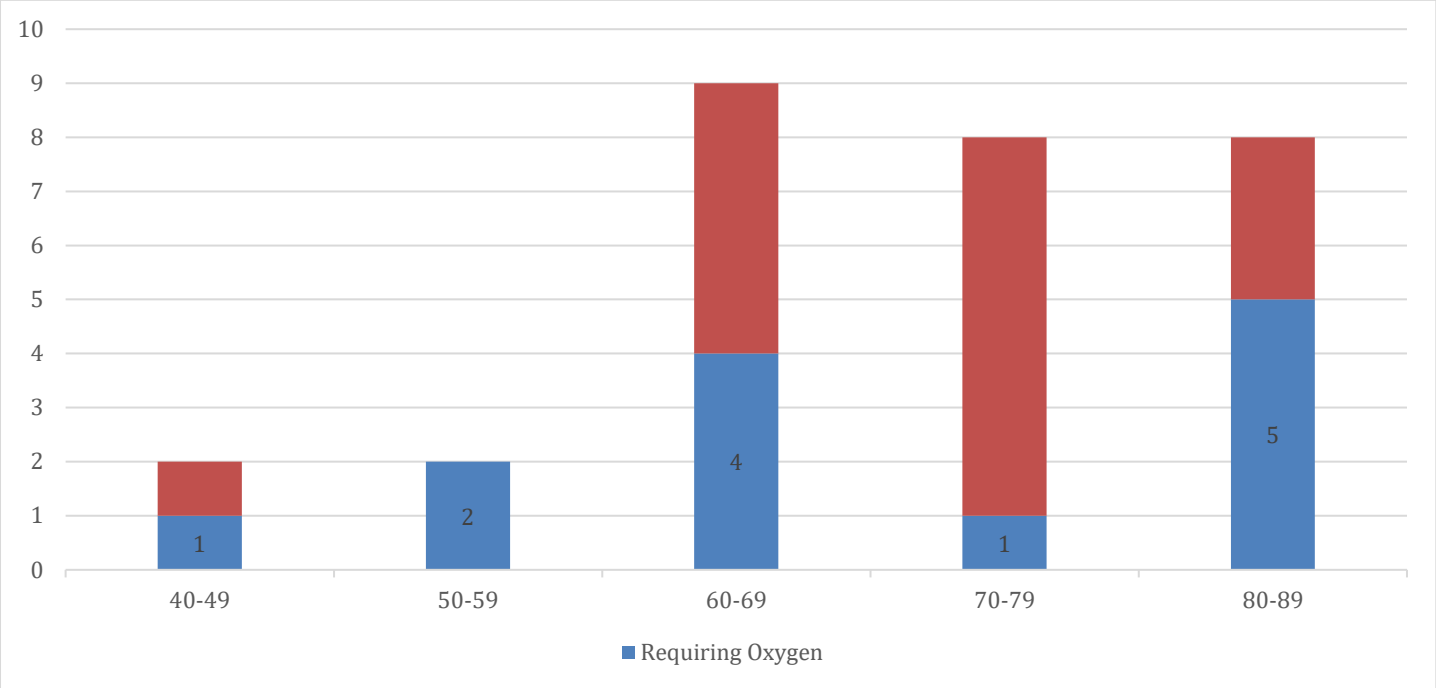


Table 3 Oxygen requirements by age-group

Age Group	Requiring Oxygen	Proportion
40-49	1	50%
50-59	2	100%
60-69	4	44.44%
70-79	1	12.50%
80-89	5	62.50%

Two patients required transfer to Mater Dei Hospital in view of clinical deterioration. Both were oxygen-dependent patients with secondary bacterial lower-respiratory tract infections. Both were moved in view of the increasing likelihood of needing ventilatory support. They returned following inpatient admissions of a mean duration of 7.5 days to complete their recovery at Mount Carmel Hospital. Neither patient required ventilatory support.

DISCUSSION

The outbreak of SARS-CoV-2 in such a vulnerable patient population within the setting of a mental health hospital represented a challenging undertaking. We believe that the formation of the medical response team and the partnership which

was formed with the Infectious Diseases team were key to the positive outcomes we experienced.

The burden a pandemic would place on mental health services and inpatient facilities was identified early from data gathered in Wuhan,[8] though further literature on the subject remains scanty. One of the conclusions of this study was that hospital bed shortage had necessitated the setting up of isolation wards within psychiatric hospitals for confirmed cases in psychiatric patients. The setting up of the isolation ward and management principles applied at our hospital during the outbreak no doubt alleviated the Infectious Diseases Unit at Mater Dei Hospital of significant strain.

The quality of presenting symptoms identified in our cohort were consistent with findings reported in a large scale study of SARS-CoV-2 in nursing homes in the United Kingdom.[6] While still striking, the proportion of our patients who were asymptomatic or presented atypically (44.83% and 20.69% respectively) was not higher in long-term psychiatric inpatients, suggesting that sufferers of chronic mental illness are no more likely to present without or with atypical symptoms than their counterparts in care homes.

Elderly psychiatric patients are at increased risk of medical comorbidity due to a number of factors.[10,13] Access to healthcare can be impaired; clinical presentation can be more difficult to elicit; and psychiatric medications can have their own adverse effects, which means medical illnesses can be both underdiagnosed and undertreated.[14]

An intriguing feature during the early stages of the set-up which was put in place was the approach that nursing staff took to this new group of patients. Semi-dependent and even entirely independent patients were nursed as if they were completely dependent in their ADLs. Patients who were able to mobilize and toilet without assistance were nursed almost entirely at the bedside and given nappies to meet their bathroom needs. We hypothesize that inexperience with SARS-CoV-2 patients and subsequent anxiety in nursing staff may have contributed to this initial strategy of care.[17]

There were a number of limitations in our study. First, our patient cohort was exclusively female – males have consistently been demonstrated to fare worse with the virus.[1,6,11,15] It is not unlikely that our outcomes may have been poorer should the cohort have been mixed. Second, the limited communicative capabilities a number of our patients faced may have actually led to an underrepresentation of presenting symptoms. Third, while oxygen cylinders had to be manually transported to meet the requirements of all of our oxygen-dependent patients, having one 8-bedded room with established oxygen supply was advantageous. We understand this might not always be the case in other low-resource healthcare settings. Fourth, a number of our patients suffered from secondary bacterial infections – it is unclear how much they contributed to their presenting symptomatology and oxygen requirements. Fifth, it is likely the initial barriers to care that have been laid out above may have lengthened recovery times and led to the development of complications.

CONCLUSION

Outbreaks of SARS-CoV-2 within the setting of a low-resource, long-term care or psychiatric inpatient facility can be contained and managed using a policy that employs straightforward clinical monitoring and supportive care; a targeted medical response team; an identified isolation ward; and close liaison with regional Infectious Diseases specialists.

SUMMARY

Present Knowledge

- Age and medical comorbidity are well-known risk factors for a more adverse outcome in SARS-CoV-2 infection.
- Greater rates of mortality have been observed in vulnerable settings such as long-term care homes.
- Psychiatric illness is associated with greater medical disease burden, diagnostic difficulties and communication barriers, which can worsen prognosis on SARS-CoV-2.

New Findings

- The impact of SARS-Cov-2 in the setting of a mental health inpatient facility in patients with chronic psychiatric illness has not been widely studied.
- Positive outcomes can be achieved through straightforward clinical monitoring, the setting up of a medical response team and liaison with specialists in Infectious Diseases.
- Patients with psychiatric illness present with similar rates of asymptomatic and atypical presentations to those encountered in long-term care homes.
- The setting of a psychiatric hospital presents unique clinical and interpersonal difficulties, and the impact of SARS-CoV-2 can significantly affect the psychological wellbeing of psychiatric patients.

REFERENCES

1. UK Office for National Statistics. Deaths registered weekly in England and Wales, provisional: week ending 28 August 2020. HMSO (2020) [Updated on 8th September. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsregisteredweeklyinenglandandwalesprovisional/weekending28august2020#deaths-registered-by-age-group Accessed on 14th September 2020]
2. Malta Ministry of Health. COVID-19 Malta – Data Dashboard. [Updated on 14th September. Available from: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/covid-19-infographics.aspx Accessed on 15th September 2020]
3. World Health Organization. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. [Available from: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations Accessed on 15th September 2020]
4. World Health Organization. Infection Prevention and Control guidance for Long-Term Care Facilities in the context of COVID-19 [Available from: https://apps.who.int/iris/bitstream/handle/10665/331508/WHO-2019-nCoV-IPC_long_term_care-2020.1-eng.pdf Accessed on 15th September 2020]
5. Yourish K, Lai KKR, Ivory D & Smith M. One-Third of All U.S. Coronavirus Deaths Are Nursing Home Residents or Workers. New York Times. [Available from: https://www.nytimes.com/interactive/2020/05/09/us/coronavirus-cases-nursing-homes-us.html Accessed on 15th September 2020]

6. NSN Graham, C Junghans, R Downes et al. SARS-CoV-2 infection, clinical features and outcome of COVID-19 in United Kingdom nursing homes. J infect 2020; 81(3): p411-9.

7. M Czeisler, R Lane, E Petrosky et al. Mental Health, Substance Use, and Suicidal Ideation During the COVID-19 Pandemic — United States, June 24–30, 2020. MMWR Morb Mortal Wkly Rep 2020; 69: p1049–57.

8. YT Xiang, YJ Zhao, ZH Liu et al. The COVID-19 outbreak and psychiatric hospitals in China: managing challenges through mental health service reform. Int J Biol Sci 2020; 16(10): p1741 – 1744.

9. Bahorik A, Satre D, Kline-Simon A, Weisner C & Campbell C. Serious Mental Illness and Medical Comorbidities: Findings from an Integrated Health Care System. J Psychosom Res 2017; 1(100): p35-45.

10. Goh A, Westphal A, Daws T, Gascoigne-Cohen S, Hamilton B & Lautenschlager N. A retrospective study of medical comorbidities in psychogeriatric patients. Psychogeriatrics 2016; 16: p12-9.

11. RH Du, LR Liang, CQ Yang et al. Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: a prospective cohort study. Eur Respir J 2020; 55(5).

12. LH Zhu, ZG She, Xu C et al. Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes. Cell Metab 2020; 31(6): p 1068-77.

13. S Loi & E Chiu. Medical comorbidity in psychiatric patients. Curr Opin Psychiatry 2011; 24(4): p355-358.

14. Fagiolini A & Goracci A. The effects of undertreated chronic medical illnesses in patients with severe mental disorders. J Clin Psychiatry 2009; 70(3): p22-29.

15. Petrilli CM, Jones SA, Yang J et al. Factors associated with hospital admission and critical illness among 5279 people with coronavirus disease 2019 in New York City: prospective cohort study. BMJ 2020; 369. Article m1966.

16. Connors J & Levy J. COVID-19 and its implications for thrombosis and anticoagulation. Blood 2020; 135(23): p2033-2040.

17. Sun N, Wei L, Shi S et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. Am J Infect Control 2020; 48(6): p592-8.

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ORIGINAL ARTICLE

A prospective observational study on Emergency Medical Admissions at Mater Dei Hospital, Malta

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Background

Ambulatory Emergency Care is a novel healthcare paradigm that has not yet been adopted locally. The aim of this study was to determine how many patients admitted to medical wards in Mater Dei Hospital between January 2020 and December 2020 could have been managed in an ambulatory setting.

Methods

We determined which patients had a length of stay of less than 24 hours as well as calculated the Amb score for each patient, postulating these two criteria as effective markers of patients that could be selected for ambulatory management. With the unfolding of the COVID-19 worldwide pandemic, data collection stopped in March 2020. A total of 54 patients were randomly sampled from post-take medical ward rounds and data pertaining to their medical admission was recorded.

Results

20.37% of patients had a length of stay of less than 24 hours whilst *44.4%* of patients had an Amb score of 5 or more. *18.5%* of patients were found to have an Amb score of 5 or more AND a length of stay of less than 24 hours. A moderate negative correlation (r_s = -0.66) between a high Amb Score and a short length of stay was demonstrated. Lower respiratory tract infection and Chest pain were the two commonest provisional diagnoses making up *37.0%* of all admissions.

Conclusions

One in every 4.6 patients could benefit from ambulatory emergency management. We hypothesize that such a service would help reduce pressures on the current local healthcare system, improving emergency department throughput and patient satisfaction.

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INTRODUCTION

Ambulatory emergency care (AEC) or Same Day Emergency Care (SDEC) is an evolving concept that does not yet exist within the Maltese healthcare system. As the scope and delivery of acute care services becomes ever more complex and the medical and social needs of an increasingly aging, comorbid population demand to be met, AEC might be the solution that clinicians at the acute interface between primary and secondary care are looking for.

AEC is defined as 'acute clinical care which includes investigation, treatment and rehabilitation of patients for whom, in the absence of an ambulatory emergency care service, admission to hospital would have been the default option.'[1] It is a model within which a significant proportion of emergency department attendees are managed on the same or next day without being admitted to a hospital bed.[2] The implications of this are far-ranging: a reduction in the number of patients that are admitted to hospital for less than 24hours, a reduction in bed occupancy leaving more room for the sickest of patients, improved patient flow with less crowding in the emergency department and an overall better patient experience. AEC has been described as a 'transformational change in care delivery' and has the potential to be as significant to emergency care as day case surgery is to elective surgery.[2]

The aim of this study was to determine how many patients admitted to medical wards in Mater Dei Hospital between January 2020 and December 2020 could have been managed in an ambulatory setting. To do this we determined which patients had a length of stay of less than 24 hours as well as calculated the 'AMB score' (Figure 1), for each patient. This score, mentioned in the Royal College of Physicians' (RCP) 2014 Acute Care Toolkit,[3] is a tool developed by Ala et al. in their 2010 pilot study[4] to help identify patients who can be managed in an ambulatory setting safely.

Figure 1 The 'Amb' Score – used to determine which patients can be managed safely in an ambulatory setting

			Score
Sex	Female Male	0 -0.5	
Age	<80 years ≥80 years	0 -0.5	
Access to transport	Yes No	2 0	
Will likely need IV Rx	Yes No	0 2	
Acutely confused	Yes No	0 2	
NEWS	NEWS=0 NEWS ≥1	1 0	
Discharged last 30 days	Yes No	0 1	
Total			

If the AMB score is ≥5, consider ambulatory care.

With the unfolding of the COVID-19 worldwide pandemic, the data collection was cut short in mid-March. The results presented here therefore represent a small fraction of the total sample the authors had initially hoped to analyse.

MATERIALS AND METHODS

Approval from the Data Protection Office at Mater Dei Hospital was obtained prior to commencing data collection. Anonymized information from patient notes and electronic case summaries was transferred to a password-protected spreadsheet created using Microsoft Excel 2010 software. A total of 55 patients admitted to general medical wards between January 2020 and March 2020 were randomly sampled from post-take ward rounds. Data for this prospective study was then collected and included gender and age of patient, provisional diagnosis on admission, reason for admission, length of stay in hospital and various criteria pertaining to the aforementioned AMB score. Direct intensive care unit admissions or patients reviewed for potential admission to the intensive care unit were excluded from the data collection.

RESULTS

Of the 55 patients that were randomly selected for the study, 1 patient passed away during their inpatient admission and was subsequently excluded from further analysis. 46.3% of patients were female and 53.7% were male. 23 out of 54 patients sampled (42.6%) were admitted during the month of January, 19 patients (35.2%) were admitted in February and 12 (22.2%) were admitted in March. Figure 2 shows the age distribution of these patients, with the highest number (24.1%) falling within the 71-80 age group. 12.9% (*n*=7) hailed from various nursing homes around the island.

Figure 2 Age distribution of patients admitted through the Emergency Department

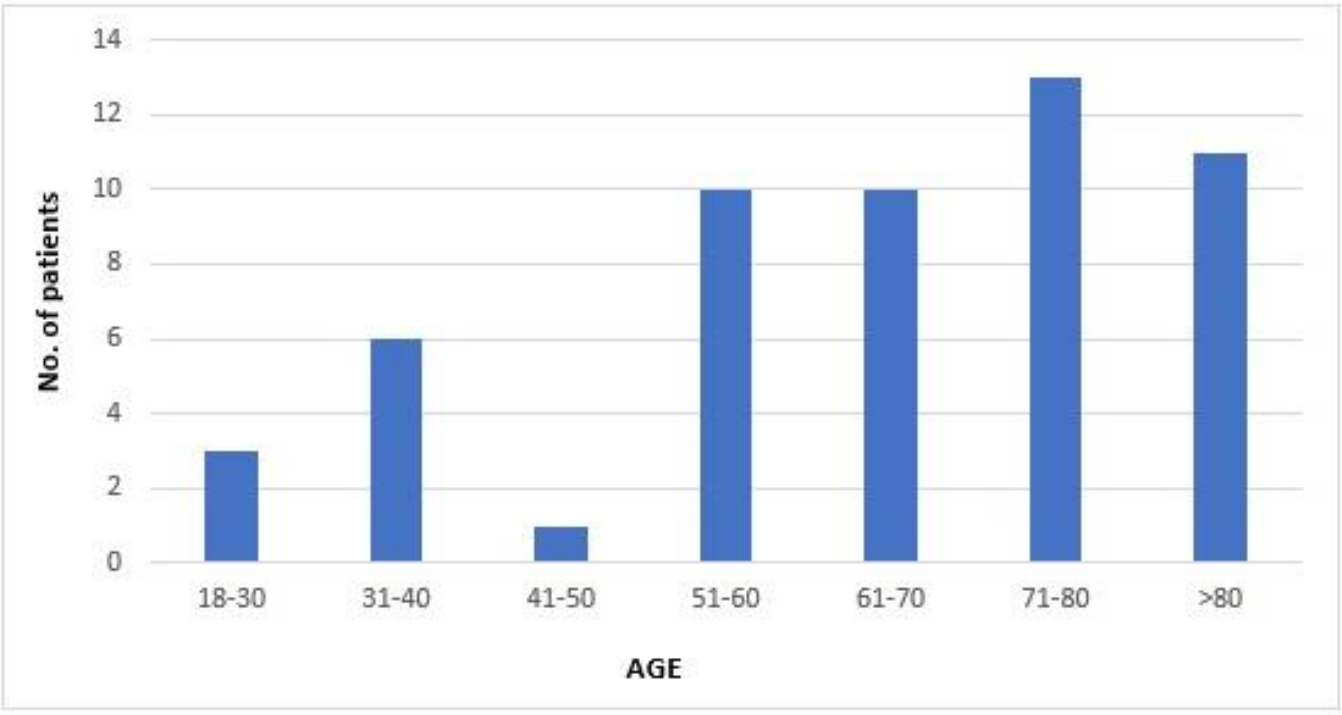


Figure 3 shows the provisional diagnoses with which patients were admitted to the medical wards. 'Lower respiratory tract infection' (*n*=11) and 'Chest pain' (*n*=9) were the two commonest provisional diagnoses making up 37.0% of all admissions. 23 other diagnoses, ranging from 'High INR' to 'Progression of Malignancy' made up the rest of the admissions. On discharge, 75.9% of the provisional diagnoses remained the same whereas 20.4% of patients had a different discharge diagnosis from their provisional one. 3.7% (*n*=2) had no completed discharge letter on the Electronic Case Summaries (ECS) online portal Mater Dei Hospital uses to log such documents, so their diagnosis on discharge could not be compared to their provisional diagnosis on admission.

Further data analysis revealed that *20.37%* of patients (*n*=11) were admitted to a general medical bed for less than 24 hours. 8 out of these 11 patients (72.7%) did not require any further investigations. The other 3 patients required further blood tests but no other imaging or diagnostic studies. All 11 patients had observations that were within normal limits on admission, scoring 0 on Mater Dei Hospital's Early Warning Scores on adult observation charts (Figure 4).

Figure 3 Provisional Diagnoses on Admission

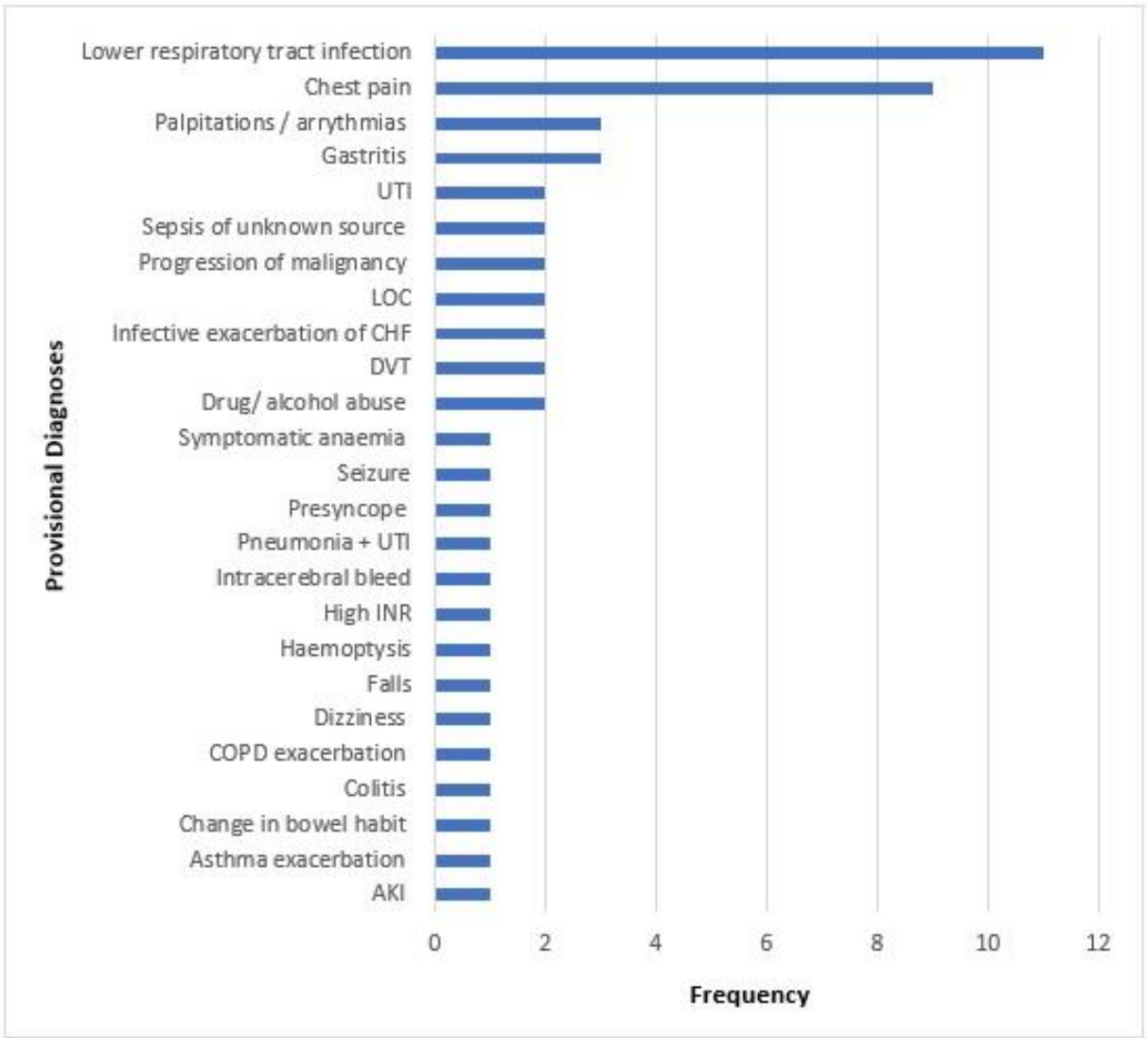
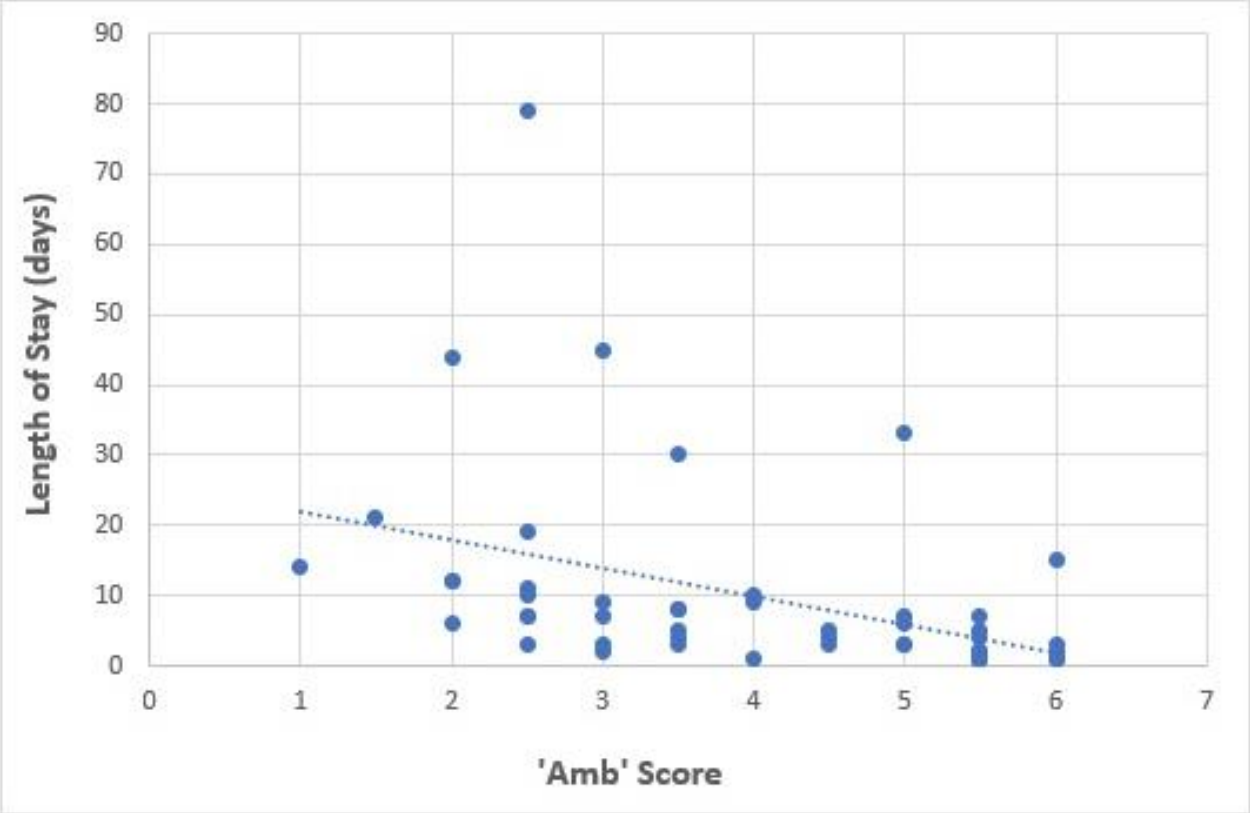


Figure 4 Mater Dei Hospital's Early Warning Score (EWS)

EWS SCORE	3	2	1	0	1	2	3
Respiratory Rate	≤8		9-11	12-20		21-24	≥25
Oxygen Saturation	≤91	92-93	94-95	≥96			
Extra Oxygen		YES		NO			
Temperature	≤35.0		35.1-35.5	35.6-38.0	38.1-39.0	≥39.1	
Systolic BP	≤90	91-100		101-180	≥181		
Heart Rate	≤40		41-50	51-90	91-110	111-130	≥131
Level of Consciousness				Alert, Verbal			Pain, Unresponsive

Figure 5 Scatter correlation plot of 'Amb' score against length of stay in days for 54 patients. There is a negative correlation between high 'Amb' Score and a short length of stay



A further 9.26% of the total number of patients (*n*=5) had a length of stay (LOS) of between 24 to 48 hours. 1 patient did not require any further investigations, 1 patient required further blood tests, 1 patient required an exercise stress test, 1 patient required further blood tests and imaging to be undertaken and 1 patient required further blood tests as well as an invasive procedure such as a 'lumbar puncture/angiogram/endoscopy'.

Of note, 27.8% of the total number of patients had no further investigations done during their inpatient admission whilst 77.8% had no specialty consultations performed on Day 1 of admission.

The 'AMB Score' (Figure 1) was calculated for all 54 patients. Using the revised 2015 version of the AMB score, *44.4%* (*n*=24) of our patients scored 5 or more. 18.5% of patients (*n*=10) were found to have an AMB score of 5 or more AND a LOS of less than 24 hours. Figure 5 shows the negative correlation between a short LOS and a high AMB score as depicted on the scatter plot graph. Spearman's rho value was then calculated as neither AMB scores nor LOS fitted parametric data distribution. A value of -0.66 was obtained using Microsoft Excel 2010 software, showing moderate negative correlation between LOS and AMB score.

DISCUSSION

With an increasing focus on overcrowding, hospital bed availability and patient safety, healthcare systems are required to find innovative ways of reducing pressure on their services. We set out to identify which patients presenting to the Emergency Department at Mater Dei Hospital could be managed in an ambulatory setting without the need for an in-hospital admission.

In our study, we used a LOS of less than 24 hours and an AMB score of 5 or more to be effective markers of patients that could have been seen in an ambulatory setting. The latter criteria was taken from the original study by Ala et al.[4] where a score of 5 or more was found to have a 96% sensitivity and 62% specificity in identifying such patients. *20.37%* of our patients had a LOS of less than 24 hours whilst *44.4%* of patients had an AMB score of 5 or more. Therefore, at least 1 in every 5 patients could have been spared a hospital admission when taking into account the LOS only. When the AMB score alone is considered, this goes up to 1 in every 2.25 patients. When both are taken in tandem, 1 in every 4.6 patients could have benefitted from referral to an ambulatory emergency care service. Although not the primary aim of this study, we did find a negative correlation between the LOS and the AMB score. The calculated coefficient shows a moderate inverse correlation and we predict that with larger sample sizes this correlation might be stronger.

Out of the 10 patients who had a hospital stay of less than 24 hours and an AMB score of 5 or more, 7 were admitted with chest pain. All 7 of these patients could have been seen in an ambulatory setting thus highlighting the potential for an ambulatory Chest Pain Pathway. Our major limitation is our sample size however we estimate that other clinical pathways may have scope depending on patient presentation patterns.

AEC services, mainly in the UK, have taken on many forms ranging from specific clinics tackling singular pathology, such as lower limb DVTs, to more generalised non-bedded units seeing patients with deranged liver function tests, asymptomatic anaemia, limb cellulitis, high INRs, electrolyte disturbances, low risk chest pains and low risk pulmonary embolisms. So streamlined are some of these processes that advanced nurse practitioners now lead some of these clinics, of which a few are even virtual. A directory has been developed by the 'Ambulatory Emergency Care Network'[5] which lays

out all potential pathology that can be managed successfully in an ambulatory setting whilst emphasizing key principles such as interspeciality collaboration and rapid access to diagnostics. Apart from reduction in admissions and improved patient throughput in the ED, there are reductions in adverse effects of hospitalisation such as deep vein thrombosis, hospital-acquired infections, confusion and pressure sores.[6-8]

NHS England has recognised the importance of integrating AEC services to the more traditional emergency care services provided by emergency departments nationwide. Their *Long Term Plan (2019)* requires all type 1 EDs to have adopted some form of ambulatory emergency care strategies by 2020.[9] The NHS Data Dictionary[10] defines a Type 1 ED as 'a consultant-led 24hour service with full resuscitation facilities and designated accommodation for the reception of accident and emergency patients.' In Malta, a short- lived trial of a Clinical Decision Unit (CDU) was introduced in 2016 as an extension to the main Emergency Department at Mater Dei Hospital. However this only allowed for patients to be moved to a different area to wait for results and/or treatment with the purpose of helping to reduce overcrowding in the main department.

Consideration of the local context is paramount. Our short distances allow for such a model of care to be even safer than what other European countries can provide. What we need is not the presence of a separate physical building, although having such a unit may well provide a better service for patients, but rather robust and effective clinical care pathways that do not create new work but allow for the same work to be streamlined and done more efficiently. Above all a change in mindset and work culture might be the first challenge that needs overcoming. We firmly believe that a similar study with a larger sample size would reinforce our findings and help pave the way for the introduction of ambulatory emergency care in Malta

ACKNOWLEDGEMENTS

The authors would like to thank Dr.M.Cassar, Consultant in Emergency Medicine, for her support during the initial stages of this project.

SUMMARY BOX

1. Ambulatory emergency care is a healthcare paradigm in which patients are managed on the same or next day without being admitted to a hospital bed.
2. Several models of ambulatory care have been devised, ranging from Emergency Department Observations Units to highly specific DVT clinics.
3. We postulated that an inpatient length of stay of less than 24 hours and an AMB score of 5 or more would be effective markers to screen for patients who could be managed in an ambulatory setting safely.
4. This study showed that *20.37%* of patients had a length of stay of less than 24 hours whilst *44.4%* of patients had an AMB score of 5 or more.
5. 18.5% of patients were found to have an AMB score of 5 or more AND a length of stay of less than 24 hours.
6. We hypothesize that an ambulatory care management model would help reduce pressures on the current healthcare system although further feasibility studies would have to be performed.

REFERENCES

1. Sood, T. and Hassan, T. (2019). The RCEM Ambulatory Emergency Care Toolkit. [online] Available from: https://www.rcem.ac.uk/docs/RCEM%20Guidance/RCEM_Ambulatory_Emergency_Care_Toolkit_(Feb_2019).pdf [Accessed 30 Oct. 2020]
2. Same Day Emergency Care (ambulatory emergency care) (2018) London: NHS Improvement [online] Available from: https://improvement.nhs.uk/documents/2161/same-day-emergency-care.pdf [Accessed 30 Oct. 2020]
3. Acute Care Toolkit 10 - Ambulatory Emergency Care. (2014). London: Royal College of Physicians. [online] Available from: https://www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-10-ambulatory-emergency-care [Accessed 30 Oct. 2020]
4. Ala L, Mack J, Shaw R, Gasson A, Cogbill E, Marion R, et al. Selecting ambulatory emergency care (AEC) patients from the medical emergency in-take: the derivation and validation of the Amb score. Clin Med (Lond) 2012; 12(5): 420-426.
5. Ambulatory Emergency Care Network. (2016). AEC Directory. [online] Available from: http://www.ambulatoryemergencycare.org.uk/Tools-and-Resources/AEC-Directory [Accessed 30 Oct. 2020]
6. Baglin T. Venous thromboembolism in hospitalised patients: a public health crisis? Br J Haematol 2008; 141: 764-770. doi: 10.1111/j.1365-2141.2008.07141.
7. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. Infect Control Hosp Epidemiol 2011; 32(2): 101-114. doi: 10.1086/657912.
8. Bakerjian D. Hospital Care and Older Adults - Geriatrics - MSD Manual Professional Edition. MSD Manual Professional Edition. 2020 [online] Available from: https://www.msdmanuals.com/professional/geriatrics/providing-care-to-older-adults/hospital-care-and-older-adults [Accessed 2 Jan.2021]
9. NHS. The NHS Long Term Plan #NHSLongTermPlan www.longtermplan.nhs.uk. [online] Available at: https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf [Accessed 30 Oct. 2020]
10. EMERGENCY CARE DEPARTMENT TYPE. Datadictionary.nhs.uk. 2021 [online] Available from: https://datadictionary.nhs.uk/attributes/emergency_care_department_type.html [Accessed 2 January 2021]

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ORIGINAL ARTICLE

Lithium monitoring in clinical practice

Edith Agius, Annalise Bellizzi, Lara Rapa, Claire Vassallo

Background

Lithium is widely used for the treatment of bipolar disorder. Owing to its narrow therapeutic index and side-effect profile, regular monitoring is recommended by all major guidelines on lithium use.

Aims

The aim of this study was to determine whether routine lithium monitoring practice at the local mental hospital in Malta reaches the standard set by the NICE guidelines in 2014.

Method

All patients on lithium maintenance treatment for bipolar disorder at the local Mental Hospital were included. Blood tests within the last one year were collected using iSOFT clinical manager (iCM). After the first audit cycle, a lithium monitoring sheet was created in accordance with the NICE guideline and after 6 months of implementation, the second audit cycle was conducted.

Results

In the first cycle, 28 patients met the NICE criteria for increased risk of toxicity and have a recommended testing frequency for lithium levels of every 3 months. However, only 1 patient (3.7%) was observed to meet this criteria. When assessing the last lithium level only 35.7% were within 0.4-0.8 mmol/L. In the second audit cycle, 28 patients met the NICE criteria for increased risk of toxicity and have a recommended testing frequency for lithium levels of every 3 months. Almost half of the patients (12 patients, 42.8%) were to observed to meet this criteria. When assessing the last lithium level, 50.0% were within 0.4-0.8 mmol/L.

Conclusions

The introduction of the lithium monitoring sheet helped significantly in increasing the monitoring of lithium levels in patients which are at a higher risk of lithium toxicity. Moreover, the monitoring sheet helped the clinicians in maintaining lithium levels within the normal therapeutic range, hence prevent unwanted side effects related to lithium toxicity.

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Introduction

Lithium is treatment used for bipolar mood disorder, both in the acute and maintenance phase.[1] Mood stabilizers effectively treat the symptoms of bipolar disorder however, they are potential linked with adverse drug events (ADEs).[2] Nederlof in 2015,[3] mentioned that apart from lithium serum levels, monitoring of should include other laboratory tests and physical paraments. Lithium use has been associated with a gradual decline in renal function, however, this decline can become irreversible and may also lead to renal failure.[4] Moreover, the decline in renal function can lead to an increased risk of lithium toxicity.[5] In view of possible hypothyroidism and hyperparathyroidism, monitoring of thyroid function and calcium levels is recommended.[6] Physical parameters such as weight and blood pressure may also be influenced with lithium use so regular monitoring of such parameters are crucial.[4]

Objectives

The aim of this study was to determine whether routine lithium monitoring practice during maintenance phase treatment of bipolar mood disorder, at the local Mental Hospital in Malta reaches the standard set by the National Institute for Health and Care Excellence (NICE) guideline “Bipolar disorder: assessment and management” published in 2014.[7]

Methodology

Approval was sought from the Clinical Chairman of Psychiatry and Data Protection officer. Retrospective data were extracted from patient’s clinical file and iSOFT clinical manager (iCM). All patients on lithium maintenance phase treatment for bipolar disorder at the local Mental Hospital were included in the study. Blood test monitoring and physical parameters within the last 1 year were collected for each patient.

After the first audit cycle, a lithium monitoring sheet was created in accordance with the NICE guideline "Bipolar disorder: assessment and management” published in 2014. After getting the necessary approval, this monitoring sheet was disseminated in every ward at the local hospital. Training on how to use the sheet was provided all the foundation doctors and psychiatric trainees to facilitate usage. After 6 months of implementation, the second audit cycle will commence.

Results

Audit Cycle 1

A sample of 42 patients were collected. 25 were males and 17 were females. Of these 42 participants, 23.8% were aged 65 and above, 35.7% had interacting medications (NSAID, COX II inhibitor, thiazide or loop diuretic, ACE inhibitor or angiotensin II receptor antagonist), 64.3% had co-morbid disease (hypertension, diabetes and/or any thyroid disorder) and 21.4% had kidney impairment (EGFR less than 60).

When assessing the last lithium level, 35.7% were within 0.4-0.8 mmol/L, 35.7% were within 0.8-1.0 mmol/L, 19% were below 0.4 mmol/l and 9.5% were above 1.0 mmol/L. (Figure 1).

For those patients who had >1 test result in the database, the recommendation of at least one blood test every 6 months was met 76.1% of cases for lithium level, 88.0 % of cases for EGFR and renal function and 71.4% of cases for thyroid function. However, only 38.0% had a serum calcium level within the last 6 months. BMI or weight monitoring are recommended at least yearly, but only 14.2% met this recommendation within the last year. (Figure 2).

Figure 1 Serum lithium levels

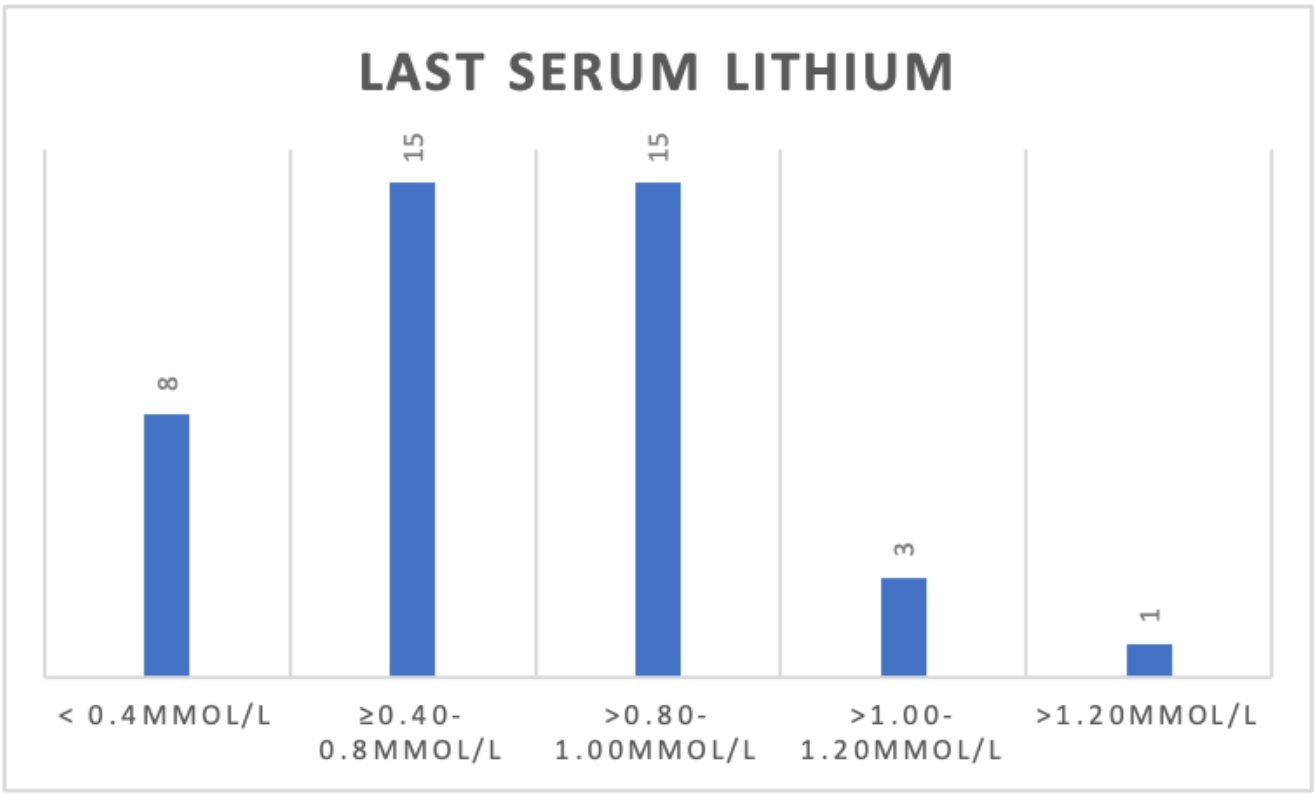
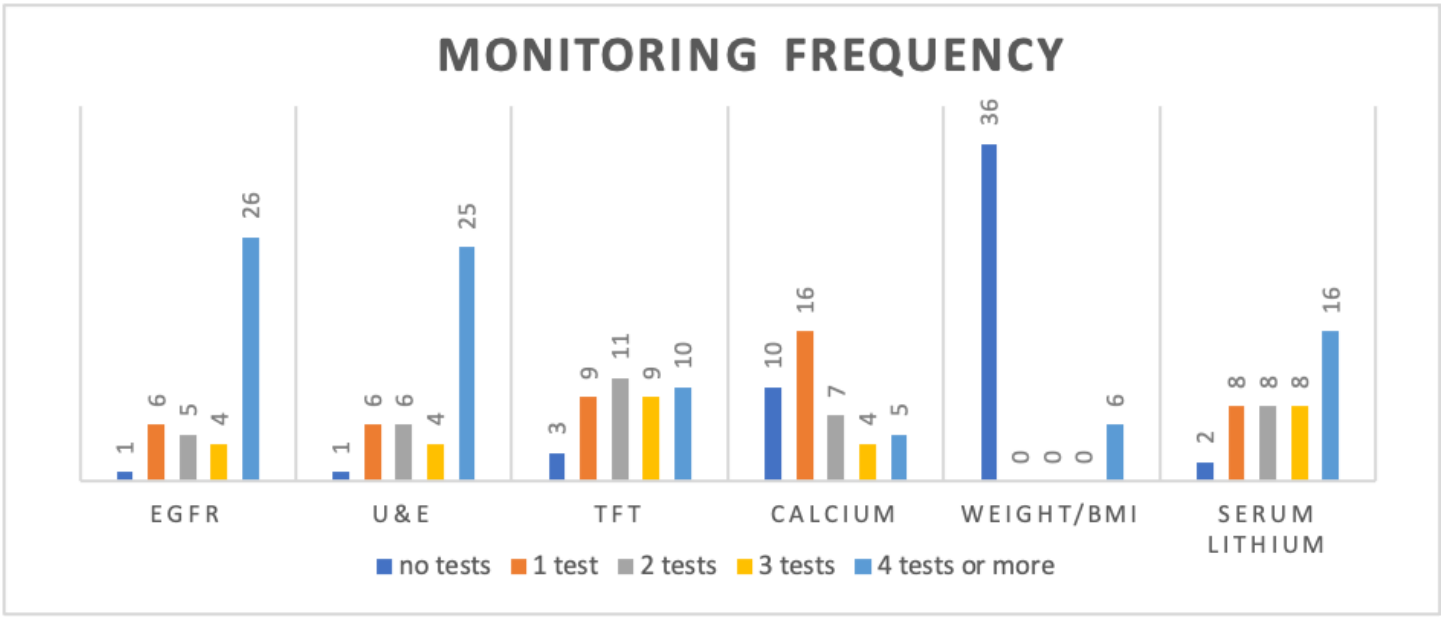


Figure 2 Frequency of monitoring



Twenty-eight out of the 42 patients, had met the NICE 2014 criteria for increased risk of toxicity (i.e. elderly, chronic co-morbidity and/or were co-prescribed at least one medication with a BNF specified interaction with lithium). In such cases, serum lithium monitoring frequency is recommended to be least once every 3 months. However, only 1 patient (3.6%) was observed to meet the criteria. 12 patients were observed to be monitored on a period of between 5-7 months, whilst 15 patients were observed on a period of greater than 7 months.

Audit Cycle 2

A sample of 44 patients were collected. 23 were males and 21 were females. Out of the 44 patients, 9.0% were aged 65 and above, 50.0% had interacting medications (NSAID, COX II inhibitor, thiazide or loop diuretic, ACE inhibitor or angiotensin II receptor antagonist) and 39.0% had chronic co morbidity (hypertension, diabetes, any thyroid disorder).

When assessing the last lithium level, 50.0% were within 0.4-0.8 mmol/L, 16.0% were within 0.8-1.0 mmol/L, 25.0% were below 0.4 mmol/l, 5.0% were above 1.0 mmol/L and 5.0% had no bloods recorded. (Figure 3).

For those patients who had >1 test result in the database, the recommendation of at least one blood test every 6 months was met 80.0% of cases for lithium level, 52.0% of cases for EGFR and renal function and 71.4% of cases for thyroid function. However, only 25.0% had a serum calcium level within the last 6 months. BMI or weight monitoring are recommended at least yearly, but none of the patients met this recommendation within the last year (Figure 4).

28 out of 44, had met the NICE 2014 criteria for increased risk of toxicity (i.e. elderly, chronic co-morbidity and/or were co-prescribed at least one medication with a BNF-specified interaction with lithium) and have a recommended testing frequency for lithium levels of every 3 months. Almost half of the patients (12 patients, 42.0%) were to observed to meet these criteria. 12 patients were observed to be monitored on a period of between 5-7 months, whilst 4 patients were observed on a period of greater than 7 months. (Figure 5).

Figure 3 Serum lithium levels

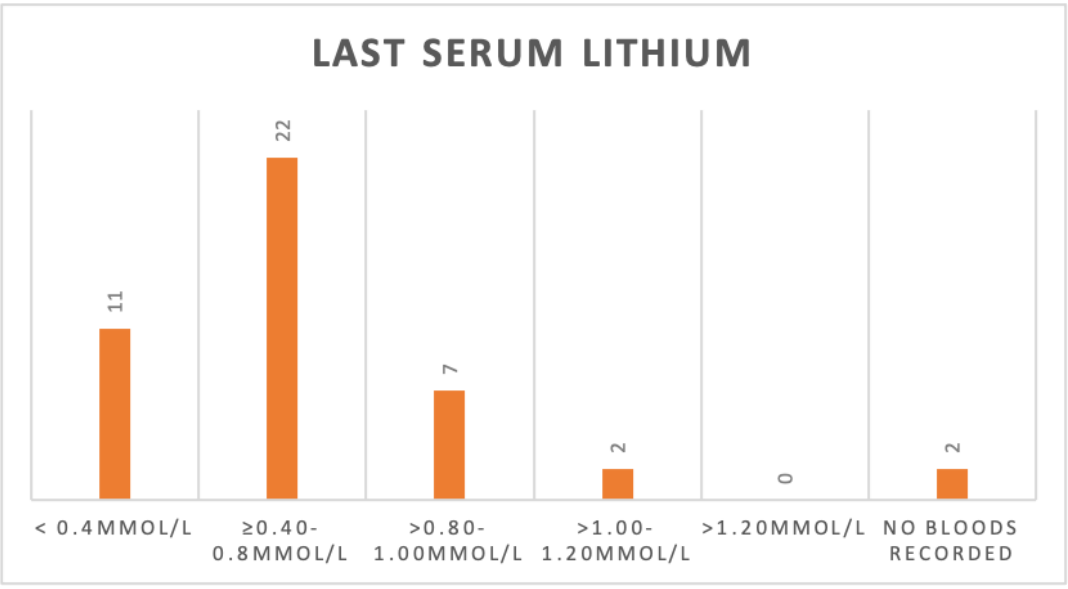


Figure 4 Frequency of monitoring

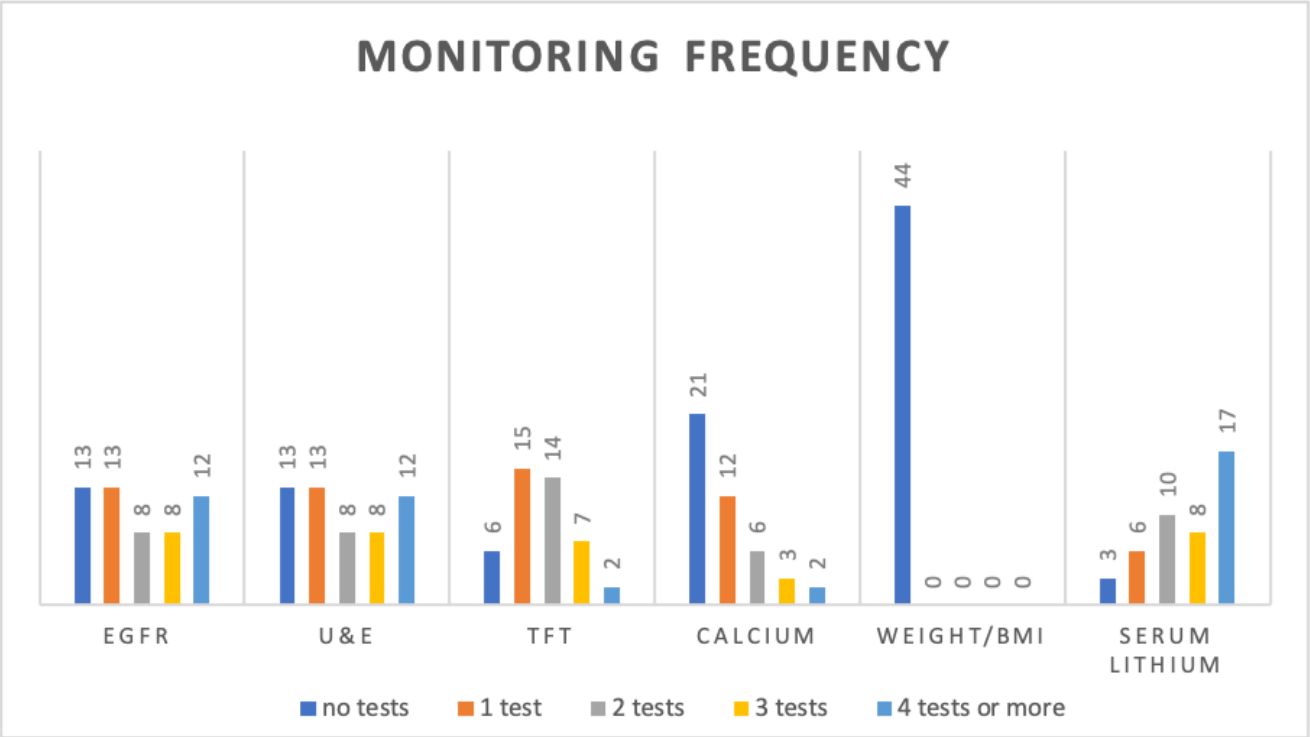
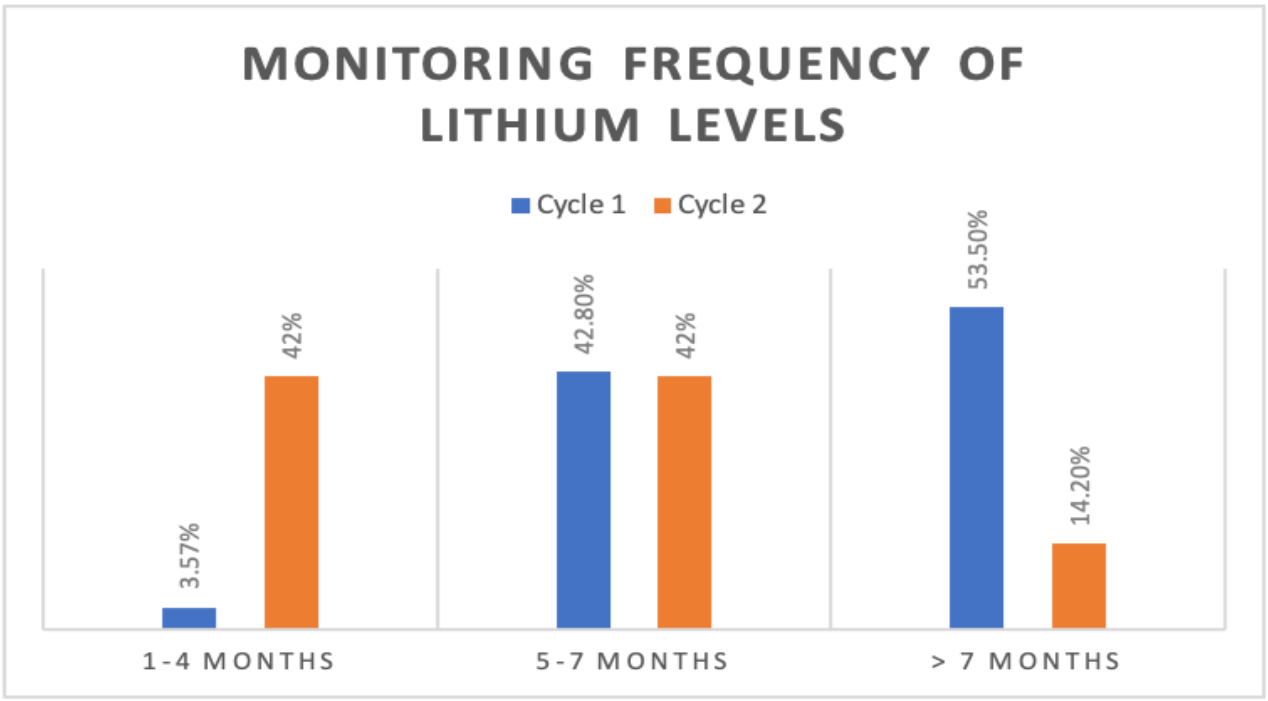


Figure 5 Comparing the monitoring frequency of lithium levels in cycle 1 and cycle 2



Conclusion

The introduction of the lithium monitoring sheet helped significantly in increasing the monitoring of lithium levels in patients which are at a higher risk of lithium toxicity. Moreover, the monitoring sheet helped the clinician in maintaining lithium levels within the normal therapeutic range, hence prevent unwanted side effects related to lithium toxicity.

Recommendations

Introducing the lithium monitoring sheet in the Community Mental Health Clinics and disseminating amongst general practitioners may help in increasing safety practices amongst all mental health services and primary care.

References

1. Licht, R. (2011). Lithium: Still a Major Option in the Management of Bipolar Disorder. CNS Neuroscience & Therapeutics, 18(3), 219-226. doi: 10.1111/j.1755-5949.2011.00260.x
2. Rothschild, J., Mann, K., Keohane, C., Williams, D., Foskett, C., & Rosen, S. et al. (2007). Medication safety in a psychiatric hospital. General Hospital Psychiatry, 29(2), 156-162. doi: 10.1016/j.genhosppsych.2006.12.002
3. Nederlof M, Stoker LJ, Egberts TCG, Heerdink ER. Instructions for clinical and biomarker monitoring in the summary of product characteristics (SmPC) for psychotropic drugs: overview and applicability in clinical practice. J Psychopharmacol Oxf Engl. 2015;29(12):1248–54. Disorders, 6(1). doi: 10.1186/s40345-018-0120-1
4. Gitlin, M. (2016). Lithium side effects and toxicity: prevalence and management strategies. International Journal Of Bipolar Disorders, 4(1). doi: 10.1186/s40345-016-0068-y
5. Lepkifker E, Sverdlik A, Iancu I, Ziv R, Segev S, Kotler M. Renal insufciency in long-term lithium treatment. J Clin Psychiatry. 2004;65(6):850–6.
6. Nederlof, M., Heerdink, E., Egberts, A., Wilting, I., Stoker, L., Hoekstra, R., & Kupka, R. (2018). Monitoring of patients treated with lithium for bipolar disorder: an international survey. International Journal Of Bipolar
7. Bipolar disorder: assessment and management. (2014). Retrieved 24 January 2021, from https://www.nice.org.uk/guidance/cg185/resources/bipolar-disorder-assessment-and-management-35109814379461

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ORIGINAL ARTICLE

Infective triggers for asthma exacerbations in Malta

Stephanie Pullicino, Jonathan DeBattista, Caroline Gouder, Stephen Montefort

Background

Several asthma exacerbations can be triggered by respiratory infections. Asthma guidelines do not provide detailed guidance on management of infective asthma exacerbations. The aims of this study were to identify whether asthmatics were investigated for infective triggers during an exacerbation, to identify micro-organisms responsible, and if these infective exacerbations were treated appropriately.

Method

The clinical notes and investigation results of patients discharged with a diagnosis of asthma between November 2018 and March 2019 from Mater Dei Hospital, Malta, were reviewed.

Results

Our cohort included 245 patients of which 66.5% were female. Chest X-ray was performed in 98.8%, of which 7.4% revealed consolidation. Results from respiratory screens via throat swab and sputum cultures were analysed and overall, 46.1% of the total number of patients had asthma exacerbations with an on-going infectious process. 63.7% of these were confirmed to be viral, commonly human rhinovirus and influenza A, while 22.1% had an on-going bacterial infection. Antibiotics were prescribed in 64.5% of the total, and antivirals in 3.7% of all patients including those with no on-going infectious process. When comparing bacterial versus viral triggers, there was no statistical significant difference in age, white cell count and C-reactive protein levels.

Conclusion

Most patients in our hospital with an exacerbation of asthma were investigated for infective sources. However, most were prescribed antibiotics, albeit there having been no evidence of a bacterial process. The use of procalcitonin could guide antibiotic prescription needs. This highlights the importance of formal guidelines to ensure judicial antibiotic use while reducing the burden of antibiotic resistance and any potential adverse effects.

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Background

Asthma is a serious and common respiratory condition affecting all age groups in which there is reversible airflow obstruction mediated by smooth muscle bronchoconstriction of the airways.[1] It is a chronic inflammatory airway disorder that is characterized by airway hyper-responsiveness. This leads to the typical symptoms of asthma which include chest tightness, shortness of breath, wheezing and coughing.[2]

Asthma can be managed and controlled in several ways including through environmental and lifestyle modifications, inhaled corticosteroids, short-acting and long-acting inhalers as well as oral or intravenous medications. In some instances, however, asthma control may be lost and asthmatics may experience an exacerbation of their condition. These episodes are usually provoked by specific stimuli such as irritant environmental triggers including infective processes, pollution, dust (PM2.5 and PM10), pollen, animal dander, cold temperatures and mould; stress, extreme emotional states and exercise; certain medications as well as lack of compliance to the prescribed asthma treatment. Exacerbations can have a significant negative impact on the quality of life of asthmatics, and in some cases may lead to death.[3-5]

Several guidelines on management of asthma are available, particularly the guidelines suggested by British Thoracic Society (BTS) and Global Initiative for Asthma (GINA) which are regularly updated and offer detailed information on the ideal, evidence-based management of asthma.[6-7]

Infective triggers, including bacterial and viral respiratory infections, are an important cause for exacerbations of asthma. Viral respiratory infections, particularly human rhinovirus (RV), are reported to be the commonest causes of infective asthma exacerbations.[8] Bacterial infections are less likely to be a direct cause of acute asthma exacerbations than viral stimuli; however, the increased production of mucus, impaired ciliary ability to clear mucus as well as viral-induced impairment of antibacterial defences can potentially increase the risk of a superimposed bacterial infection during a primarily viral-associated respiratory infection. This can therefore contribute to a bacterial exacerbation of asthma.[8-9]

Asthmatic patients are at high risk of asthma exacerbations despite ideal guideline-based management to control their asthma on a long-term basis. This highlights the importance of studying triggers for asthma exacerbations and the management of such events in order to decrease healthcare burden, as well as morbidity and mortality.[8]

This study focuses on these infective triggers for asthma exacerbations in adult patients prior to the global pandemic with Coronavirus Disease (COVID-19) with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The primary aim was to identify whether patients admitted with a diagnosis of asthma were adequately investigated for possible infective triggers during their exacerbation. The secondary aim was to identify any micro-organism responsible and whether these infections were treated appropriately.

Methods and Materials

This retrospective study included analysing the data of 245 adult consecutive admissions to Mater Dei Hospital, Malta, who were discharged with a diagnosis of asthma between November 2018 and March 2019.

Patients were identified through the hospital's electronic discharge summary records from which the details of their demographic data, admission, treatment and management were obtained. Results of investigations were obtained through iSoft Clinical Manager. Data protection approval was obtained from data protection manager at Mater Dei Hospital. Ethical approval was obtained from the University Research Ethics Committee.

Patients' clinical examination findings were recorded, particularly temperature and chest findings.

When taken, serological, microbiological and radiological investigations were sought and the results were recorded. Admission blood investigations included a Full Blood Count (FBC), C-Reactive Protein (CRP) and Erythrocyte Sedimentation Rate (ESR). Microbiological investigations included nasopharyngeal/throat swab (Respiratory Screen) which included Polymerase Chain Reaction (PCR), Sputum for Microscopy, Culture and Sensitivity (MCS) as well as Blood Cultures for MCS. Radiological investigations included Chest X-Rays (CXR) and thoracic Computerized Tomography (CT) scans.

Analysis of Variance (ANOVA) test was used to compare variables. A *p*-value of less than 0.05 was taken to be statistically significant.

Results

Demographics

245 cases met the inclusion criteria between November 2018 and March 2019. December 2018 had the least frequent admission rate (mean 1.39 cases per day) and January 2019 had the most frequent admission rate (mean 1.84 cases per day). The shortest admission duration was 2 days, whilst the longest hospital stay was 43 days, with an average of 6.42 days.

The majority of admissions (*n*=163, 66.5%) were female. The age ranged between 18 to 93 years, with a mean of 58.3 years.

Respiratory co-morbidity was present in 33 (13.4%) of 245 patients, 2 of which had multiple respiratory co-morbidities. The commonest co-morbidities were obstructive sleep apnoea (OSA) (*n*=11), and asthma - chronic obstructive pulmonary disease (COPD) overlap syndrome (ACOS) (*n*=9). 169 (68.9%) of the patients had other, non-respiratory co-morbidities, of which 113 patients (46.1%) had multiple co-morbidities. The commonest were hypertension (*n*=86), diabetes mellitus type 2 (*n*=44), and heart failure (*n*=39).

Treatment on admission

The vast majority of patients (98.9%) were on regular 'reliever' inhaled treatment on admission. 44% of patients were on inhaled short-acting beta$_2$-agonist (SABA) only, 42.4% on a combination of SABA and long-acting beta$_2$-agonist (LABA) and 4.9% on a combination of SABA and short-acting muscarinic antagonist (SAMA). On admission, 88.1% of patients were on inhaled 'preventer' treatment. The commonest was fluticasone propionate (32.7%), followed by beclomethasone (30.6%). 10.2% of patients were on immunomodulatory treatment on admission, most of whom were on leukotriene receptor antagonists (9%). 3.8% were on immunosuppressive treatment, 2.9% were receiving regular systemic corticosteroids and 1.6% (4 patients) were on Omalizumab.

Clinical examination

10.6% of patients were febrile on admission. The maximum temperature recorded was 38.3˚C. 213 patients (86.9%) had documented clinical respiratory signs on examination. The commonest

findings were wheeze (85.9%) and decreased air entry (31.9%).

Investigations

All 245 patients had blood tests taken on admission. With regards to inflammatory markers, FBC and CRP levels were taken from all patients. An ESR level was taken from 26 patients (10.6%). Blood results are shown in Table 1.

Table 1 Blood Investigation Results

Blood Indices Measured	Range (Lowest – Highest)	Mean (± SD)
White cell count (x10^9 cells/L)	3.42 - 24.54	10.37 (± 3.75)
Neutrophils (x10^9 cells/L)	2.58 - 20.23	7.38 (± 3.37)
Lymphocytes (x10^9 cells/L)	0.32 - 7.71	1.8 (± 1.17)
Eosinophils (x10^9 cells/L)	0 - 2.69	0.3 (± 0.42)
ESR (mm in 1st hour)	2 - 133	43.42 (± 32.73)
CRP (mg/L)	0.17 - 405	27.74 (± 51.87)

Table 2 Radiology Investigations Results

Chest X-Ray (*n*=242)		CT scan (*n*=19)	
Result	**n (%)**	**Result**	**n (%)**
Normal	176 (72.7%)	Normal	7 (36.8%)
Atelectasis	5 (2.1%)	Atelectasis	1 (5.3%)
Consolidation	18 (7.4%)	Consolidation	6 (31.58%)
Pleural effusion	4 (1.7%)	Pleural effusion	3 (15.8%)
Other (Congestive Heart Failure, Elevated Hemidiaphragm, Emphysema, Fibrosis, Hiatus Hernia)	39 (16.1%)	Other (Fibrosis, Metastasis)	2 (10.5%)

Table 3 Respiratory Screen Results

Respiratory Screen (PCR) (*n*=170)	
Pathogen Identified	***n* (%)**
Human rhinovirus	29 (17.1%)
Influenza A	19 (11.2%)
Human coronavirus	8 (4.7%)
Influenza H1N1	7 (4.1%)
Enterovirus	6 (3.5%)
Moraxella catarrhalis	6 (3.5%)
Haemophilus influenzae	5 (2.9%)
Human parainfluenzae	4 (2.4%)
Klebsiella pneumoniae	4 (2.4%)
Human metapneumovirus	3 (1.8%)
Staphylococcus aureus	2 (1.2%)
Adenovirus	1 (0.6%)
Streptococcus pneumoniae	1 (0.6%)

A CXR was taken in 242 patients (98.8%). In one instance, it was omitted in view of pregnancy. They were reported as normal in 176 patients (72.7%). In the rest, the commonest abnormalities noted were changes suggestive of heart failure (*n*=25, 10.3%) and consolidation (*n*=18, 7.4%). A CT scan was performed in 19 patients (6.5%). 11 of these were thoracic scans, 7 were pulmonary artery scans, and 1 was a thoracic-abdomino-pelvic scan. Of these, 7 were normal (36.8%), and of the rest, the commonest abnormality detected was consolidation in 6 scans (31.6%). Radiology results are shown in Table 2.

A nasopharyngeal/throat swab (Respiratory Screen) and PCR was performed on 170 patients (69.4%). The commonest pathogens detected by PCR were human rhinovirus (29 swabs, 17.1%) and influenza A (19 swabs, 11.8%) as can be seen in Table 3.

A sputum sample for MCS was taken in 53 patients (21.6%). The commonest pathogen grown was *Haemophilus influenzae* in 6 sputum samples (11.3%). Five of the sputum samples (9.4%) were unsuitable for investigation. Table 4 highlights results from sputum samples.

Table 4 Sputum Culture Results

Sputum for microscopy, culture and sensitivity (*n*=53)	
Pathogen Identified	***n* (%)**
Haemophilus influenzae	6 (11.3%)
Unsuitable sample	5 (9.4%)
Candida albicans	2 (3.8%)
Eschericia coli	1 (1.9%)
Group C haemolytic Streptococcus	1 (1.9%)
Streptococcus canis	1 (1.9%)
Pasteurella multicoda	1 (1.9%)
Klebsiella pneumonia	1 (1.9%)
Pseudomonas aeuruginosa	1 (1.9%)
Streptococcus pneumoniae	1 (1.9%)

Blood samples for MCS were taken in 35 patients (14.3%). Of these, 18 patients had fever (51.4%). Only 2 of the blood MCS samples cultivated a pathogen: one revealed coagulase negative staphylococcus, and the other revealed *Propionibacterium acnes*.

Overall, there were 113 cases (46.1%) of asthma exacerbation with infectious aetiologies.

Of these, 25 (22.1%) had a bacterial cause, 72 (63.7%) were viral, and 16 (14.2%) had a co-infection.

Antibiotic treatment was started in 158 cases (64.5%) as shown in Table 5. The commonest antibiotic regimes were intravenous co-amoxiclav (*n*=74, 46.8%), or a combination of co-amoxiclav and clarithromycin (*n*=25, 15.8%).

Oseltamivir was prescribed to 9 patients (3.7%). 8 of these patients had influenza A virus detected on the respiratory screen. It is not known whether Oseltamivir was started prior to result of Respiratory Screen being confirmed.

Complications during admission were noted in 24 cases (9.8%). The commonest complication was type 2 respiratory failure (*n*=15, 62.5%), of which 10 patients then required transfer to Intensive Care Unit (ITU) as seen in Table 6.

Table 5 Antibiotic Treatment

Antibiotic treatment (*n*=158)	
Antibiotic	***n* (%)**
Co-amoxiclav	74 (46.8%)
Co-amoxiclav + Clarithromycin	25 (15.8%)
Clarithromycin	5 (3.2%)
Doxycycline	10 (6.3%)
Levofloxacin	15 (9.5%)
Other (Amoxicillin, Ciprofloxacin, Azithromycin, Doxycycline, Metronidazole, Ceftazidime, Co-trimoxazole, Ceftriaxone, Cefuroxime, Piperacillin and Tazobactam)	28 (17.7%)

Table 6 Complications

Complications (*n*=24)	
Complication	***n* (%)**
Type 2 respiratory failure, requiring intensive care	10 (41.6%)
Type 2 respiratory failure, not requiring intensive care	5 (20.8%)
Phlebitis	2 (8.3%)
Persistent shortness of breath	2 (8.3%)
Allergic reaction to antibiotic therapy	1 (4.2%)
Delirium (Benzodiazepine withdrawal)	1 (4.2%)
Antibiotic-induced diarrhoea	1 (4.2%)
Lung collapse	1 (4.2%)
Sepsis	1 (4.2%)

Table 7 Data Comparison in Patients with Viral, Bacterial, or Co-Infections in Asthma Exacerbations

Parameter	Viral infection (PCR) n (%)	Bacterial infection (PCR and sputum MCS, blood MCS) n (%)	Co-infection (PCR and sputum MCS, blood MCS) n (%)	*p*-value
Total number of patients (% of total patient population)	72 (29.4%)	25 (10.2%)	16 (6.5%)	/
Age Range (years) Mean age (±SD)	19 – 92 55.9 (±21.7)	20 – 89 55.2 (±22.1)	22 – 87 67.75(±16.89)	0.113653
Number of Females n (% of group)	55 (76.4%)	17 (68%)	11 (69%)	/
Duration of admission range (days) Mean duration (±SD)	2 - 43 6.9 (± 5.7)	2 – 18 7.2 (±4.2)	3 – 32 12(±8.23)	0.007098
Abnormal chest radiograph (% of group) ➔ Consolidation ➔ Effusion ➔ Other findings	17 (23.6%) 6 (8.3%) 1 (1.4%) 10 (13.9%)	10 (41.7%*) 2 (8.3%) 0 8 (33.3%)	9 (56%) 2 (12.5%) 2 (12.5%) 5 (31.3%)	/
CRP Range (mg/L) Mean CRP (±SD)	0.6 - 204 25.8 (±36.1)	1.9 – 304 39.2 (±68.9)	0.17 – 308.4 36.62(±76.14)	0.470959
Neutrophils Range (x10^9 cells/L) Mean Neutrophils (±SD)	2.58 – 19.23 7.2 (± 4.0)	3.13 – 20.23 7.9 (±3.9)	5.15 – 16.49 8.71(±2.74)	0.334918
Lymphocytes Range (x10^9 cells/L) Mean Lymphocytes (±SD)	0.35 – 7.71 1.56 (± 1.0)	0.64 – 7.08 2.07 (±1.39)	0.37 – 7.47 1.42(±1.69)	0.143404
Treated with antibiotics (% of group)	55 (76.4%)	18 (72%)	12 (75%)	/
Complications (% of group) ➔ Respiratory Failure needing ITU ➔ Respiratory Failure not needing ITU ➔ Other	9 (12.5%) 6 (8.3%) 2 (2.8%) 1 (1.4%)	1 (4%) 0 1 (4%) 0	3 (18.8%) 2 (12.5%) 0 1 (6.3%)	/

** Values for abnormal chest radiographs in the bacterial infection group take into consideration 24 total cases not 25, as in one particular case a Chest X-Ray was not taken*

Twenty-four patients were admitted more than once to hospital for an asthmatic exacerbation within the period of data collection. 22 patients were admitted twice, and 2 patients were admitted thrice (both females), thus a total of 26 repeat admissions. Of these, 7 were male (mean age 61.6, range 31 - 92), whilst 17 were female (mean age 66.6 years, range 19 - 92).

Of these re-admissions, 4 were repeatedly infective asthma exacerbations and 3 of these confirmed to be viral-induced throughout. For 8 of these patients, their first admission was a non-infective exacerbation of asthma but their repeat admission was considered infective, of which 6 were confirmed to be viral-induced. For 3 patients who were re-admitted, their first visit was considered viral-induced but their re-admission did not reveal any infective source for their asthma exacerbation. Out of the re-admissions, 9 patients repeatedly had non-infective asthma exacerbations. Table 7 compares patients diagnosed with viral and bacterial infections.

Discussion

Although evidence-based and guideline-based treatment of asthma is essential to reduce asthma attacks, asthma patients are still prone to experiencing exacerbations of asthma. Aside from significant impact on patient health and lung function, it also increases healthcare utilisation and expenses.[8]

This local retrospective study focuses on a common cause of asthma exacerbations, the infectious aetiologies including viral and bacterial respiratory infections. 46.1% of patients in this cohort had evidence of a respiratory infection, of which 63.7% were viral. 22.1% of the cohort seemed to have an on-going bacterial infection. The commonest viral aetiology in the cohort studied was human rhinovirus which concurs with global trends.[8] Other common viruses causing an asthma exacerbation were influenza A and human coronavirus (this does not include SARS-CoV-2). There is less evidence in the literature about bacterial infections directly causing an asthma attack, albeit the possibility of secondary bacterial infections following a primary viral respiratory infection, particularly due to lack of normal macrophage activity against bacteria in human alveoli during a viral respiratory infection.[8,10]

There is a lack of evidence as to the efficacy of antibiotics given as part of the treatment regime in an acute asthma exacerbation.[11] The BTS Asthma Guideline 2016 suggests that routine prescription of antibiotics is not indicated for patients with acute asthma, and deciding on the use of antibiotics in acute asthma should be guided by objective measures, including procalcitonin where available.[6] There are no other international evidence-based guidelines on antibiotic prescription and management of infective exacerbations of asthma apart from BTS 2016 and the updated GINA guidelines 2021.[6-7]

In spite of this, our results have shown that the majority of our cohort (64.5%), which included patients with no particular on-going respiratory infection, was initiated on antibiotic treatment when admitted to Mater Dei Hospital in view of an asthma attack. Of those who had an infectious agent which seemed to be causing their exacerbation, approximately 63.7% had a confirmed viral infection. Of these patients with viral-induced asthma exacerbations, 76.4% were treated with antibiotics as can be appreciated in Table 7. Antiviral treatment was initiated in only 3.7% of the cohort. The routine prescription of antibiotics for asthma exacerbations in Mater Dei Hospital could be multifactorial. Some possible reasons as to why this occurs include the lack of more specific, rapidly

available testing such as procalcitonin; no available local guidelines or lack of awareness of international guidelines. In addition, the lack of clinical pharmacists on acute medical wards, as well as having the more junior staff managing such patients, especially after hours, who may lack the necessary experience with such cases and therefore may choose to err on the side of caution.

In a randomised double blind study, Graham et al. revealed that, in patients with an asthma exacerbation, there was no significant difference in improvement of condition between a cohort of patients who were treated with an antibiotic such as amoxicillin and a cohort of patients who were given a placebo.[12] Similarly, in a retrospective study performed in Tunisia to determine the role of antibiotics in asthma exacerbations, and whether the outcome is impacted, it concluded that the outcome was similar for patients who were treated with antibiotics when compared to those who were not.[13] In another study of antibiotic prescription in acute asthma attacks in patients presenting to several Emergency Departments (EDs) in the United States of America in 1993-2004, it was noted that antibiotic prescription has maintained a steady rate, approximately 22%, despite antibiotic resistance campaigns and guidelines stating routine antibiotic prescription in asthma is not advised. This is in comparison to a general reduction in antibiotic prescription rate to all patients presenting to the same EDs.[14] In a randomized control trial of a cohort of patients with acute asthma exacerbation in Shangai, withholding antibiotic treatment for patients did not cause any obvious repercussions in the year following the exacerbation, which further highlights that antibiotics should not be prescribed routinely in such cases.[15]

Our cohort was considered to be thoroughly assessed through available investigations that included serological, microbiological and radiological studies, however, treatment of these patients was not considered concordant to the results of said investigations. The rising concerns with over-prescription of antibiotics in patients who may not require such treatment include potential side effects of said treatment, as well as antibiotic resistance, which is a worrying global healthcare issue.[11]

There could be numerous factors which drive antibiotic prescription in asthma exacerbations. These may include doubtful diagnosis and/or reason for exacerbation, lack of resources, lack of awareness of current guidelines, as well as lack of confidence in the use of guidelines, especially when facing difficult cases. Some may also consider the risk of potential worsening of patients' condition resulting in the routine use of antibiotics out of habit should this risk be considered likely to happen. In addition, the possibility of medico-legal action against the clinician may steer them towards a more proactive approach, even if treatment is not required at the time, as opposed to watchful waiting.[16]

One way of reducing antibiotic over-prescription to patients who are only experiencing viral exacerbations of asthma is via the use of procalcitonin levels. This is a more specific and useful test for bacterial infective processes, and would not normally be elevated in patients with viral infections or inflammation.[15] In our study, procalcitonin level results were excluded as this is not a readily available investigation in our hospital. Although a more costly test than routine inflammatory markers, it may be worth considering as an investigation in acute asthma exacerbations if it is more readily available in order to guide

appropriate treatment. Its use has also been suggested by the BTS Asthma Guideline 2016 for the same reason.[6]

CRP and CBC can be useful low-cost investigations in suspected respiratory infections; however, they are non-specific and could be elevated in conditions other than bacterial infections. Table 7 reveals comparison of data between patients in our cohort having viral and bacterial asthma exacerbations. In our study, the mean CRP level in viral infections was 25.8mg/dL, albeit not significantly lower than that in bacterial infection (39.2mg/dL). A difference in abnormality of chest radiograph can be appreciated between viral and bacterial infections in our cohort, with 41.7% being abnormal in bacterial infections as opposed to 23.6% in viral infections, however, this is also non-specific. Therefore, use of procalcitonin can aid in reduction of unnecessary antibiotic prescription in asthma exacerbations which are mostly viral in aetiology.[15]

Concerning the global pandemic with COVID-19, GINA guidance suggests that asthmatics are not at an overall increased risk of COVID-19 as there was no obvious rise in asthma exacerbations during the pandemic. In fact, many countries experienced a reduction in cases, which may be due to use of facemasks, social distancing and overall improved hand hygiene. There was no mention of routine antibiotic prescription with regard to asthma exacerbations in the setting of COVID-19 infection, however, the guideline does suggest to avoid routine antibiotic prescription in primary care or acute care facilities unless there is strong evidence of a bacterial infection.[7]

Limitations of our study include that this cohort of patients included only those who were hospitalized at Mater Dei Hospital. This study therefore excludes patients who were treated exclusively at the Accident and Emergency (A&E) Department, patients who left hospital against medical advice, patients in other governmental or private hospitals or within the community such as governmental or private General Practitioners' (GP) Clinics. It is a retrospective study and so we were unable to conduct face-to-face interviews. Discharge summaries, prepared by different people, were used for data collection and so could lead to variable data. Another limitation is that we were unable to ascertain whether each patient was on inhaled vs. nebulized treatment on admission. In addition, the study was carried out during the cold winter months and may not be wholly representative of all asthma exacerbations.

Conclusion

Most patients with an exacerbation of asthma in our cohort were thoroughly investigated for potential infective triggers. However, most of these patients were prescribed antibiotic treatment, albeit there having been no evidence to a bacterial process in the majority of cases. The use of procalcitonin, where available, could be of guidance to antibiotic prescription. However, the results of this study highlight the importance of needing clear and evidence-based guidelines on infective exacerbations of asthma to be communicated across all health care levels globally. This can be done through further studies on the subject as well as discussion between bodies providing formal guidance on respiratory diseases. It would be ideal to include the management of an asthma exacerbation secondary to a viral or bacterial respiratory tract infection. This will ensure judicial and appropriate antibiotic use while reducing their potential adverse effects as well as the burden of antibiotic resistance.

Summary

Facts known about asthma exacerbations:

1. Infectious triggers are common causes of asthma exacerbations.
2. There is minimal guidance on management of infective asthma exacerbations.
3. Antibiotics are over-prescribed to patients who have exacerbations of asthma.

New findings from this study:

1. In our cohort, 63.7% of patients had viral triggers for their asthma exacerbation whilst 22.1% had a confirmed bacterial trigger.
2. Antibiotics were over-prescribed in our cohort: 64.5% of the total cohort were prescribed antibiotics; 76.4% of the patients who had a viral trigger were prescribed antibiotics whilst 72% of those with a bacterial infection were also prescribed antibiotics.
3. Our findings confirm the need for more detailed guidance in this regard.
4. We suggest the use of procalcitonin as guidance for antibiotic prescription in such cases.

References

1. Edwards MR, Ritchie AI, Johnston SL. Exacerbations of chronic respiratory diseases. Rhinovirus Infections. 2019;137-168. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7173443/
2. Bateman ED, Hurd SS, Barnes PJ et al. Global strategy for asthma management and prevention: GINA executive summary. European Respiratory Journal 2008;31(1):143-178 https://erj.ersjournals.com/content/31/1/143.full#sec-4
3. Asthma. World Health Organisation. https://www.who.int/news-room/fact-sheets/detail/asthma 2020. Accessed on November 2020.
4. Hoskins G, McCowan C, Neville RG, Thomas GE, Smith B, Silverman S. Risk factors and costs associated with an asthma attack. Thorax. 2000;55(1):19-24. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1745605/
5. Tiotiu AI, Novakova P, Nedeva D, Chong-Neto HJ, Novakova S, Steiropoulos P, Kowal K. Impact of Air Pollution on Asthma Outcomes. International Journal of Environmental Research and Public Health 2020;17(17):6212-6241 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7503605/
6. Asthma. British Thoracic Society. https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/ 2020.
7. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2021. www.ginasthma.org
8. Castillo JR, Peters SP, Busse WW. Asthma Exacerbations: Pathogenesis, Prevention and Treatment. Journal of Allergy and Clinical Immunology Practice. 2017;5(4):918-927 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5950727/
9. Oliver BGG, Lim S, Wark P, et al. Rhinovirus exposure impairs immune responses to bacterial products in human alveolar macrophages.Thorax. 2008;63:519-525. https://thorax.bmj.com/content/63/6/519.full

10. Busse WW, Lemanske RF, Gern JE. Role of viral respiratory infections in asthma and asthma exacerbations. Lancet. 2010;376(9743):826-834. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2972660/

11. Normansell R, Sayer B, Waterson S, Dennett EJ, Del Forno M, Dunleavy A. Antibiotics for exacerbations of asthma. Cochrane Database Syst Rev. 2018;6(6) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6513273/

12. Graham VA, Milton AF, Knowles GK, Davies RJ. Routine antibiotics in hospital management of acute asthma. Lancet. 1982 Feb 20;1(8269):418-20 https://pubmed.ncbi.nlm.nih.gov/6121090/

13. Maazaoui S, Hamdi B, Abdelmoulah K et al. Is antibiotic treatment during asthma exacerbation necessary? European Respiratory Journal Sep 2017, 50 https://erj.ersjournals.com/content/50/suppl_61/PA4030

14. Vanderweil SG, Tsai CL, Pelletier AJ, et al. Inappropriate Use of Antibiotics for Acute Asthma in United States Emergency Departments. Academic Emergency Medicine. 2008;15:736-743. https://onlinelibrary.wiley.com/doi/full/10.1111/j.1553-2712.2008.00167.x

15. Long W, Li LJ, Huang GZ, et al. Procalcitonin guidance for reduction of antibiotic use in patients hospitalized with severe acute exacerbations of asthma: a randomized controlled study with 12-month follow-up. Crit Care. 2014;18(5):471. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4180966/

16. Mihaela SS, Kerry AS, Sehar Z, et al. Uncertainty as a critical determinant of antibiotic prescribing in patients with an asthma exacerbation: a qualitative study, Journal of Asthma. 2020. https://www.tandfonline.com/doi/abs/10.1080/02770903.2020.1847929

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ORIGINAL ARTICLE

The role for Physiotherapists in the management of minor musculoskeletal injuries presenting to an Emergency Department. An evaluation of the Physiotherapy service at the Emergency Department of Mater Dei Hospital

Mary Rose Cassar, Franco Davies, Sharon Braddock, Victoria Massalha, Josef Pace

Background

Musculoskeletal injuries presenting to the emergency department are very common and a significant burden of work. This study aims to assess the impact of their management by musculoskeletal physiotherapists.

Method

A comparative analysis was selected with three outcomes: (1) patients' total length of stay in the emergency department, (2) patients' return rate with the same complaint, and (3) the referral rate to physiotherapy out-patients. Retrospective data over six months was collected from an electronic record of patients who presented with minor musculoskeletal injuries to the Emergency Department in Mater Dei Hospital, Malta.

Results

Over a period of 6 months, 6,087 patients with minor musculoskeletal complaints presented to the emergency department. Of these, 11% were managed by a physiotherapist who worked a limited total of 30 hours per week. The length of stay in the emergency department for patients managed by physiotherapists had a mean of 202 minutes and a mode of 99 minutes, whilst those managed by doctors had a mean of 380 minutes and mode of 109 minutes. Of the patients who returned to the emergency department with the same complaint, 74% were managed by doctors only and 26% were managed together with the physiotherapist. Physiotherapists referred 26% of their patients for follow-up physiotherapy appointments whilst doctors referred only 11% of the patients. The latter two findings were statistically significant.

Conclusion

Timely physiotherapy intervention in the Emergency Department for minor musculoskeletal cases contributes to a shorter length of stay, lower return rate, and more specific referrals to physiotherapy out-patients.

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Introduction

A physiotherapy service in the Emergency Department (ED) of Mater Dei Hospital (MDH), Malta, was introduced in August 2016. This ED is the main one on the island with a turnover of approximately 300 patients per day.[1] Physiotherapy in the ED has long been proven to be effective and to help free up medical staff from minor Musculoskeletal (MSK) conditions which are commonly encountered in the ED.[2,3] Research reveals that traditional management of MSK conditions with analgesia and onward referral produces poor results.[4] Recent studies have shown that physiotherapists can manage MSK conditions effectively resulting in reduced admissions, shorter ED length of stay (LOS) and less waiting time, and these studies have recommended their role as primary contact health providers in ED's.[5-8]

Physiotherapy in the ED evolved in the UK in the 1990s. This was due to the increased pressure on EDs because of increased visits for minor MSK conditions and started with physiotherapists working as secondary contact practitioners.[9] The drive for specialisation, through advanced practitioners, fostered the development of MSK physiotherapists working in EDs as primary contact health providers.[10] Local internal audits so far have consistently revealed positive results, and included a situational analysis of physiotherapy referrals from the ED in 2006, a patient satisfaction survey in 2016, yearly audits, and an undergraduate study of ED doctors' perceptions of ED physiotherapy.

Although quantitative studies investigating ED physiotherapy services are scarce, the majority conclude that there is a scope for this service.[2,5-8,11] Two particular observational cohort studies revealed that primary contact physiotherapists were effective in reducing waiting times in EDs.[6,7] Another prospective observational study revealed similar positive results focusing on length of stay as a major outcome.[5] A prospective non-randomised control trial investigating the difference between primary and secondary contact physiotherapists in EDs using waiting times as the major outcome, concluded that primary contact physiotherapists were more efficient than secondary contact, which is the system currently used in Malta and analysed in this study.[11] Two more recent systematic reviews have specifically investigated qualitative studies, both showing positive patient and staff perceptions of the service given by physiotherapists in EDs.[10,12] Current evidence seems to support the role of MSK physiotherapy in the ED mainly by reducing waiting time and LOS, and this study was designed to assess this role within the main ED in Malta.

Materials and Method

A retrospective quantitative comparative method was used with three outcomes: LOS in the ED, return rates with the same complaint to the ED and physiotherapy out-patients referral rate. LOS was taken as the total time in minutes from when the patient was registered on arrival to the ED to the time the patient was discharged and left the ED. Return rates represented patients with minor MSK cases who returned to the ED with the same complaint during the same month (a total of 113 in the study period). These outcomes were selected on the basis of being the most commonly used in current literature to evaluate the effectiveness of the service.[5-8] The cohort of 6,087 patients studied included all those presenting to Mater Dei hospital's ED with minor MSK complaints over a 6-month period, from January to June 2018. Minor MSK complaints were defined as any MSK injury classified as Emergency Severity Index (ESI) 4 or 5, the lowest two priorities out of a five-tier MDH ED triage system that included traumatic and non-traumatic cases.

Retrospective data of the cases seen by physiotherapists and doctors were retrieved from ED and physiotherapy electronic records following the appropriate ethical and hospital approvals. The three outcome measures were analysed for these two sets of data in order to make comparison. The patients who were not managed by physiotherapists were those who presented after physiotherapy working hours (during this study period, ED physiotherapists worked from Monday to Friday, from 8am to 2pm).

Data on the cases seen by a physiotherapist were taken from the ED physiotherapy database. Data on the cases seen by doctors only were taken from the ED statistics on the hospital database while data on physiotherapy out-patient referrals were taken from the physiotherapy out-patient department database. The LOS return rates and referral rates for physiotherapy follow-up were noted from both groups. The data were calculated using descriptive statistics and the Statistical Package for the Social Sciences (SPSS).

RESULTS

During the study period, 6,087 patients presented with minor MSK complaints to the ED; of these 669 patients (11%) were seen by physiotherapists. These 11% represented 35% of the ESI 4 and 5 MSK patients who attended the ED during physiotherapy working hours, totalling 30 hours per week (Monday to Friday, 8am to 2pm). An average of 1,015 patients presented with minor MSK complaints to the ED per month, and these accounted for 8% of the total number of attendees to ED. The results showed a significant preponderance (4,194 patients or 69% of total) for MSK patients presenting outside physiotherapy working hours, that is, during the afternoons, evenings and weekends.

Length of Stay (LOS)

As shown in Figure 1, the mean LOS for patients who received a physiotherapist assessment in the ED was 202 minutes. It was noted that this was heavily affected by a small number of cases with extremely long LOS. Indeed, the mode for this group was significantly shorter at 99 minutes. In comparison, the mean LOS of minor MSK cases seen by doctors only after physiotherapy hours was 380 minutes (i.e. 178 minute longer), and the mode was 109 minutes (10 minute difference). These latter numbers were also influenced by a few cases with extremely long LOS.

Return Rates

The results showed that out of a total of 113 patients who returned to the ED, 28 patients (26%) returned in the same month after being seen by a physiotherapist, while 85 patients (74%) returned after being seen by a doctor only. Out of these 85 patients, who were seen by a doctor during their first visit, and seen by a physiotherapist in their second visit, 39 patients (37%) did not return again to the ED. Figure 2 shows the 6-month figures comparing patients returning after being seen by a physiotherapist with those seen by a doctor only after-hours. The results were found to be statistically significant as shown from the Chi test (p<0.001) as presented in table 1.

Figure 1 Graph showing the Mean and the Mode of Length of Stay in minutes of Minor MSK cases managed during Physiotherapy hours and outside Physiotherapy hours.

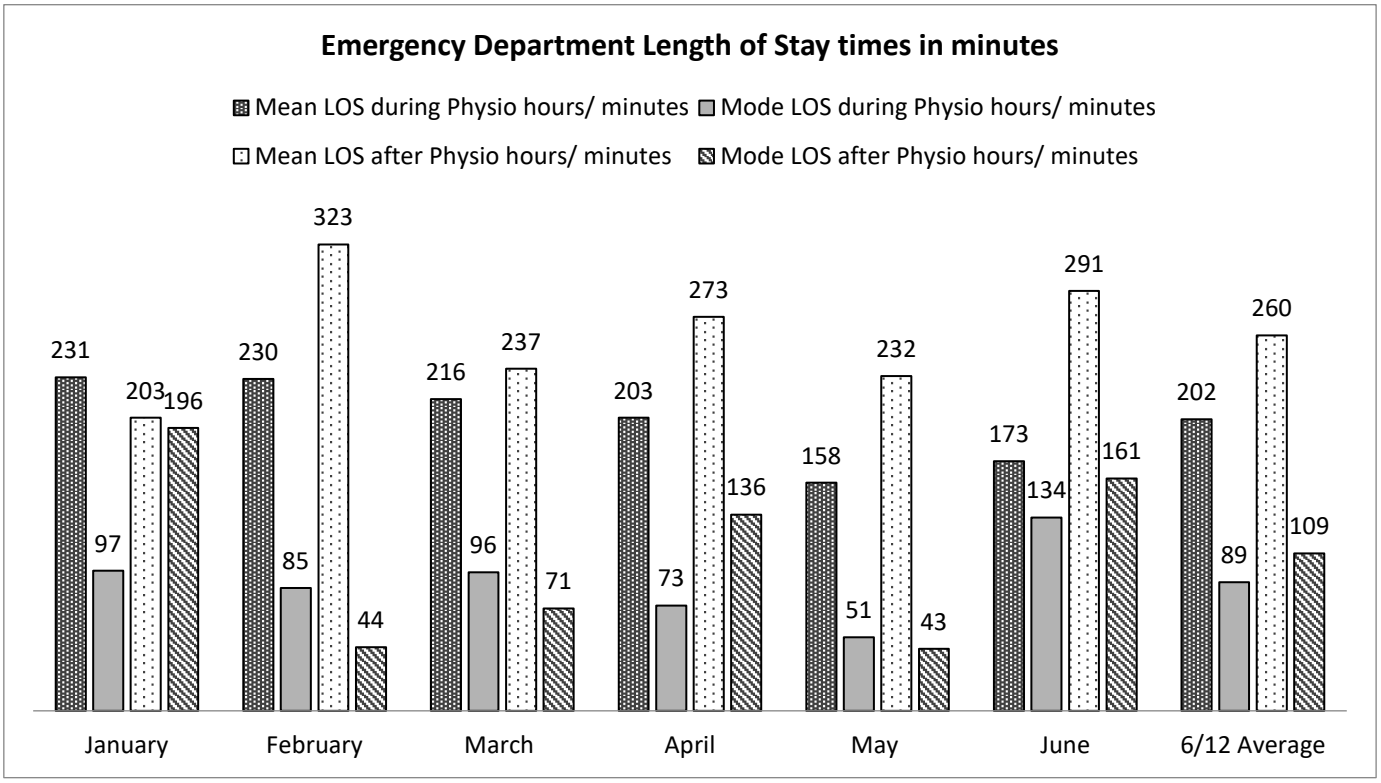


Figure 2 Number of Minor Musculoskeletal cases returning to the Emergency Department with the same complaints within the same month

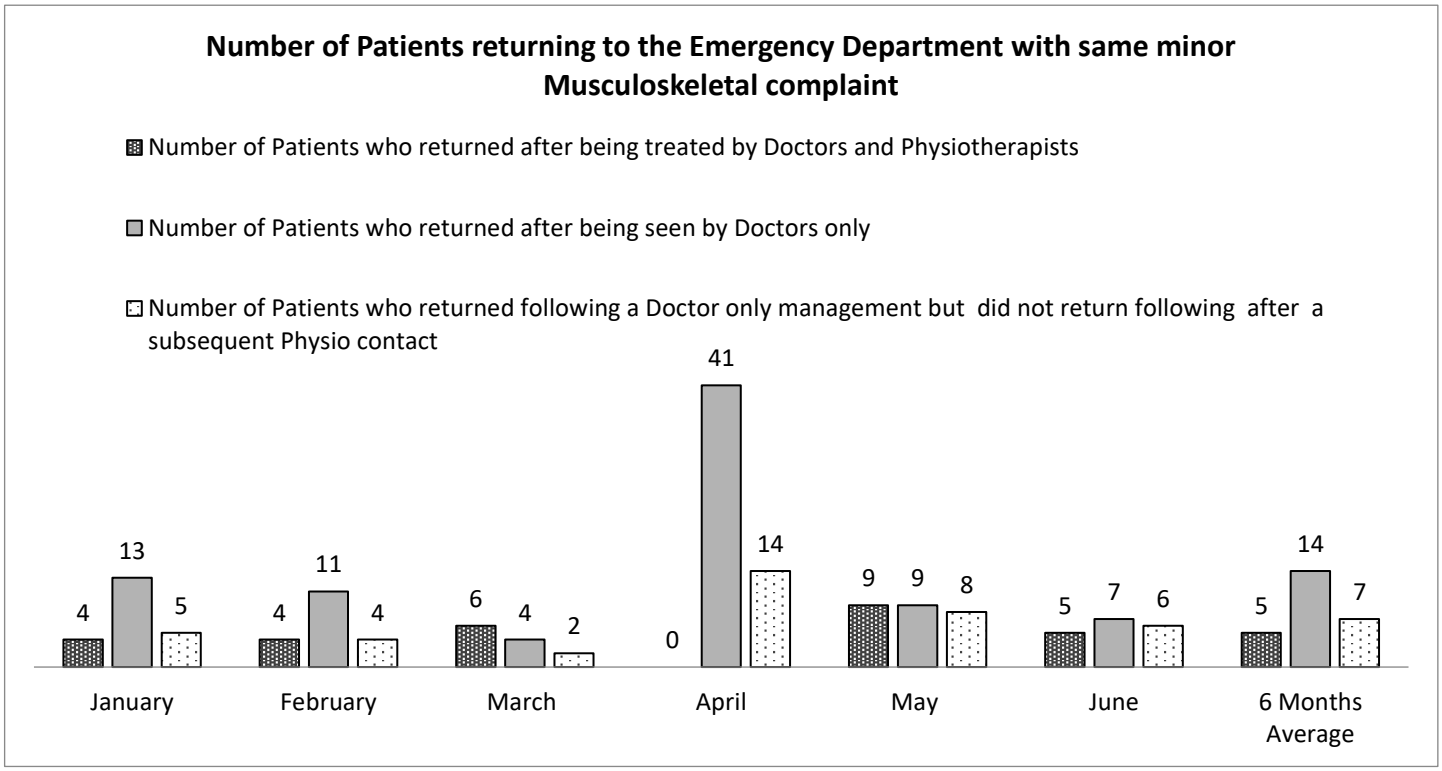


Table 1 Chi-Square Tests for return rates and physiotherapy follow-up referrals

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	115.896[a]	3	0.000
Likelihood Ratio	103.115	3	0.000
N of Valid Cases	1423		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 29.86.

Physiotherapy Out-Patient Referrals

Out of the total of 669 patients seen by physiotherapists, 174 (26%) were referred to physiotherapy out-patient services, which included follow-up care in speciality and general clinics. On the other hand, doctors, who managed the majority of patients, only referred 11% (481 patients) to physiotherapy out-patients. Among those onward referrals sent by physiotherapists, 96 patients (55%) were sent to general physiotherapy out-patients while 78 patients (45%) were sent to the various speciality physiotherapy clinics, namely hospital staff, hands-unit, woman's health, paediatrics, oncology, geriatrics, Gozo residents, neuro-rehab, amputees, and community physiotherapy. In comparison, among those onward referrals sent by doctors, 92% (441 patients) were sent to general physiotherapy outpatients while only 8% (40 patients) were sent to speciality physiotherapy clinics. Figures 3A and 3B illustrate these two trends. The data suggest that specific follow-ups to individuals presenting to the ED with MSK pain depend on whether they are seen by a physiotherapist which was found to be statistically significant (p<0.001) as presented in table 1.

Figure 3A Referrals to Physiotherapy Outpatients by Physiotherapists during Physio Hours.

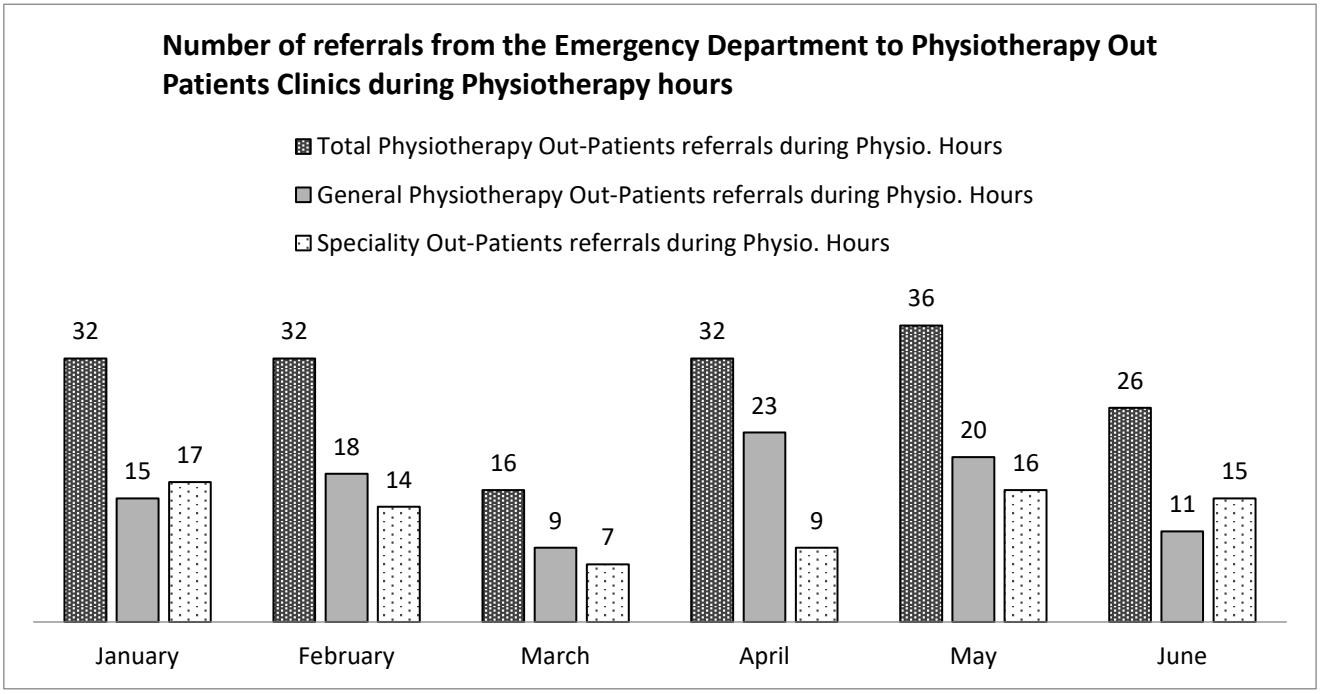
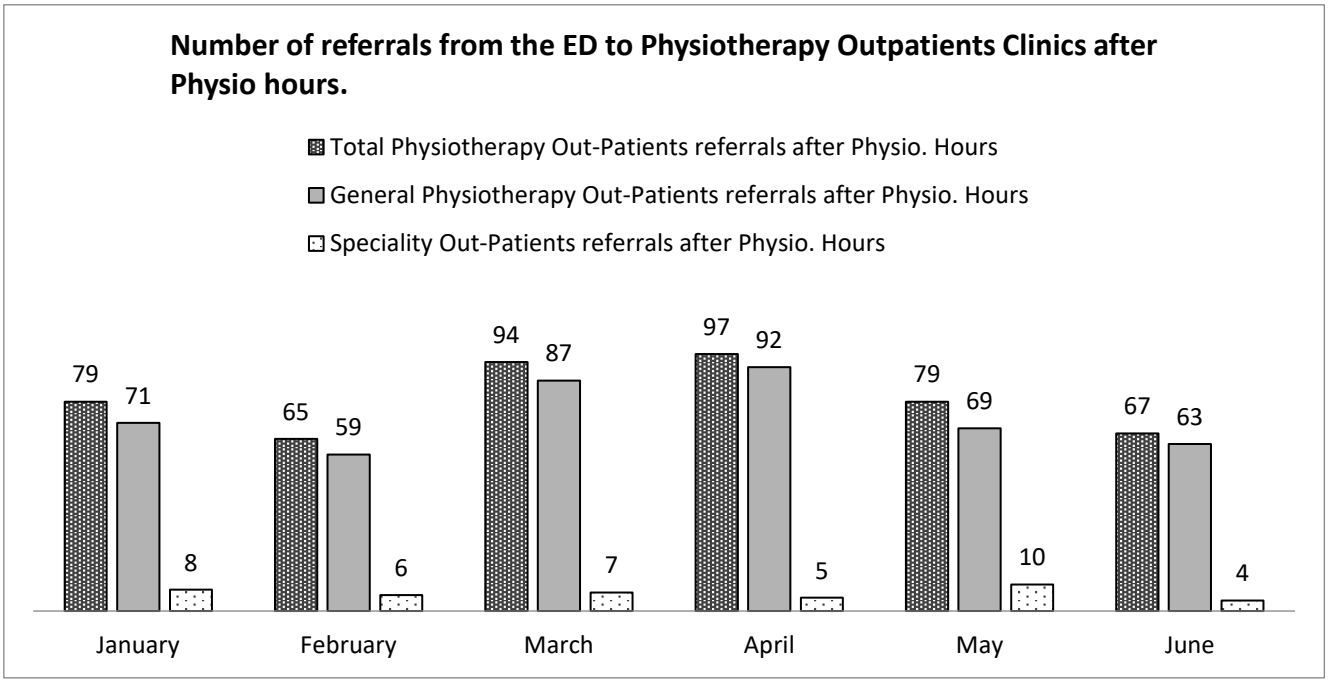


Figure 3B Referrals to Physiotherapy Outpatient Services by Doctors after Physio Hours.



Discussion

Within the limited operational hours (30 hours) provided by physiotherapists per week, physiotherapists at the ED managed 11% of all minor MSK cases in the ED, which represent 35% of the minor MSK patients presenting during physiotherapy working hours. This finding supports the further development and expansion of an MSK service at the ED delivered by physiotherapists. Within the local context, despite independently assessing, treating and advising patients, the physiotherapist had to liaise with a medical practitioner to request imaging, issue pharmaceutical prescriptions and discharge the patient, as per hospital policy. Notwithstanding this medical input, this study found that the LOS for patients seen by physiotherapists was shorter than those seen by doctors only, and the return rate with the same complaint was lower. Reasons for these findings may include the fact that physiotherapists selected MSK patients only, whereas doctors had to see these cases together with all the other patients in the department. Physiotherapists referred a higher number of patients (26%) to physiotherapy out-patients than did the doctors (11%), possibly because they may have a greater awareness of what general and specialty physiotherapy services were available.

There are a number of factors influencing the LOS of patients at the ED such as the requirement for imaging, blood tests, or specialist consultation. This resulted in much longer LOS regardless of whether being seen jointly with physiotherapists or doctors only. Mean LOS duration was significantly skewed by a relatively small number of patients who required very lengthy stays in the ED. Hence, the mode was also considered. Nevertheless, the LOS of patients seen by a physiotherapist besides the doctor was shorter than that of patients seen by a doctor alone (mean -178min, mode -10min). This finding was similar to that reported by similar studies, where the difference ranged from 34-83 minutes.[6-8,11] A possible explanation for this could be that physiotherapists are specifically trained in MSK examination skills, and differential diagnosis in

relation to MSK conditions increasing their efficiency in managing such cases.[6,7,11]

In order to reduce the enormous pressure on the ED and LOS future practice may consider implementing first contact physiotherapy in the ED leading to a more efficient patients' care pathway. This may help to reduce the need for a doctor to see the patient before referring to the ED physiotherapist. This would only be possible if MSK physiotherapists with adequate post-graduate training are employed to screen for minor MSK cases, and search for red flags in accordance with established scientific guidelines.[6] Indeed, first contact physiotherapy practice is currently strongly advocated in the countries like the UK & Australia to increase efficiency and quality of public health services.[6,7,9,11]

When observing patients' return rates to the ED, those previously seen by physiotherapists demonstrated lower return rates (26%) compared with those (74%) only seen by doctors ($p<0.001$). This finding was significantly higher than other studies which reported a minimal difference.[8,11] Since a returning patient suggests lack of satisfaction with the management of a condition, persistence or worsening of that condition, this result may indicate that physiotherapists, in the local scenario, provided more targeted care for the conditions they saw such as exercise and lifestyle changes. The spike in the return rates (figure 2) during the month of April may reflect the fact that less physiotherapy interventions were carried out by resident physiotherapists due to absences resulting from leave entitlements.

This study found that ED physiotherapists had a higher physiotherapy out-patient referrals rate (26%), compared to doctors (11%). This may also contribute to the observed reduced return rates since patients were given an alternative follow-up pathway by their physiotherapist. Lower referrals by doctors may have reflected a general lack of awareness of the variety of physiotherapy speciality clinics. Of the number of cases seen by physiotherapists during operational hours, only a quarter (26%) was sent for follow-up. This may indicate that ED physiotherapists managed to deal with minor MSK injuries effectively on the front line through assessment, advice, and onward specialty referral. While physiotherapists referred more follow-ups than doctors, 45% were sent to speciality clinics rather than to general physiotherapy. The relatively high speciality clinic referral rate ($p<0.001$) by physiotherapists may be due to their understanding of the physiotherapy speciality clinics available. It may also indicate that physiotherapists were more specific with their management options. Appropriate referral means timely treatment for the patient at the appropriate speciality clinics. After-hours, doctors sent 92% of their referrals to general physiotherapy out-patient clinics, with the low specific clinic referral rate resulting in longer appointment delays for patients needing such follow-ups. Further doctor awareness on the various existing physiotherapy services may help improve the quality and specificity of referrals. This can be achieved by reformatting the physiotherapy referral form, and making it available digitally with a drop-down selection with all the available services. This would not replace the physical presence of an experienced physiotherapist, triaging cases on site and deciding best follow-up options, as well as providing a first session with assessment, management and advice on the day. Further inter-professional in-service training between MSK physiotherapists and ED medical doctors would help bridge this gap in the service and lead to two-way mutual learning benefitting both professions.

While the feedback for the ED physiotherapy service in Malta is positive, a number of limitations are

evident, namely the lack of tools and procedures leading to a primary contact role. It is also a very niche clinical area, requiring adequately trained staff with experience in the local health system, which adds a human resource challenge. The positive results obtained in the ED are heavily dependent on the working relationship between MSK physiotherapists and ED doctors. This has allowed the service to develop successfully, by both professions complementing each other in the provision of a more holistic service to minor MSK conditions.

The fact that the study was retrospective presents a number of weaknesses, including the inability to compare the outcomes prospectively. While it gives a good overview as a service evaluation, the study was limited by the low number of patients' enrolled, the short study period and absence of comparable local studies. The service evaluation did not consider actual days and hours of service, but rather provided a blanket overview on the effects of physiotherapy presence in the ED, using the chosen outcomes. It did not investigate patient-oriented outcomes but analysed patient metrics. Further quantitative and qualitative patient-oriented outcomes and satisfaction surveys with larger samples are recommended to be able to collect improved data on the service provided. Notwithstanding these limitations, the results were clinically and statistically significant and there seems to be strong scope for the presence of physiotherapists in the local ED to manage minor MSK complaints and a future potential to implement first contact physiotherapy as an ED service.

Conclusion and Recommendations

This retrospective analysis produces encouraging results and supports the role of the ED physiotherapist in managing minor MSK injuries in the ED. It has shown that the MSK ED physiotherapy service resulted in shorter LOS for minor MSK cases, lower return rate with the same MSK complaint, and more appropriate referrals to physiotherapy out-patients. It showed that patients seen by physiotherapists were better informed on how best to manage their MSK condition with or without follow-up, and how to use the public service better, resulting in reduced return rates. There is thus a scope for a practice shift towards a primary contact physiotherapy service, in line with international practice.[5-7,10] To achieve this, patient pathways need to be formed to facilitate first contact practice in a more efficient way. Further training, on emergency medicine for physiotherapists and MSK medicine for doctors, would strengthen the skillset of the practitioners and contribute to solidify the service further.

Summary

- Physiotherapists manage minor MSK injuries effectively in the ED in Malta. They contribute to a shorter LOS, lower return rate and more accurate physiotherapy follow-up referrals, compared to patients managed by doctors alone.
- Recommendation for future practice includes increasing physiotherapy capacity and strengthen the role of the physiotherapist at the ED with clearer operational procedures and first contact.
- Further quantitative and qualitative patient-oriented outcomes of larger samples are recommended to assess the quality of the service.

REFERENCES

1. Azzopardi-Muscat N, Buttigieg S, Calleja N, Merkur S. Health Systems in Transition. Malta Health System Review. 2017; 19(1): 80.
2. Lau PM, Chow DH, Pope MH. Early physiotherapy intervention in an Accident and Emergency Department reduces pain and improves satisfaction for patients with acute low back pain: a randomised trial. Australian Journal of Physiotherapy. 2008; 54: 243-249.
3. Sohil P, Hao PY, Mark L. Potential impact of early physiotherapy in the emergency department for non-traumatic neck and back pain. World Journal of Emergency Medicine. 2017; 8(2): 111-115.
4. Machado GC, Rogan E, Maher CG. Managing non-serious low back pain in the emergency department: Time for a change? Emergency Medicine Australasia. 2018; 30: 279-282.
5. De Gruchy A, Granger C, Gorelik A. Physical therapists as primary practitioners in the emergency department: six-month prospective practice analysis. Physical Therapy. 2015 Sep; 95(9): 1207-1216.
6. Sutton M, Govier A, Prince S, Morphett M. Primary-contact physiotherapists manage a minor trauma caseload in the emergency department without misdiagnoses or adverse events: an observational study. Journal of Physiotherapy. 2015; 61: 77-80.
7. Bird S, Thompson C, Williams KE. Primary contact physiotherapy services reduce waiting and treatment times for patients presenting with musculoskeletal conditions in Australian emergency departments: an observational study. Journal of Physiotherapy. 2016; 62: 209-214.
8. Sayer JM, Kinsella RM, Cary BA, Burge AT, Kimmel LA, Harding P. Advanced musculoskeletal physiotherapists are effective and safe in managing patients with acute low back pain presenting to emergency departments. Australian Health Review. 2018; 42: 321-326.
9. Seal R. Can advanced musculoskeletal physiotherapy practitioners help to relieve some of the pressures on the emergency department? International Emergency Nursing. 2017; 35: 59-61.
10. Ferreira GE, Traeger AC, O'keeffe M, Maher CG. Staff and patients have mostly positive perceptions of physiotherapists working in emergency departments: a systematic review. Journal of Physiotherapy. 2018; 64: 229-236.
11. Taylor NF, Norman E, Roddy L, Tang C, Pagram A, Hearn K. Primary contact physiotherapy in emergency departments can reduce length of stay for patients with peripheral musculoskeletal injuries compared with secondary contact physiotherapy: a prospective non-randomised controlled trial. Physiotherapy. 2011; 97: 107-114.
12. Barrett R, Terry L. Patients' and healthcare professionals' experiences and perceptions of physiotherapy services in the emergency department: a qualitative systematic review. International Journal of Emergency Medicine. 2018; 11(1): 1-10.

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CASE REPORT

Treating *Acinetobacter lwoffi* Peritonitis in a patient undergoing peritoneal dialysis

Julian Delicata, Paula Grech, Roberta Callus

Acinetobacter spp are increasingly recognized as an important cause of nosocomial infections, especially in relation with indwelling catheters. They are ubiquitous, gram negative bacilli, being normally found on the skin and oropharynx and are notorious for their broad antimicrobial resistance pattern.

Only a few cases of peritoneal dialysis-associated *Acinetobacter lwoffi* peritonitis have been reported with most of the affected patients being diabetic and/or immunosuppressed. Literature concerning the management of non-pseudomonas gram negative peritonitis is scarce.

We describe a case of a sixty-six year old gentleman with end stage kidney disease due to autosomal dominant polycystic kidney disease on Automated Peritoneal Dialysis who was successfully treated for *Acinetobacter lwoffi* peritonitis.

The patient did very well, did not require hospital admission and the peritoneal catheter remained in-situ.

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Introduction

Peritonitis is accepted as being one of the major complications of peritoneal dialysis (PD), contributing, directly or indirectly, to the death of 16% of PD patients.[1-2] Moreover, it may lead to catheter removal, compromising dialysis access and significantly impacting quality of life.

Skin and nasopharynx gram negative commensals such as *Acinetobacter*, *Stenotrophomonas* and *Pseudomonas* contribute up to 5% of PD-associated peritonitis.[2-3] This is significant as gram-negative peritonitis episodes have been shown in various studies to have a worse mortality and a higher risk of catheter removal when compared to gram-positive ones.[2,4]

A literature review showed that data on *Acinetobacter spp* PD-associated peritonitis, and its subsequent management, is scarce. We know that these gram-negative bacillli are prone to cause multidrug resistant infections.[2,4] This makes their early detection and prompt eradication critical, especially since a foreign body, the peritoneal catheter, is involved.

It has been reported that almost half of Acinetobacter PD-associated peritonitis require hospitalization.[5] Acinetobacter PD-associated peritonitis seems to be more prevalent in immunosuppressed and/or diabetic patients.[5-6]

Case Presentation

Our case describes a sixty-six year old gentleman who had been on automated peritoneal dialysis (APD) for 2.5 years and presented to the Dialysis Unit with vague abdominal pains and turbid peritoneal fluid. He was a smoker of 40-pack years and his past medical history included hypertension (on three anti-hypertensive medications), end stage kidney disease (ESKD) secondary to autosomal dominant polycystic disease (ADPKD), and peripheral vascular disease. He did not have a history of previous peritonitis.

On clinical examination he was afebrile and had mild central abdominal tenderness with no rebound or guarding. There was no evidence of tunnel or exit site infection.

The white cell count (WCC) from his peritoneal fluid was 380/mm^3 with 68% neutrophils. An initial gram stain showed no bacteria. Serum white blood cell count was within range while the inflammatory marker C-reactive protein (CRP) was only mildly elevated at 10mg/L (normal range: 0-5mg/L).

Since the patient was not systemically unwell, it was decided to manage the patient in the community with daily visits to the dialysis unit for the administration of intraperitoneal antibiotics.

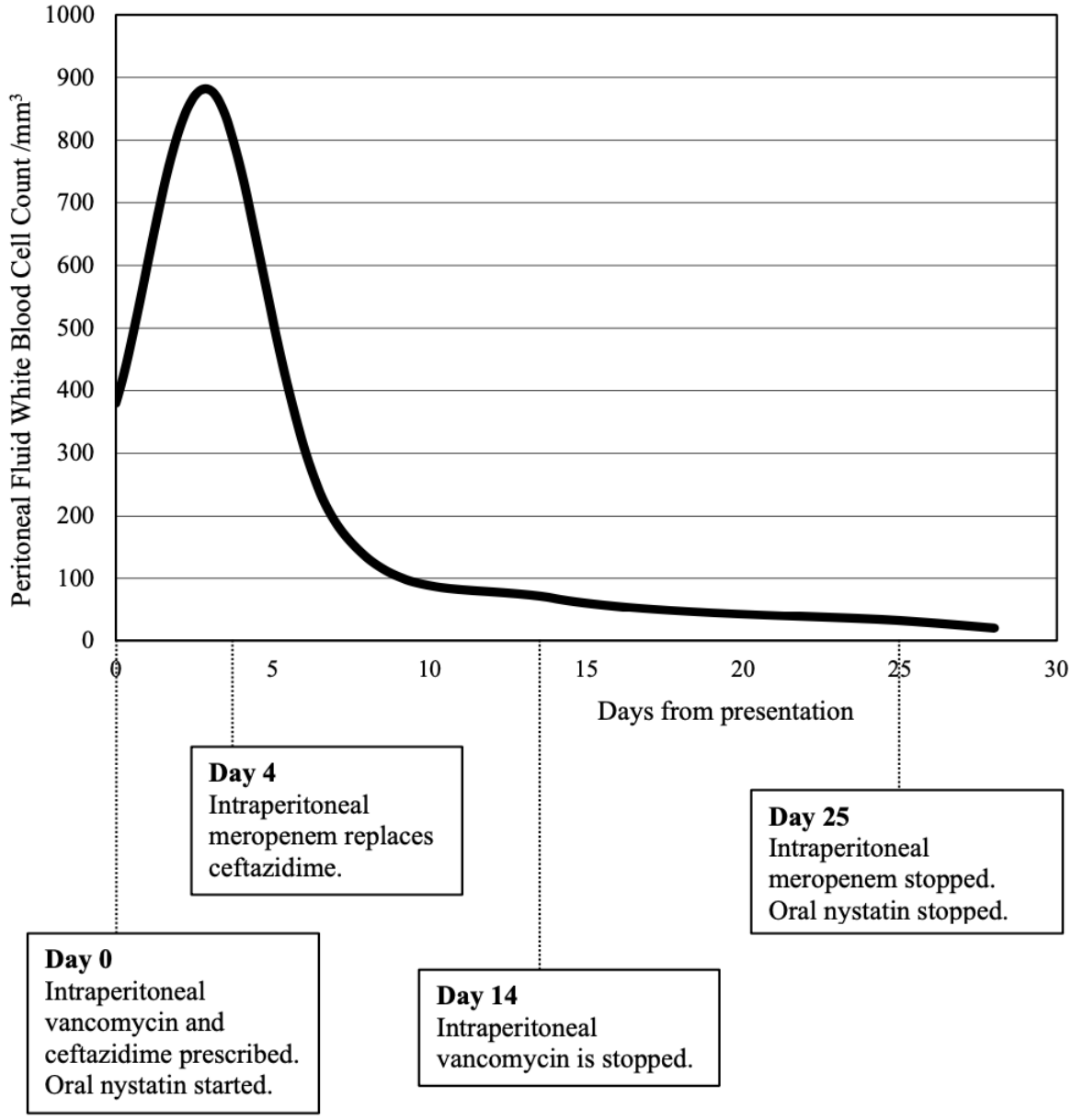
Once the diagnosis of peritonitis was confirmed, an intraperitoneal antibiotics regime including daily ceftazidime and vancomycin according to serum levels was started as per local protocol. Antifungal prophylaxis in the form of daily oral nystatin was also prescribed.

Despite antibiotics, the patient's symptoms however persisted. On day 3 of treatment, the peritoneal fluid WCC went up to 880/mm^3. At this stage, *Acinetobacter lwoffi* was grown in the culture medium obtained from the peritoneal fluid. This was resistant to 3rd generation cephalosporins. On the other hand, it was shown to be sensitive to gentamicin, ciprofloxacin, trimethroprim/sulfamethoxazole and the carbapenems meropenem and imipenem.

The intraperitoneal antibiotic regime was changed on day 4. Intraperitoneal meropenem at 1 gram daily replaced ceftazidime. No intravenous or oral antibiotics were given while the intraperitoneal vancomycin was continued.

The peritoneal white cell count dropped to less than 200/mm^3 after three days of this new regime and less than 100/mm^3 after a further week (Figure 1). Intraperitoneal meropenem was given for a total of 3 weeks, while vancomycin was stopped after 2 weeks.

Figure 1 The graph above illustrates the change in peritoneal fluid white cell count (WCC) from the first day of intraperitoneal antibiotics until the last. The intraperitoneal antibiotics regimes are illustrated to emphasize the affect intraperitoneal meropenem had on the peritoneal fluid WCC when introduced.



Outcome and follow-up

The patient's symptoms completely resolved within three days of starting treatment with intraperitoneal meropenem. The peritoneal catheter remained in situ and at no stage was dialysis efficiency compromised.

During a Renal Unit clinic visit 6 weeks after this event, the patient was symptomatically well and peritoneal fluid was clear with a normal WCC.

Discussion

Acinetobacter lwoffi is a nonfermentative aerobic gram-negative bacillus that normally inhabits the skin and oropharynx. Being so ubiquitous makes multi-drug resistance a problem. This may be attributed to various mechanisms, including beta-lactamases, permeability defects and aminoglycoside-modifying enzymes.[7]

Acinetobacter baumanni is the most common Acinetobacter spp cultured in PD-associated peritonitis as outlined in the literature.[5] Reports of the actual management of Acinetobacter spp peritonitis, and even more so *Acinetobacter lwoffi* are scarce. Furthermore *Acintetobacter spp* are not mentioned in the most recent 'ISPD Peritonitis Recommendations' (2016).[1]

It has been demonstrated from previous studies that a high proportion of patients diagnosed with acinetobacter spp peritonitis are diabetic and/or on immunosuppressive therapy. This was not so in this case report, however our patient did have a history of heavy smoking.

Based on the sensitivities obtained in our case, one may argue that an intraperitoneal aminoglycoside or fluoroquinolone may have sufficed, rather than a carbapenem. Literature on the management of non-pseudomonas gram negative peritonitis is scarce with the ISPD recommending (Grade 2c) at least a three-week course of effective antibiotics. In view of the risk of ototoxicity associated with aminoglycosides, such a prolonged course is controversial. Moreover, a previous computed tomography (CT) angiography had shown evidence of atherosclerosis throughout the iliac and femoral arteries and abdominal aorta. This, along with the significant history of hypertension, makes the use of fluoroquinolones contentious. Epidemiological studies have shown that the use of fluoroquinolones is linked to a higher risk of aortic aneurysm and dissection in populations with these clinical features.[8-9]

Our experience highlights the role of intraperitoneal carbapenems as an alternative to third generation cephalosporins when managing *Acinetobacter lwoffi* peritonitis. As referenced above, the use of alternative antibiotics such as aminoglycosides and fluoroquinolones presents a challenge in patients with ESKD due to possible complications.

References

1. Li PK, Szeto CC et al. ISPD peritonitis recommendations: 2016 update on prevention and treatment. Perit Dial Int 36:481–508; doi: 10.3747/pdi.2016.00078.
2. Fried LF, Bernardini et al. Peritonitis influences mortality in peritoneal dialysis patients. JASN October 1996, 7 (10) 2176-2182;
3. Li PH, Cheng VCC et al. Epidemiology and Clinical Characteristics of Acinetobacter Peritoneal Dialysis-Related Peritonitis in Hong Kong—with a Perspective on Multi-Drug and Carbapenem Resistance. Peritoneal Dialysis International. 2017;37(2):177-182. doi:10.3747/pdi.2016.00123

4. Kim DK, Yoo TH et al. Changes in causative organisms and their antimicrobial susceptibilities in CAPD peritonitis: a single center's experience over one decade. Perit Dial Int. 2004 Sep-Oct;24(5):424-32.

5. Chao CT, Lee SY et al. Acinetobacter Peritoneal Dialysis Peritonitis: A Changing Landscape over Time. PLoS ONE 9 (10). 2014; doi: 10.1371/journal.pone.0110315.

6. Tas MY, Oguz MM, Ceri M. Acinetobacter lwoffii Peritonitis in a Patient on Automated Peritoneal Dialysis: A Case Report and Review of the Literature. Case Reports in Nephrology volume 2017, Article ID 5760254, 2 pages. 2017; doi: 10.1155/2017/5760254

7. Lee CR, Lee JH et al. Biology of Acinetobacter baumannii: Pathogenesis, Antibiotic Resistance Mechanisms, and Prospective Treatment Options. Front Cell Infect Microbiol. 2017;7:55. Published 2017 Mar 13. doi:10.3389/fcimb.2017.00055

8. US Food and Drug Administration. Safety Announcement (2018) https://www.fda.gov/Drugs/DrugSafety/ucm628753.htm. (Accessed October 2020)

9. Carino D, Zafar MA et al. Fluoroquinolones and Aortic Diseases: Is There a Connection. Aorta (Stamford). 2019;7(2):35-41. doi:10.1055/s-0039-1693468

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CASE REPORT

Thyrotoxic periodic paralysis: A treatable cause of weakness

Wan Norlina Wan Azman, Julia Omar, Aniza Mohammed Jelani, Hanim Afzan Ibrahim, Nur Karyatee Kassim

Thyrotoxic periodic paralysis (TPP) is a rare disorder seen predominantly in adolescent Asian males. We report a patient who presented with sudden onset of progressive body weakness, associated with palpitations, and tremor. Biochemical investigations showed hypokalaemia, elevated free thyroxin (FT4) and suppressed thyroid-stimulating hormone (TSH) consistent with TPP. He was started on oral carbimazole, hypokalaemia was treated, and the body weakness resolved. It is important for clinicians to consider the diagnosis of TPP, in patients presenting with acute onset of weakness, as TPP is a treatable cause of paralysis, and delayed recognition could potentially lead to unnecessary interventions and even death

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INTRODUCTION

Thyrotoxic periodic paralysis is a rare disorder, which requires a high index of suspicion in patients who present with sudden onset of proximal muscle weakness of the limbs. Hypokalaemia in TPP results from an intracellular shift of potassium induced by the thyroid hormone sensitization of Na^+/K^+–ATPase pump of the skeletal muscles, and was first identified by Rosenfeld in 1902.[1] This disorder has been reported in different Asian countries. The presence of different HLA antigen subtypes such as DRw8, A2, Bw22, Aw19, B17, B5, and Bw46 has been observed in the Asian population making it more susceptible to TPP.[2]

Genetic mutations in the control of Na+, K+, adenosine triphosphatase (ATPase) activity, which controls the exchange of intracellular potassium with extracellular sodium within the same HLA antigen subtype has been described for the occurrence in different ethnic groups in the epidemiology of TPP.[3]

TPP is characterized by hypokalemia (< 3.0 mmol/L) with hyperthyroidism. Unrecognized TPP has been associated with complications such as arrhythmia and respiratory failure with fatal outcome.[3] Early diagnosis and prompt treatment could save life as it is a treatable-disorder.

CASE REPORT

A 29-year-old male presented to the Emergency Department complaining of progressive body weakness for 2 days. During initial presentation, he was still able to ambulate, however on admission, he was unable to move, walk and stand up. The weakness was sudden onset, and symmetrical, starting in the lower limb. He had palpitations and tremors of both hands as well. However, there was no history of excessive sweating, irritability, heat intolerance or weight loss, and no changes in skin and hair. On further questioning, he had similar episodes of body weakness that self-resolved over the past 2 months.

There was no history of trauma, fever, vomiting, loose stool and seizures. Patient also denied shortness of breath, abdominal pain, and other neurological symptoms. There was no history of alcohol intake and recent drug ingestion. There was no significant past illness and family history.

On examination, his blood pressure was 114/72 mm Hg, pulse rate was 90/min and respiratory rate 16/minute. Neck examination revealed diffuse thyroid enlargement, which was non tender, smooth and firm. There was no sign of ophthalmopathy. Neurological examination showed increased tone in the lower limb, 3/5 power on right side and 2/5 on the left side with normal reflexes. Power, tone and reflexes were normal for both upper limbs. There were no sensory deficits and the cranial nerves were intact. Systemic examination was normal. Electrocardiography showed prolonged QT interval.

In the Emergency department, his potassium level was 1.8 mmol/L. Intravenous (IV) potassium was started at 10 mEq/ hour and the potassium rose to 2.0 mmol/L. He was admitted to the medical ward for further treatment. His clinical presentation and laboratory abnormalities were consistent with TPP (Table 1). He was started on potassium chloride suspension 15ml TDS, Slow potassium tablets 1.2g TDS and Carbimazole 15 mg once daily. He was discharged on the fourth day with a potassium level of 3.8 mmol/L, and complete resolution of symptoms. He was advised for continued follow up and compliance to treatment.

Table 1 Laboratory investigation results

Variables	At presentation	Reference range
Potassium	1.8	3.5-5.0 mmol/L
Magnesium	0.79	0.77 – 1.03 mmol/L
Phosphate	0.96	0.81-1.58 mmol/L
Urine Spot Potassium	5.9	12- 62 mmol/L
Thyroid Stimulating Hormone (TSH)	<0.005	0.4 – 4.0 mIU/L
Free Thyroxine (FT4)	20.4	7.8 – 14 pmol/L

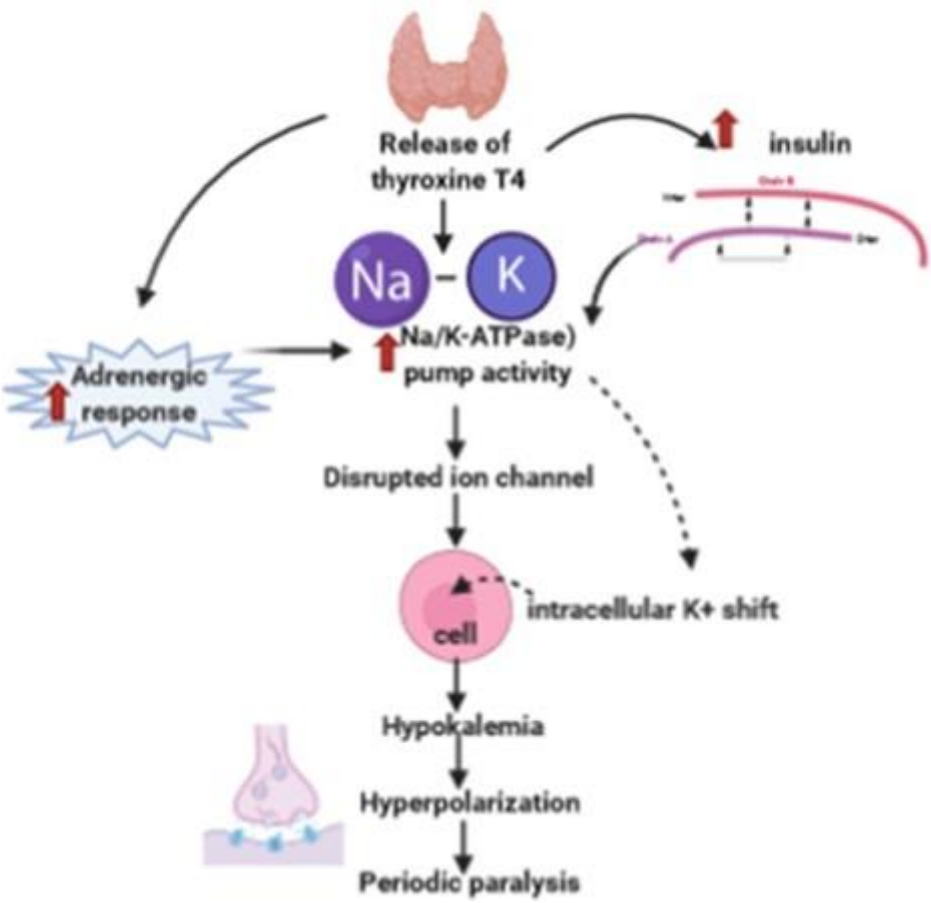
DISCUSSION

Thyrotoxic periodic paralysis is an unusual complication of hyperthyroidism. It is more prevalent in Asian men, in the second and fourth decades of life, although it can be observed in adolescents and children.[4] TPP is observed in hyperthyroidism mostly due to Graves' disease, nevertheless, other conditions like amiodarone-induced thyrotoxicosis, levothyroxine intoxication and thyrotropin (TSH) producing pituitary adenoma, toxic adenoma, thyroiditis and toxic multinodular goitre.[5]

The severity of the episodes may differ from weakness to complete paralysis, generally involving proximal muscles of the limbs. The duration may vary from a few hours to three days.[1] However, the severity of the paralysis does not directly correlate with the degree of hyperthyroidism.[6] The sensory system, higher mental functions and cranial nerves are spared. Patients can manifest with cardiac arrhythmias and thyrotoxic crisis in the worst scenario.[7]

Numerous hypotheses have been made to explain TPP, but the pathogenesis remains uncertain. The proposed mechanism for TPP was that thyroid hormone stimulates and augments the K^+-Na^+ ATPase action on the cellular membrane, causing an intracellular shift of potassium. The disruption of these cellular transport mechanisms involving the K^+-Na^+ ATPase pump causes irregularities in muscle contractibility and paralysis.[1] In thyrotoxicosis, the enhanced beta-adrenergic response further increases K^+-Na^+ ATPase activity. Hyperinsulinemia has been shown to stimulate K^+-Na^+ ATPase activity in an acute attack of TPP.[8](Figure 1).

Figure 1 Mechanism of paralysis in TPP



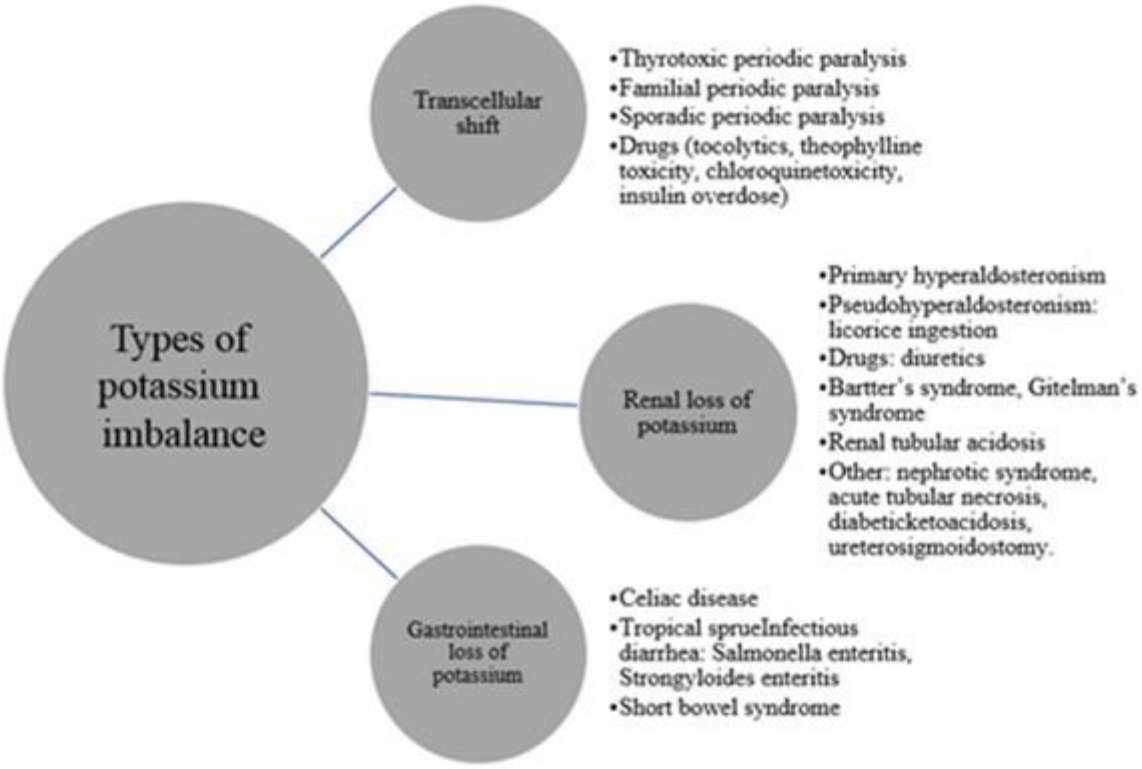
Hypokalaemia is the hallmark characteristic of TPP [9]. Normally in TPP, the potassium level is <3 mmol/L and the urinary potassium is < 20 mmol/L, which has been observed in this patient. This was supported by electrocardiogram (ECG) findings that showed prolonged QT intervals as previously reported.[10]

Besides hypokalaemia, hypophosphataemia and hypomagnesaemia may also be present due to intracellular shifts of phosphate and magnesium that follow potassium transport across the cellular membrane.[11] However in our patient, the serum phosphate and magnesium level were within normal limits.

In a patient who presents with hypokalaemia, a few differential diagnoses should be considered (Figure 2). Drug history and family history should be elicited to rule out toxicities and familial disorders. Besides, laboratory investigations, such as urinary potassium and arterial blood gases are also crucial to differentiate TPP from other causes of hypokalaemia such as renal and gastrointestinal loss of potassium.

Urgent correction of hypokalaemia is required, together with antithyroid drugs for the underlying hyperthyroid state, in the management of TPP. Euthyroidism restoration will prevent future attacks; however, non-selective β-blockers can be used until a euthyroid state is achieved. In addition, precipitating factors such as exercise or high carbohydrate diet should be avoided.

Figure 2 Differential diagnosis of hypokalaemic paralysis



Conclusion

TPP should be considered, even in the absence of thyrotoxic state, in all cases of acute hypokalemic paralysis, especially in young male patients. Thyroid function tests should be performed in all cases of periodic paralysis to allow an early diagnosis of TPP and initiate definite treatment.

Acknowledgments:

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References

1. Vijayakumar A, Ashwath G, Thimmappa D. Thyrotoxic periodic paralysis: clinical challenges. Journal of thyroid research. 2014 Feb 20;2014.
2. HLA and thyrotoxic periodic paralysis in Japanese patients.Tamai H, Tanaka K, Komaki G, Matsubayashi S, Hirota Y, Mori K, Kuma K, Kumagai LF, Nagataki S J Clin Endocrinol Metab. 1987 May; 64(5):1075-8.
3. Lin SH. Thyrotoxic periodic paralysis. In Mayo Clinic Proceedings 2005 Jan 1 (Vol. 80, No. 1, pp. 99-105). Elsevier.
4. Paul B, Hirudayaraj P, Baig MW. Thyrotoxic periodic paralysis: an unusual presentation of weakness. Emergency Medicine Journal. 2003 Sep 1;20(5):e7-

5. Lee JI, Sohn TS, Son HS, Oh SJ, Kwon HS, Chang SA, Cha BY, Son HY, Lee KW. Thyrotoxic periodic paralysis presenting as polymorphic ventricular tachycardia induced by painless thyroiditis. Thyroid. 2009 Dec 1;19(12):1433-4.

6. Nellen H, Mercado M, Mendoza V, Villanueva S, Pérez M, Hernández A, et al. Thyrotoxic periodic paralysis in Mexican mestizo patients: A clinical, biochemical and HLA-serological study. Arch Med Res. 1999;

7. Hakami O, Ahmad MM, Johani NA. A Case of Nonfatal Ventricular Arrhythmia Due to Thyrotoxic Periodic Paralysis in a Saudi Patient as an Initial Presentation of Graves' Disease. Clinical Medicine Insights: Case Reports. 2016 Sep;9:CCRep-S345

8. Chakraborty J, Chakraborty S, Moitra R. Thyrotoxic Periodic Paralysis: An Update. Journal of Endocrinology and Metabolism. 2020 Aug 24;10(3-4):60-2

9. Garla VV, Gunturu M, Kovvuru KR, Salim SA. Thyrotoxic periodic paralysis: case report and review of the literature. Electronic physician. 2018 Aug;10(8):7174.

10. Vijayakumar A, Ashwath G, Thimmappa D. Thyrotoxic periodic paralysis: clinical challenges. Journal of thyroid research. 2014 Feb 20;2014.

11. Elston MS, Orr-Walker BJ, Dissanayake AM, Conaglen J V. Thyrotoxic,hypokalaemic periodic paralysis: Polynesians, an ethnic group at risk. Intern Med J. 2007;

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CASE REPORT

An interesting case of prolonged jaundice

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In this case report we describe the investigation and management of an 8 week old girl who presented with prolonged jaundice. She was born at term, was breast fed since birth and thriving. The investigation of her jaundice led to a diagnosis that is considered a rarity, namely progressive intrahepatic cholestasis type 2.

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CASE PRESENTATION

The patient was born at term to non-consanguineous parents of Eastern European descent *via* an elective caesarean section, weighing appropriately for age with a normal newborn examination. On the third day of life the newborn was noted to be jaundiced. As per routine investigation a transcutaneous bilirubin measurement was taken which resulted to be 219 µmol/L. The cutoff for initiating phototherapy on day 3 of life was 300 µmol/L. The transcutaneous bilirubin was repeated the following day and it had decreased to a value of 183 µmol/L which was within normal limits for her gestational age and in keeping with physiological jaundice in an exclusively breast fed infant. The baby continued to have normal routine visits till 2 months of age.

During a routine check up at the age of two months she was noted to be visibly icteric. On examination there was an absence of hepatosplenomegaly and the baby was otherwise thriving. A transcutaneous bilirubin was taken; 381 µmol/L, indicating the presence of prolonged jaundice. A thorough history was taken from the parents who reported that the stools were pale and the urine was dark in colour.

A set of first line investigations to determine the cause of the jaundice were done including: a complete blood count, liver profile with direct bilirubin, electrolytes, C- reactive protein, direct antibody test and International Normalised Ratio (INR). The results suggested a diagnosis of a conjugated hyperbilirubinemia with a serum bilirubin of 105 µmol/L, direct bilirubin of 91 µmol/L, ALP of 1128 IU/L, ALT of 380 µmol/L and a normal GGT of 42 µmol/L. The INR was within normal limits and the direct antibody test was negative. In view of the conjugated hyperbilirubinemia she was started on a galactose-free formula pending exclusion of galactosemia.

Second line tests were conducted including: thyroid function test, venous blood gases, cortisol, alpha-1-antitrypsin, galactose 1-phosphate uridylytransferase level, urine organic acids, CMV PCR and hepatitis screen. The blood tests ruled out a metabolic cause such as galactosemia. The virology was negative except for positive CMV in serum and urine. The rest of the tests were within normal limits.

After excluding an infectious and metabolic cause the baby underwent an ultrasound of the abdomen that showed a hyperechoic liver, no evidence of biliary atresia or bile duct dilatation, a normal gallbladder morphology and a slightly enlarged spleen. She was subsequently referred to a tertiary paediatric liver centre for assessment and liver biopsy. The liver biopsy showed mild portal fibrosis, giant cell hepatitis and no evidence CMV infection.

In addition to blood investigations and imaging, a genetic conjugated jaundice panel was conducted. The patient was confirmed to have a compound heterozygote mutation in the *ABCB11* gene in keeping with bile salt export pump deficiency (BSEP), a hereditary cholestatic condition also referred to as progressive familial intrahepatic cholestasis (PIFC) type 2. Parental testing confirmed both parents to be carriers of this mutation but her elder sibling was not a carrier. As part of the work up an auditory response brainstem test was performed which was within normal limits for her age. An ophthalmological follow up confirmed the absence of CMV ocular involvement and was within normal limits, therefore excluding the possibility of congenital CMV infection.

She was started on Multivitamin supplements, ursodeoxycholic acid, phytomenadione, cholecalciferol, alpha tocopheryl and rifampicin (due to progressive pruritus). Her liver function tests progressively improved as can be appreciated in

Table 1. The infant received the vaccinations are per usual immunisation schedule and continued to thrive appropriately. She is currently receiving odevixibat a non-systemic ileal bile acid transport inhibitor as part of a Phase 3 trial of a novel medical treatment for the condition with the aim to limit disease progression and the need for surgical intervention. As delineated in Table 2, she is responding well with a significant reduction in serum bile acid levels and pruritus with regular 3 monthly reviews.

Table 1 Trend in liver function tests as child grew and underwent treatment

	2 months		3 months	4 months	9 months
Bilirubin (µmol/L)	106.5	113.9	90.9	74.7	38.6
Direct bilirubin ((µmol/L))	91	88	66	51	36
Alkaline phosphatase (U/L)	1128	1073	705	610	601
Alkaline transaminase (U/L)	380	550	821	683	434
Gamma Glutamyl-Transferase (U/L)	42	56	63	51	36

Table 2 Trend in serum bile acids as child got older and underwent treatment

	5 months	6 months	8 months	9 months
Serum bile acids (µmol/L)	564	540	519	399

Discussion

Prolonged jaundice is frequently encountered by paediatricians and midwives and the causes are broad, ranging from physiological to pathological. Conjugated hyperbilirubinemia is never benign and a thorough investigation is necessary. The diagnosis of PFIC is a rare condition that should be thought of when metabolic, infectious and other main causes of cholestasis such as biliary atresia are excluded.[1] PFIC type 2 is an autosomal recessive disease caused by mutations in the ABCB11 gene that encodes bile salt export pump (BSEP).[1] This pump deficiency causes ineffective secretion of bile salts which accumulate in the canaliculi and cause hepatocellular injury.[2] The resultant injury manifests as cholestasis, jaundice, malabsorption and pruritus with the risk of hepatocellular carcinoma before one year of age.[1] Ultrasonography of the liver usually shows a normal appearance with a possibly enlarged gallbladder. Liver histology with immunostaining aids diagnosis by revealing canalicular cholestasis, enlarged portal tracts, absence of true ductular proliferation and periportal biliary metaplasia of hepatocytes.[1]

Ursodeoxycholic acid is the first step in treatment, it is a non-toxic hydrophilic bile acid that helps to protect the liver cells by replacing endogenous cytotoxic bile salts.[3] Pruritus can be a severe and is thought to be caused by accumulation of bile acids. Rifampicin improves pruritus and induces conjugation as well as excretion of bilirubin. Enriched formulas with medium chain triglycerides and fat soluble vitamins are preferred as these babies suffer from malabsorption which can affect their growth.[4]

Besides the above treatment the other option is surgical management. This involves biliary diversion procedures and liver transplants for those who do not respond well to medical therapy. Ideally such procedures are offered before cirrhosis and end stage liver disease has developed. Novel therapies may avert the need for surgery and eventual liver transplant.[4]

Conclusion

In conclusion, prolonged jaundice can be due to a multitude of causes and rarities such as progressive intrahepatic cholestasis type 2 are part of a long list of differential diagnoses. It is important to keep in mind these rarities in order to be able to properly diagnose and initiate treatment before complications such as cirrhosis occur.

References

1. A. Davit-Spraul, E. Gonzales, C. Baussan, and E. Jacquemin, "Progressive familial intrahepatic cholestasis," Orphanet Journal of Rare Diseases, vol. 4, no. 1, 2009, doi: 10.1186/1750-1172-4-1.
2. S. Deswal, H. Singh, S. Dey, and T. P. Yadav, "VARIED PRESENTATIONS OF PROGRESSIVE FAMILIAL INTRAHEPATIC CHOLESTASIS TYPE 2 IN INFANCY: A REPORT OF TWO CASES," Indian Journal of Case Reports, vol. 3, no. 4, Dec. 2017, doi: 10.32677/IJCR.2017.v03.i04.010.
3. G. R. Sun and M. Burns, "Progressive Familial Intrahepatic Cholestasis: A Rare Cause of Cirrhosis in Young Adult Patients," Case Reports in Medicine, vol. 2015, 2015, doi: 10.1155/2015/428638.
4. M. Gunaydin and A. T. Bozkurter Cıl, "Progressive familial intrahepatic cholestasis: diagnosis, management, and treatment," Hepatic Medicine: Evidence and Research, vol. Volume 10, Sep. 2018, doi: 10.2147/HMER.S137209.

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CASE REPORT

Necrotizing fasciitis of the face: the flesh-eating catastrophic malady

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Necrotizing fasciitis (NF) is a rare, rapidly progressing, life-threatening infection involving the superficial fat, fascial layers with necrosis of skin. It is usually seen in the extremities, abdominal wall, and perineum and predominantly seen in elderly and immunocompromised patients. NF of the face and cervical area is usually very rare and if it occurs it is characterized by its fulminating, devastating and rapidly progressive course. Untreated facial NF may lead to complications such as airway obstruction, vascular thrombosis, mediastinitis, pleural empyema, large vessel thrombosis and septic shock. Management of NF requires a prompt and accurate diagnosis, emergency airway management, aggressive surgical debridement, intravenous antibiotics and nutritional support. We have described a rare case of necrotizing fasciitis of the face which has high morbidity and mortality rates, posing challenging reconstructive problems and a brief review of literature.

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Introduction

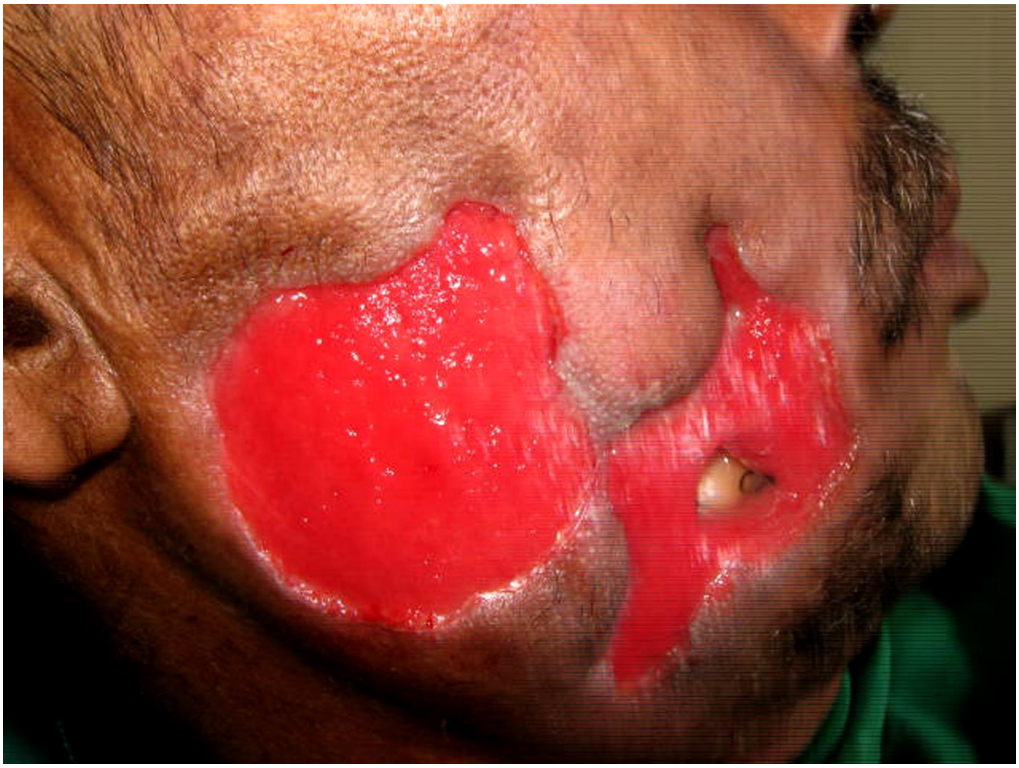
Necrotizing fasciitis (NF) was first described in 5th century BC by Hippocrates who depicted this as a complication of erysipelas.[1-2] In 1871, Joseph Jones, a confederate army surgeon observed cases of necrotizing fasciitis during the American civil war and termed it as hospital gangrene.[1-3] Pfanner in 1918 described this condition as necrotizing erysipelas[1] but the term NF was coined by Wilson in 1952.[1-3] NF is a rare rapidly progressing & potentially fatal infection of subcutaneous soft tissue characterized by extensive necrosis of fascial planes and the overlying skin.[2-5]

NF in the head and neck region is a rare occurrence especially in the facial region and in an immunocompetent patient.[4,6] Overall incidence is estimated in 3.5 cases per 100,000 persons, with a mortality rate as high as 80% without an early medical or surgical intervention.[2] NF is most commonly encountered in the extremities, abdominal wall, and perineum and is predominantly in the elderly and immunocompromised.[2-4,7] Successful management of facial NF requires early diagnosis, prompt institution of intravenous broad spectrum antibiotics, aggressive surgical debridement to control the infection, and reconstruction of the resultant soft tissue defects.

Case Report

A 34-year-old male patient reported to the Department of Oral and Maxillofacial surgery, SDM Craniofacial surgery and research Centre, Dharwad, Karnataka, India with a chief complaint of pain in the right back region of the jaw for one month. He did not have any relevant medical and drug history. Systemic examination revealed that he was poorly built and nourished and was anemic. Extra oral examination revealed complete skin loss on the right side of the lower face with exposure of the mandible and discharging pus (Fig 1). The submandibular lymph nodes were palpable, soft and tender on the right side. There was complete restriction of mouth opening. He was diagnosed to have necrotizing fasciitis of the face. He underwent drainage of the pus and debridement under general anesthesia with Intravenous empirical antibiotics such as Amoxycillin and clavulanic acid 1.2gm twice a day, Metronidazole 500mg three times a day and adequate hydration. The culture and sensitivity report which was obtained after 72 hours revealed Enterococcus species which was sensitive to Injection Linezolid 600gm and hence given accordingly two times per day. He also received non-steroidal anti-inflammatory drugs for pain relief and dressing of the wound was done twice per day. The patient was planned for secondary reconstruction of the face after the infection subsided. He denied further treatment due to financial constraints and was discharged against medical advice. He has been lost for any further follow up.

Figure 1 Extra oral Photograph showing complete skin loss with exposure of the mandible.



Discussion

NF is a rapidly advancing, suppurative infection that causes extensive necrosis of the fascia and subcutaneous tissues, often associated with vascular thrombosis and necrosis of the overlying skin.[2-3] A variety of synonyms have been used for NF including streptococcal gangrene, gangrenous erysipelas, necrotizing cellulites' and Meleney gangrene.[3] The most common site of facial NF is the periorbital area. The infection involves the superficial fascial planes of the head and neck, i.e., the superficial musculoaponeurotic system.[2]

The predisposing factors for NF include advanced age, blunt or penetrating trauma, burns, chronic alcohol abuse, diabetes mellitus, human immunodeficiency virus infection, intravenous drug abuse, malnutrition, obesity, organ failure, peripheral vascular disease, severe liver disease and patients with underlying malignancy.[6-7] NF was previously thought to be monomicrobial in its etiology, the main causative agent being Group A Beta hemolytic streptococci and hence was called as streptococcal gangrene.[4-5,8] Now NF is proved to be a polymicrobial infection involving anaerobes, gram negative bacilli and enterococci species.[1,4-5] The pathophysiological features include the formation of micro thrombi and vasculitis with eventual intravascular coagulation and spreading of necrosis.[8] The most common clinical presentations are painful edema, erythema, warmth, tenderness, crepitation, tissue necrosis, bullae, putrid discharge, gas production, rapid spread through the fascial planes and the presence of the classic tissue inflammatory signs[2,6,8] Systemic findings can include fever, tachycardia and hypotension.[2]

The diagnosis of NF of the head and neck is often a clinical one while imaging techniques such as soft

tissue radiography, CT scan and magnetic resonance imaging (MRI) will reveal the extent of the infection and the anatomic structures involved, identify any vascular thrombosis or vessel erosion.[2] Relevant laboratory tests include a complete blood test, an electrolyte panel, a coagulation profile, blood and tissue cultures, urinalysis and arterial blood gases. These often reveal leukocytosis, anemia, acidosis and hypocalcemia secondary to the deposition of calcium in necrotic tissues.[2,4]

NF is regarded as a surgical emergency and the cornerstone of treatment is surgical debridement. *The* necrotic tissue must be removed until fresh viable tissue growth is seen.[1,8] Empirical antimicrobial treatment should be instituted early and changed once the results from cultures and the antimicrobial susceptibility tests are obtained in order to enhance the patient's clinic response and improve their outcomes.[2] Patients should be resuscitated according to their clinical state and evidence of hemodynamic instability demands intensive care support with immediate resuscitation and nutritional support in order to replace lost fluids and proteins from large wounds.[2] Other adjunctive approaches to treatment that are still controversial include hyperbaric oxygen (HBO) therapy and intravenous immunoglobulin (IVIG). IVIGG can neutralize super antigens and down regulate the production of tumor necrosis factor.[2,4] HBO increases free radicals, which helps neutrophil mediated killing of some common bacteria and also acts as a bactericide for certain anaerobes.[7]

Reconstructive procedures should be planned only after complete resolution of the disease and once the recipient bed is healthy.[8] The defect can initially be covered with a split thickness skin graft and reconstructed secondarily by advancement flaps or revascularized free flaps if necessary.[1] The main complications of facial NF are airway obstruction, vascular thrombosis, mediastinitis, pleural empyema, large vessel thrombosis and septic shock.[2,6] Even with adequate surgical debridement and intravenous antibiotic therapy, the mortality rate associated with NF is 20% to 40%.[4,5]

CONCLUSION

NF of the head and neck is a rare but potentially fatal disease. Hence every medical professional should be aware of its etiology, epidemiology, risk factors and initial clinical manifestations to arrive at an accurate, prompt diagnosis and to offer adequate treatment. A delay in diagnosis would result in disastrous morbidity and mortality. An early diagnosis with Circulation, Breathing and Airway management, empirical intravenous antibiotic administration, aggressive surgical debridement followed by reconstruction of the resultant soft tissue defects, will play a pivotal role in achieving a successful outcome.

REFERENCES

1. Sangamesh NC, Vidya KC, Roopa GS, Sakri SB. Necrotizing fasciitis of odontogenic origin in a nonimmunocompromised patient: A rare case report. Journal of the Scientific Society. 2014 Sep 1;41(3):179.
2. Hernandez DA, Manuel A, Chávez G, Rivera AS. Facial necrotizing fasciitis in adults: a systematic review. Heighpubs Otolaryngol and Rhinol. 2017;1(1):20-31.
3. Lin C, Yeh FL, Lin JT, Ma H, Hwang CH, Shen BH, Fang RH. Necrotizing fasciitis of the head and neck: an analysis of 47 cases. Plastic and reconstructive surgery. 2001 Jun 1;107(7):1684-93.
4. Fenton CC, Kertesz T, Baker G, Sándor GK. Necrotizing fasciitis of the face: a rare but dangerous complication of dental infection. Journal-Canadian Dental Association. 2004 Oct 1; 70:611-6.

5. McAllister P, O'Neill F, Bharadwaj G, O'Regan B, Laverick S. A presentation of facial necrotizing fasciitis with orbital involvement. Journal of surgical case reports. 2013 Jan 1;2013(1).

6. Gupta N, Varshney S, Gupta P. Facial necrotizing fasciitis: a rare complication of maxillary sinusitis. Indian Journal of Clinical Practice. 2013 Dec;24(7).

7. Chunduri NS, Madasu K, Tammannavar PS, Pushpalatha C. Necrotising fasciitis of odontogenic origin. Case Reports. 2013 Jul 2;2013: bcr2012008506.

8. Bhaskaran M, Manappallil RG, Manuel R, Gopi J. Necrotizing fasciitis of the face and neck following a dental procedure. Saudi Journal of Oral Sciences. 2019 Jul 1;6(2):113.