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Original Article

Utilization Pattern of Magnetic Resonance Imaging at Combined Military Hospital, Dhaka

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Abstract

Introduction:

Objective: *Diagnostic MRI plays a vital role in diagnosis of disease. It improves the quality and efficiency of health care. It can provide support to the doctors when the disease is difficult to diagnose clinically. The study was carried out with the objective to ascertain various aspects of utilization pattern of MRI investigation at CMH Dhaka.*

Materials and Methods: *This descriptive Cross Sectional Study was carried out on utilization pattern of MRI services at CMH Dhaka. A total of 186 patients performing investigation at MRI Department of CMH Dhaka since 01st May 2011 to 15th May 2011 were interviewed. Data were collected by face-to-face interview and reviewing medical record with the help of a questionnaire and checklist. Finally collected data were analyzed and following findings were revealed.*

Results: *The MRI machine of CMH Dhaka is Open Type (.4 Tesla) having capacity of performing 15-20 investigations per day available at service seven days a week. Majorities (72.0%) of the patients were male and the rest (28%) were female. MRI service was availed mostly by the entitled persons (84.4%) and only (15.6%) by the non entitled patients. By religion, most (95.7%) were Muslims and rests (4.3%) were Hindus. Majority (79.6%) of the patients were married and the rest (20.4%) were Single. By age group, patients of (19-50) years were majority (77.4%) and in (51 and above) age group patients were 19.9%.The (0-18) years age group were least (2.7%). Regarding service pattern, serving patients were majority (50.5%).The Retired were the least (11.8%). By place of residence, (52.2%) were from Dhaka and from outside (47.8 %). By referral source outdoor patients were (62.9%) and indoor were (37.1%). Regarding history of trauma, the majority (60.2%) does not give any history and rest (39.2%) gives history of traumaThe majority patients i.e. (62.9%) were from outdoor and the rest (37.1%) from indoor. Majority of the patients (51.1%) who received MRI were moderate hard workers. Some patients (44.6%) who received MRI were light workers. Orthopedic cases dominated all age group. [Serving personnel- (72.3%), Family members (61.0%), Retired (36.4%), (55.2%)]. Serving personnel utilized the service most (50.5%) ,whereas the civilian nonentitled utilized least (10.8%). Majority patients had to wait for 8-12 weeks. Then 2-4 weeks waiting time had second highest (17.7%) frequency. Then 1-2 weeks waiting time was given to (16.1%) patients. Least frequent waiting time was given to (8.1%). Majority of patients (62.9%) were from Orthopedics department. Less frequent referral was from Medicine (10.8%), Neurology (9.7%), Neurosurgery (16.1%) and the least (2.7%) from other departments. Patients with vertebral column related diseases availed majority of MRI investigation (61.8%). Frequency of patients with Knee joint and Brain diseases were (15.6%) and (15.1%) respectively. Other patients reported least frequently 7.5%. Most of the MRI investigations (84.4%) patients had positive findings. Outdoor patients had longer waiting time of (8-12) weeks time. (35.9%) and indoor patients had shorter waiting time of less than 2 weeks (60.8%).*

Conclusion: *Better Medical and Surgical care depends on availability of prompt and skillful diagnostic Services. Among the many modern diagnostic techniques MRI examination contributes to facilitating effective medication and treatment.*

Key-words: *MRI, health care, diagnosis.*

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Introduction

Health is a basic requirement to improve the quality of life. National economic and social development depends on the state of health. A health care system reflects the socioeconomic and technological development of a country and is also a measure of the responsibilities, a community and Government assume for the health care of the people. The effectiveness of a health system depends on the availability and ready accessibility of services in a form which the people are able to understand, accept and utilize. The health services of a developing country should be aimed at optimum utilization of the resources to benefit the majority of the people with a simplified and comprehensive health care programme through Primary Health Care [1].

The health service functions were initially restricted to curative services. With the development of modern science and technology health service emphasizes on promotive and preventive rather than curative. Large number of people of Bangladesh particularly in rural area remained with no access to health care facilities. So health care should be improved with diagnostic facilities of patient. Most of the hospitals and clinics are situated in urban area[2].

As a signatory of the Alma Ata Declaration in 1978, the Govt of Bangladesh adopted the plan of 'Health for All' by the year 2000.But achievement so far is not encouraging in respect of diagnostic facilities. Proper diagnosis is essential for proper treatment. It is difficult to provide proper health care services without well organized diagnostic facilities [3].

With the Improvement of socioeconomic conditions health awareness among people is on the increase leading to an ever increasing trend in the utilization of hospital services by the people in the community .The expectation of the public have increased and they have started questioning the adequacy of patient care not only for quantity of service rendered but also the quality that is provided by the hospitals[4].

In Bangladesh no study has been done in this field neither civil nor Combined Military Hospital, Dhaka with reference to *Utilization Pattern of MRI services*. This study will serve as the foundation stone or landmark for further investigation for such services which will carry out Clinical Audit as part of quality control services. MRI is an advanced technology that lets the radiologist see internal organs, blood vessels, muscles, joints, tumors, areas of infection, and more — without x-rays, surgery, or pain. MRI is very safe; in fact, it makes use of natural forces and has no known harmful effects[5].

An MRI machine is basically a giant tube with a table that the patient lies on. The patient is placed into the tube either feet or head first depending on the area that is being examined. Inside the large tube there are magnets, which are not visible to the patient. When the machine is turned on the magnets rotate around the patient and create a situation where the patient is in a low strength magnetic field. The MRI machine is attached to a sophisticated computer system. The computer translates the information from the MRI to produce detailed images of your organs and tissues. The result is a document similar to an X-ray that can be interpreted by your physician[6].

In just a few decades, the use of magnetic resonance imaging (MRI) scanners has grown tremendously. Doctors may order MRI scans to help diagnose multiple sclerosis, brain tumors, torn ligaments, tendonitis, cancer and strokes, to name just a few. An MRI scan is the best way to see inside the human body without cutting it open. [4] Multiple reasons are suggested that may increase utilization (perceived need for diagnostic certainty, as well as medico-legal and patient-driven factors). Whether this increase in MRI utilization resulted in improved patient outcomes is unclear and should be studied further. Implications for radiologist coverage and resident training are discussed[7].

Better Medical and Surgical care depends on availability of prompt and Skillful diagnostic services. Among many modern diagnostic techniques MRI examination contribute to facilitating effective medication and treatment. Diagnostic MRI plays a vital role in

diagnosis of Disease. It improves the quality and efficiency of health care. It can provide support to the doctors when the disease is difficult to diagnose clinically[8].

Materials and Methods

This descriptive cross sectional study was carried out on utilization pattern of MRI services at CMH Dhaka. A total of 186 patients performing investigation at MRI Department of CMH Dhaka since 01st May 2011 to 15th May 2011 were interviewed. Data were collected by face-to-face interview and reviewing medical record with the help of a questionnaire and checklist. Finally collected data were analyzed and following findings were revealed

Results

This descriptive cross-sectional study was carried out with the aim to assess the utilization pattern of MRI services at Combined Military Hospital, Dhaka. The study was conducted among 186 patients attended the MRI Department during the study period. Data were collected by face-to-face interview and reviewing medical record with the help of a questionnaire and checklist. Finally collected data were analyzed and following findings were revealed:

Table-I

Distribution of the respondents according to different variables

		Frequency	Percentage	Statistics
Sex	Male	134	72%	
	Female	52	28%	
	Total	186	100%	
Religion	Islam	178	95.7%	
	Hindu	8	4.3%	
	Total	186	100%	
Residence	Dhaka	97	52.2%	
	Outside	89	47.8%	
	Total	186	100%	
Age Group	0-18 years	05	2.7%	Mean
	19-50 years	144	77.4%	(2.17 ±.444)
	51 and above	37	19.9%	Range=2
	Total	186	100%	
Type of Patient	Serving Persons	94	50.5%	
	Family Members	41	22.0%	
	Retired persons	22	11.8%	
	Civilians	29	15.6%	
	Total	186	100%	
Type of Requirement	Urgent	53	28.5%	
	Routine	133	71.5%	
	Total	186	100%	
History of Trauma	Yes	74	39.8%	
	No	112	60.2%	
	Total	186	100%	
Procedure of Approval	Simple	178	95.7%	
	Complicated	8	4.3%	
	Total	186	100%	
Source of Referral	Outdoor	117	62.9%	
	Indoor	69	37.1%	
	Total	186	100%	

Table-I shows that out of total 186 patients most i.e. 134(72%) was male and the rest i.e.52 (28%) was female. Male and female ratio is 1:2.5. By religion, most i.e.178 (95.7%) were Muslims and rest i.e.8 (4.3%) was Hindus. Regarding marital status, majority i.e. 178 (79.6%) of the patients were married and the rest i.e. 38 (20.4%) were Single. By age group (19-50) years were majority i.e. 144(77.4%)and in (51 and above) age group patients were 37 i.e. 19.9%.The (0-18) years age group were least i.e.5 (2.7%) . Regarding service pattern, serving patients were majority i.e. 94 (50.5%).The Retired were the least i.e. 22 (11.8%).By source of residence, 97 (i.e.52.2%) were from Dhaka and from outside 89 (i.e. 47.8 %).By physical activity, 95 (51.1%) were those who perform moderate physical activity. Those who perform light work were 83 (44.6%) persons .Least i.e. 8(4.3%) were those who do not do any work, By referral source Outdoor patients were 117(62.9%) and indoor were 69 (37.1%).

Regarding history of trauma, the majority i.e. 112 (60.2%) do not give any history and rest i.e. 74(39.2%) gives history of trauma. The procedure of Approval was simple to most i.e.178 (95.7%) patients and complicated to few i.e. 8(4.3%) patients. The majority patients i.e. 117(62.9%) were from outdoor and the rest i.e. 69(37.1%) from indoor source.

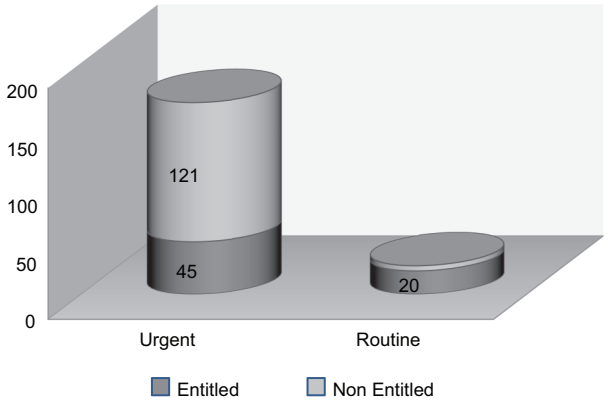


Figure-1: *Distribution of MRI services according to Entitlement*

Figure-1 shows that MRI service was availed mostly by the entitled persons i.e. 157(84.4%) and only 29 (15.6%) nonentitled patients received MRI services.

Table II

Distribution of MRI by waiting time

Waiting time	Frequency	Percent
Below 1 week	27	14.5
1-2 weeks	30	16.1
2-4 weeks	33	17.7
4-6 weeks	18	9.7
6-8 weeks	17	9.1
8-12 weeks	46	24.7
Moran 12 weeks	15	8.1
Total	186	100.0

Table -II highlights that majority of the patients 24.7% had to wait (8-12) weeks for MRI, while the rest 8.1% had to wait more than 12 weeks for MRI service.

Table III

Distribution of MRI by Cost of Investigation

Cost of Investigation	Frequency	Percent
Cheaper than Outside	25	13.4
Not Applicable	161	86.6
Total	186	100.0

Table III views, only 25(13.4%) patients who are nonentitled opined that the investigation was cheaper than outside. For most of the patients i.e. 161(86.6%) who are entitled to get the treatment free, the question of cost was not applicable.

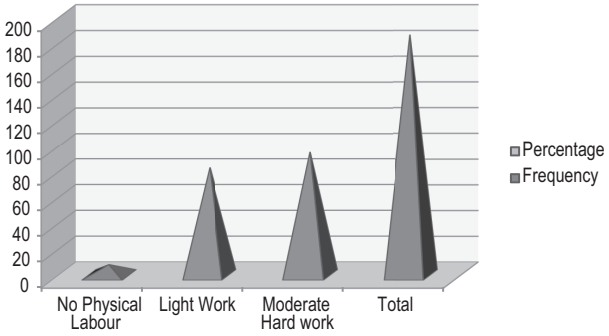


Figure 2: *Distribution of MRI by Service type*

Figure-2 shows that majority of the patients i.e.95 (51.1%) who received MRI were moderate hard workers. Some patients i.e.83 (44.6%) who received MRI were light workers. On the other hand, few patients i.e 8(4.3%) were performing no physical labour. This means physical labor has a relation with disease pattern.

Table IV

Distribution of MRI by Department

Department	Frequency	Percentage
Medicine	20	10.8%
Orthopaedics	117	62.9%
Neurology	14	7.5%
Neurosurgery	30	16.1%
Others	5	2.7%
Total	186	100.0%

Table -IV shows that majority of patients i.e. 117(62.9%) receiving MRI services were referred from Orthopedics department. The least i.e. 5(2.7%) were referred from other departments.

Table V

Distribution of MRI by Part of Body

Part of Body	Frequency	Percentage
Brain	28	15.1%
Vertebral Column	115	61.8%
Knee	29	15.6%
Others	14	7.5%
Total	186	100.0%

Table V shows that patients with vertebral column related diseases performed MRI investigation most i.e.115 (61.8%). Frequency of patients with Knee joint and Brain diseases were 29 (i.e. 15.6%) and 28(i.e. 15.1%) respectively. Other 14 patients reported least frequently i.e. 7.5%.

Table VI

Distribution of MRI by Frequency of Positive findings

	Frequency	Percentage
Positive	157	84.4%
Negative	29	15.6%
Total	186	100.0%

Table VI shows that most of the MRI investigations i.e. 157 (84.4%) patients had positive findings .On the other hand, only 29(i.e. 15.6%) patients did not show any findings.

Table VII

Distribution of MRI by Marital Status

Marital Status	Frequency	Percentage
Married	148	79.6%
Single	38	20.4%
Total	186	100.0%

Table VII shows that majority of the patients i.e. 148 (79.6%) reporting for MRI were married patients. Rest 38(i.e. 20.4%) patients were single.

Table-VIII

Distribution of MRI waiting Time by Department

Department	Below 1 week	1-2 weeks	2-4 weeks	4-6 weeks	6-8 weeks	8-12 weeks	More than 12 weeks	Total
Medicine	5(25.0%)	4 (20.0%)	3 (15.0%)	3(15.0%)	3(15.0%)	1(5.0%)	1(5.0%)	20(100.0%)
Orthopedics	11(9.4%)	18(15.4%)	20(17.1%)	11(9.4%)	11(9.4%)	33(28.2%)	13(11.1%)	117(100.0%)
Neurology	7(50.0%)	2(14.3%)	3(21.4%)	0(.0%)	0.(0%)	2(14.3%)	0.(0%)	14(100.0%)
Neurosurgery	2(6.7%)	6(20.0%)	5(16.7%)	4(13.3%)	2(6.7%)	10(33.3%)	1(3.3%)	30(100.0%)
Others	2(40.0%)	0(.0%)	2(40.0%)	0(.0%)	1(20.0%)	0(.0%)	0(.0%)	5(100.0%)
Total	27(14.5%)	30(16.1%)	33(17.7%)	18(9.7%)	17(9.1%)	46(24.7%)	15(8.1%)	186(100.0%

[$\div^2$=38.401df =24 p value = .032]

Table-VIII shows that waiting time for MRI investigation was performed maximum at 8-12 weeks waiting time.Then2-4 weeks waiting time had second highest i.e.33 (17.7%) frequency. Then 1-2 weeks waiting time was given to 30(i.e.16.1%) patients.Least frequent waiting time was given to 15(8.1%) This difference of waiting time for MRI by Departments was statistically significant i.e.p value=.032 or <.05)

Table-IX shows Department wise distribution of MRI according to Service status of patients. Data shows that all group of patients received MRI facilities due to Orthopedics diseases mainly [i.e. Serving personnel-68/94(72.3%), Family members-25/41(61.0%),Retired-8/22(36.4%),Others-16/29(55.2%)].It is also observed that serving Armed Forces personnel availed majority of the MRI facilities from Medicine, Orthopedics, Neurology, Neurosurgery specialty background .Family members availed most i.e.4/5(80%) of the other departments referral. Thereby Next utilization priority groups are Neurosurgery and Medicine consecutively. Serving personnel utilized the facility most 94(50.5%) ,whereas the civilians utilied least 20(10.8%).

Table-X shows that serving persons availed most frequent i.e. 48.1% investigations 0f (0-1)week waiting time among all service patterns. Within (1-2) weeks waiting time also they availed majority i.e.50.0% MRI service. Only in case of 2-4 weeks waiting time the other (nonentitled) patients availed 33.3% of the service.. Ultimately serving persons utilized maximum i.e. 94/186(50.5%) and retired got minimum i.e. 22/186(11.8%) service.

Table-IX

Department wise Distribution of MRI according to Service status

Name of Dept	Serving Armed Forces pers	Family Members	Retired	Others	Total
Medicine	8(40.0%)	4(20.0%)	4(20.0%)	4(20.0%)	20(100.0%)
Orthopaedics	68(58.1%)	25(21.4%)	8(6.8%)	16(13.7%)	117(100.0%)
Neurology	5(35.7%)	2(14.3%)	4(28.6%)	3(21.4%)	14(100.0%)
Neurosurgery	13(43.3%)	6(20.0%)	6(20.0%)	5(16.7%)	30(100.0%)
Others	0(.0%)	4(80.0%)	0(.0%)	1(20.0%)	5(100.0%)
Total	94(50.5%)	41(22.0%)	22(11.8%)	29(15.6%)	186(100.0%)

[χ^2=23.446 df =12 p value=.024]

Table-X

Distribution of MRI by Waiting Time according to Service Type

Waiting Time	Serving Armed Forces pers	Family Memebers	Retired	Others	Total
Below 1 week	13	6	5	3	27
	48.1%	22.2%	18.5%	11.1%	100.0%
1-2 weeks	15	4	7	4	30
	50.0%	13.3%	23.3%	13.3%	100.0%
2-4 weeks	8	9	5	11	33
	24.2%	27.3%	15.2%	33.3%	100.0%
4-6 weeks	9	2	3	4	18
	50.0%	11.1%	16.7%	22.2%	100.0%
6-8 weeks	10	4	0	3	17
	58.8%	23.5%	.0%	17.6%	100.0%
8-12 weeks	27	13	2	4	46
	58.7%	28.3%	4.3%	8.7%	100.0%
Moran 12 weeks	12	3	0	0	15
	80.0%	20.0%	.0%	.0%	100.0%
Total	94	41	22	29	186
	50.5%	22.0%	11.8%	15.6%	100.0%

[$\chi^{2=}$33.640[a] df=18 p value=.014]

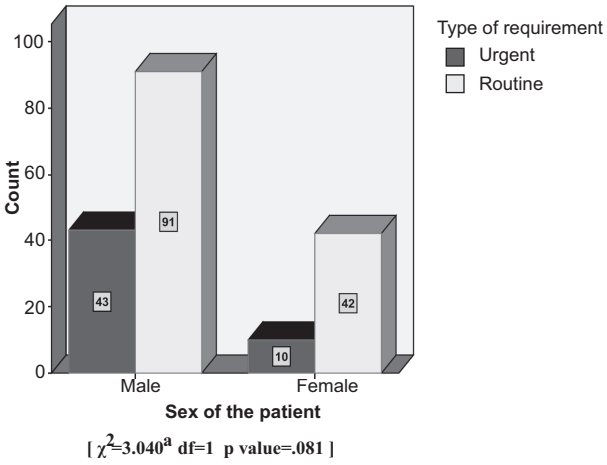
Table XI

Distribution of MRI by MRI Finding according to Department

Name of Dept	Positive	Negative	Total
Medicine	14	6	20
	7.5%	3.2%	10.8%
Orthopaedics	100	17	117
	53.8%	9.1%	62.9%
Neurology	10	4	14
	5.4%	2.2%	7.5%
Neurosurgery	28	2	30
	15.1%	1.1%	16.1%
Others	5	0	5
	2.7%	.0%	2.7%
Total	157	29	186
	84.4%	15.6%	100.0%

[χ^2=7.787 df=4 p value=.100]

Table-XI shows that the frequency of positive findings was highest (i.e100/117.) in orthopedic cases and frequency of positive findings was least i.e. 10/14(7.5%) in Neurology cases.



[χ^2=3.040[a] df=1 p value=.081]

Fig.-3: *Distribution of MRI by Type of Requirement as per Sex of the Patient*

Figure-3 shows that male patients availed more frequent urgent service i.e .43(32.1%) than female i.e.10 (19.2%).

Table XII

Distribution of MRI by Name of Dept and Marital Status

	Name of Dept					Total
Marital Status	Medicine	Orthopaedics	Neurology	Neurosurgery	Others	
Married	18(9.7%)	89(47.8%)	14(7.5%)	26(14.0%)	1(.5%)	148(79.6%)
Single	2(1.1%)	28(15.1%)	0(.0%)	4(2.2%)	4(2.2%)	38(20.4%)
Total	20(10.8%)	117(62.9%)	14(7.5%)	30(16.1%)	5(2.7%)	186(100.0%)

[χ^2=17.659 df=4 p Value=.001]

Table-XII shows that married people availed 79.6 %(148/186) of the service and single persons received 20.4 %(38/186) of the services. Both married and single persons suffered from Orthopedic diseases in same proportion, but the utilization of other department services are much more in case of married population.

Table XIII

Distribution of MRI by Type of Requirement and MRI finding

		MRI Finding		Total	P Value
		Positive	Negative		
Type of Requirement	Urgent	55(84.6%)	10(15.4%)	65(100.0%)	.567
	Routine	102(84.3%)	19(15.7%)	121(100.0%)	
Total	157(84.4%)	29(15.6%)	186(100.0%)		

Table XIII. Distribution of MRI by Type of Requirement and MRI finding

Figure shows that more number of routine investigations 121/1869(65.1%) were done than urgent cases 65/186 (34.9%).Frequency of positive finding is little more i.e. 84.6% in routine cases than urgent cases i.e. 84.3%.So,relation between these two variables are not significant.(p value= >.05)

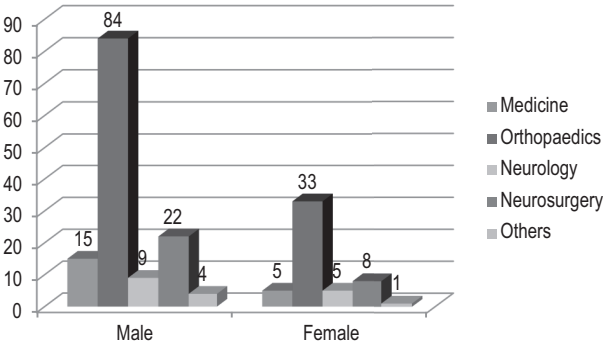


Figure 4: *Distribution of MRI by Name of Dept and Sex of the Patient*

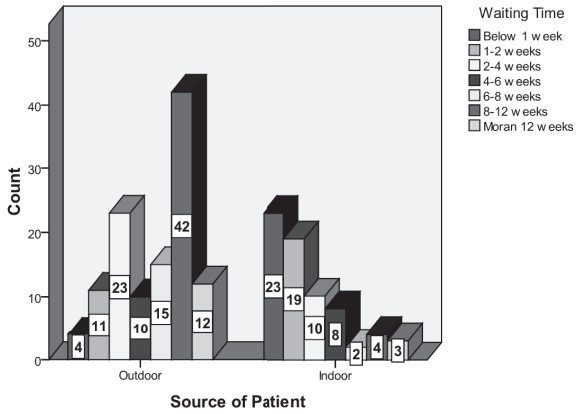
Figure 4 shows that male patients utilized 72.0 %(134/186) of the service and female patients availed 28.0 %(52/186) of the service. Male and female both group had mainly Orthopedic referral.

Table XIV

Distribution of MRI by Type of Requirement and Department

Name of Dept	Type of Requirement		Total
	Urgent	Routine	
Medicine	9	11	20
	45.0%	55.0%	100.0%
Orthopaedics	26	91	117
	22.2%	77.8%	100.0%
Neurology	10	4	14
	71.4%	28.6%	100.0%
Neurosurgery	6	24	30
	20.0%	80.0%	100.0%
Others	2	3	5
	40.0%	60.0%	100.0%
Total	53	133	186
	28.5%	71.5%	100.0%

Table XIV shows that orthopedic patients were provided with urgent services maximum i.e. 33/65(17.7% of total), but patients of Medicine specialty received MRI in highest proportion i.e. 11/20(5.9% of total) in comparison with routine examination of same specialty. Result shows that overall ratio of urgent and routine cases were around 1:2



[χ^2=59.130[a] df=6 p Value=.000]

Figure 5: *Distribution of MRI by Waiting Time of Source of Patient*

Figure 5 shows that outdoor patients had more frequent waiting time of (8-12) weeks time. i.e. 42/117(35.9%) and indoor patients had more frequent waiting time of within 2 weeks i.e.42/69 (60.8%).So,there is strong relation between these two variables.(p value= .000)

Table-XV

Annual change of Utilization pattern of MRI Servicesat CMH Dhaka

Year	No of investi-gations	Increase	Percentage of increase
2006	2228	No Previous data	-
2007	2337	109	4.9%
2008	2942	605	25.9%
2009	3645	703	23.9%
2010	4241	596	14.1%
2011 (Till 15 July)	2422 (Probable)	603 (Probable)	14.2%

Table-XV shows that frequency of utilization of MRI service is increasing every year (2007-4.9%,2008-25.9%, 2009-23.9%,2010-14.1%, 2011- 14.2%).The data was collected from MRI Department of CMH Dhaka.

Table-XVI

Distribution of work schedule MRI department

Utilization in 2 weeks	186
Utilization per week	93
Utilization per day	13

Table-XVI shows that during study period total 186 MRI done in two weeks period, so average in a week is 93 MRI/week and 13/ day.

Discussion

The descriptive cross-sectional study was conducted to assess the utilization pattern of MRI services at Combined Military Hospital, Dhaka. The study was conducted among 186 patients attended the MRI Department of the hospital during the study period. Data were collected by face-to-face interview and reviewing medical record with the help of a questionnaire and checklist. Finally collected data were analyzed and following findings were revealed.

This study found that out of total 186 patients MRI service was availed mostly by the entitled persons (84.4%) and only (15.6%) non entitled patients received MRI services. By religion, most (95.7%) were Muslims and rest (4.3%) was Hindus. Regarding marital status, majority (79.6%) of the patients was married and the rest (20.4%) were Single. By age group (19-50) years were majority (77.4%)and in (51 and above) age group patients were 19.9%.The (0-18) years age group were least (2.7%) . Regarding service pattern, serving patients were majority (50.5%).The Retired were the least (11.8%). By place of residence, (52.2%) were from Dhaka and from outside (47.8 %). By referral source outdoor patients were (62.9%) and indoor were (37.1%). Regarding history of trauma, the majority (60.2%) do not give any history and rest (39.2%) gives history of trauma. The procedure of approval from authority for MRI was simple to most (95.7%) patients and complicated to few (4.3%) patients. The majority patients i.e. (62.9%) were from outdoor and the rest (37.1%) from indoor. Majority of the patients (51.1%) who received MRI were moderate hard workers. Some patients (44.6%) who received MRI were light workers. On the other hand, few patients (4.3%) were performing no physical labour. This means physical labor has a relation with disease pattern .No other study findings were found related with these variables of this study to compare.

The study revealed that out of total 186 patients, majority i.e. (72.0%) of the patients was males and the rest (28%) patients were females. In this regard similar finding was revealed by a study conducted by Wang L et al where males received significantly more MRI scans ($p < .01$). [25]In this regard different finding was revealed by a study conducted by Levin DC et al among Ontario residents where women compared with men had higher MRI utilization across all age groups less than 70 years of age[9].

This study shows that frequency of utilization of MRI service at CMH Dhaka is increasing every year. From 2006 to 2007 increase was 4.9%, from 2007 to 2008-25.9%, 2008 to 2009 - 23.9%, 2009 to 2010 increase was 14.1% and 2010 to 2011 percentage of increase was 14.2%. According to a report in 1997, In a study by Levin D C et al, MRI utilization in the US is increasing up to 17% per year, with increases for vascular use leading the way. Overall, MRI volume increased 21% from 1993 to 1996 and 35% from 1996 to 1999[9].

In this study it was revealed that department wise distribution of MRI according to Service status of patients. Data shows that all group of patients received MRI facilities due to Orthopedics diseases mainly [i.e. Serving personnel-68/94(72.3%), Family members-25/41 (61.0%), Retired -8/22 (36.4%), Others-16/29 (55.2%)]. It is also observed that serving Armed Forces personnel availed majority of the MRI facilities from Medicine, Orthopedics, Neurology, Neurosurgery specialty background.

Family members availed most i.e.4/5(80%) of the other department's referral. Thereby Next utilization priority groups are Neurosurgery and Medicine consecutively. Serving personnel utilized the facility most (50.5%) ,whereas the civilians utilied least (10.8%). No other study findings found related with this variables of this study to compare.

This study found that outdoor patients were (62.9%) and indoor were (37.1%). In a study by Finger Lakes health systems agency Rochester, New York, inpatients represent only 10-15 percent of an MRI service volume [10]. It was also found that waiting time for MRI investigation was performed maximum at 8-12 weeks waiting time.Then2-4 weeks waiting time had second highest i.e.33 (17.7%) frequency. Then 1-2 weeks waiting time was given to 30(i.e.16.1%) patients. Least frequent waiting time was given to 15(8.1%) This difference of waiting time for MRI by Departments was statistically significant i.e. p value=.032 or <.05)

It was found in this study that, majority of patients i.e. (62.9%) received MRI services at CMH Dhaka as referred by the Orthopedics department. From Medicine 10.8%, Neurology 62.9%, Neurosurgery 16.1% and the least i.e. (2.7%) were referred from other departments like Pediatrics, Gynecology and ENT departments. In this aspect, the study conducted by Levin D C et al showed that outpatient MRI scans were mainly ordered by neurologists (24%), family physicians (20%), orthopedic surgeons (17%) and neurosurgeons (8%). These four physician types ordered almost 69% of all MRI scans in 2001.[9] Another study conducted by Iron K found that the specialty of the physician ordering an MRI (neurologists order 24% of all MRI scans, family physicians 20%, orthopedic surgeons 17%, neurosurgeons 8%)[11]. On the other hand medical illustrations found that most urban areas the specialties of neurosurgery, neurology, and orthopedics contribute at least 70% of MRI volume.[12]

This study found that majority of the patients with vertebral column related diseases performed MRI investigation (61.8%). Frequency of patients with Knee joint and Brain diseases were (15.6%) and (15.1%) respectively. Other patients reported least frequently 7.5%. According to a report in 1997, the study conducted by Levin D C et al, MRI utilization in the US is increasing up to 17% per year. Pelvic and neurologic MRIs increased 29%, chest/breast 10%, extremities 64%, and abdominal 101%, from 1996 to 1999. This being said, the majority of MRIs were for brain/spine (around 80%) and extremities (16%) in 1999[9].

This study found that most of the MRI investigations (84.4%) patients had positive findings .On the other hand only (15.6%) patients did not show any findings. It also shows that the frequency of positive findings was highest (i.e100/117.) in orthopedic cases and frequency of positive findings was least i.e. 10/14(7.5%) in Neurology cases. No other study findings were found on this variable to compare with these findings.

While referring from the various departments concerned doctors give remarks to prioritize the investigation as urgent and routine. In this study found that more number of routine investigations 121/1869(65.1%) were done than urgent cases 65/186 (34.9%).Frequency of positive finding is little more i.e. 84.6% in routine cases than urgent cases i.e. 84.3%. So, relation between these two variables are not significant.(p value= >.05). It was also found that orthopedic patients were provided with urgent services maximum i.e. 33/65(17.7% of total), but patients of Medicine specialty received MRI in highest proportion i.e. 11/20(5.9% of total) in comparison with routine examination of same specialty. Result shows that overall ratio of urgent and routine cases were around 1:2. In this aspect, the study conducted by Levin D C et al showed that most scanners in the area were heavily used with some waiting times exceeding a year, which was longer than the 13 weeks wait that was felt appropriate for a non-urgent scan (based on informal discussions with UK specialists) .[28] Following is a summary of current wait times for accessing the two MRI services designed to serve residents of Waterloo Region and Wellington and Dufferin Counties.

High need - 1 week for inpatients; 1-2 weeks for outpatients e.g., spinal cord compression of cancer patient and acute stroke, acute onset of complex neurological symptoms.

Medium need -3 – 6 months e.g., gradual symptoms (not acute) but not going away. Low need - 3 – 6 months It is worth repeating that the waiting times for medium and low need patients will fluctuate on an ongoing basis, depending upon the number of high need patients that will receive priority. e.g., chronic symptoms, e.g., low back pain, hip and knee, headaches [30]

This study found that outdoor patients had longer waiting time of (8-12) weeks time. (35.9%) and indoor patients had shorter waiting time of less than 2 weeks (60.8%). So, there is strong relation between these two variables. (p value= .000) i.e. indoor patients had to wait less to get MRI examination done. In this aspect, the study conducted by Levin D C et al showed that Wait times generally ranged from four days for inpatients, to between 30 and 40 days for outpatients;[28] ·Upon analysis of the distribution of indications it was found that in MRI examinations 38% were cranial and 30% spinal tests[10].

Related with serving persons availed most frequent 48.1% investigations 0f (0- 1) week waiting time among all service patterns. Within (1-2) weeks waiting time also they availed majority i.e.50.0% MRI service. Only in case of 2-4 weeks waiting time the other (nonentitled) patients availed 33.3% of the service.. Ultimately serving persons utilized maximum i.e. 94/186(50.5%) and retired got minimum i.e. 22/186(11.8%) service. No other study findings were found on this variable to compare with these findings.

Related with utilization per week, this study found that, during study period total 186 MRI done in two weeks, so average 93 MRI/week and 13/ day. In this aspect, the study conducted by Levin D C et al showed that the number of inpatient MRI scans performed per day ranges from 1 to 5; these either have designated time slots or are just added into the schedule ad hoc; A median of 20 outpatients per day are performed with a range of 15 to 27[9]. In another study conducted by by Ontario Association of Radiologists, USA, the median number of scanning hours per week was 93.5. MRI scanners were routinely used on weekends in 46/79 (58%) of facilities. Only two centers (3%) routinely operated their MRI scanners on a 24/7 basis.[11]

Related with cost pattern views, i.e cost per examination DMCH-Tk 3000/- BSMMU- Tk 5000/-, Private (Square Hosp), Tk 6000/-, CMH Dhaka- Tk 5000/- (1 $=Tk 72/-). For most of the patients (86.6%) who are entitled to get the treatment free, the question of cost was not applicable. Only (13.4%) patients who are non entitled who paid for MRI opined that the investigation was cheaper than outside. In study of Inpatient Radiology utilization trends over the past decade by Matin A et al it was found that the cost of an MRI study can range from $300 to $10000.[13]

Conclusion

Better Medical and Surgical care depends on availability of prompt and skillful diagnostic Services. Among the many modern diagnostic techniques MRI examination contributes to facilitating effective medication and treatment. Diagnostic MRI plays a vital role in diagnosis of disease. It improves the quality and efficiency of healthcare to a great extent. It can provide support to the doctors when the disease is difficult to diagnose clinically.Prompt diagnosis of a disease reduces economic burden and increases the efficiency level of working force of a country.

The first step in devising cost containment strategies isto study utilization patterns and and to ensure that costly radiographic studies are used in the appropriate clinical scenarios. Information about utilization of radiology services is useful to practices .payors and policy makers for planning growth, helping to ensure that necessary services are available for patients, making financial decisions and negotiating[21]. In view of the above the present study is an attempt to put forward valuable opinions and suggestion' for improvement of health by maximum utilization of available resources in the MRI department within minimum cost and time.

Factors such as increasing magnet strength, greater utilization for emergent/trauma cases,

wider patient dependence on medical devices or implants that may be contraindicated for MR exams, larger numbers of sedation/general anesthesia patients, and interventional applications from image-guided biopsies to intraoperative imaging are all perceived to ratchet up the opportunities for mishaps.

While the ACR may be leading the way, many organizations are actively reviewing the guidance and regulation provided for MR safety issues. New standards for facility design and operations are expected in the months and years ahead from governmental and professional organizations. Peer influence can be minimized with due attention regarding maintenance of wait list.

The development of this document was guided by peer-reviewed publications and empirical data to the fullest extent possible. Where sufficient data were lacking, the workgroup sought to acknowledge this limitation and to identify the need for additional data. Furthermore, because technology is evolving rapidly and new applications of MR continue to be discovered, it is expected that new questions will arise.

References

1. Khan A.Q : Epidemiology and Disease Control, First Edition 1989 (191-92)

2. Rashid,Khabir,Hyder's Textbook of Community Medicine and Public Health, 4th Edition 2004 (9-15)

3. Haque Md Shamsul: Hospital and Health Care Management, First Edition 1994(1-2)

4. Copyright © 2010, American Imaging Management, Inc. All Rights Reserved. Diagnostic Imaging Utilization Management

5. Website: www.babradiology.com The Basics of an MRI) Understanding Open MRI Technology

6. Lori Newell -Types of MRI Machines. Types of MRI Machines | eHow.com http://www.ehow.com/about_4686615_types-mri-machines.html#ixzz1GeIPA9QI

7. Emergency MRI Utilization Trends at a Tertiary Care Academic Medical Center: Baseline Data Top of Form

   David Rankey, MDa, James L. Leach, MDa, Sabrina D. Leach, MDb, Bottom of Form Received 22 August 2007; accepted 4 January 2008.

8. Emergency MRI Utilization Trends at a Tertiary Care Academic Medical Center: Baseline Data Volume 15, Issue 4, Pages 438-443 (April 2008), Top of Form David Rankey, MDa, James L. Leach, MDa, Sabrina D. Leach, MDb Bottom of Form Received 22 August 2007; accepted 4 January 2008

9. Physician Orders Contribute To High-Tech Imaging Slowdown David C. Levin, Vijay M. Rao and Laurence Parker

10 CT AND MRI IMAGING IN ISRAEL -NATIONAL TRENDS OF UTILIZATION Vaknin Sharona • Luxenburg Osnat • Polliack Gabriel • Siebzehner Miriam I. • Shemer Joshua Harefuah. 2003 Dec;142(12):810-4, 880.

11. Access to MRI in Ontario:Addressing the Information Gap Karey Iron, MHSc, Raymond Przybysz, MSc, Andreas Laupacis, MD, MSc, FRCPC November 13, 2002.

12. Medical illustrations Copyright @ Nucleus Medical Art 2011.(Article: What else is going on in an MRI Scan?) http://www. diagnosticimaging.com/knee/content/article/ 1549113/1819345 on Apr 13, 2011 22:04:16 GMT.

13. Inpatient Radiology Utilization:Trends over the Past Decade . Amin Matin1,David W. Bates1,2 Andrew Sussman2 Pablo Ros3,Richard Hanson1 Ramin Khorasani Received April 22, 2004; accepted after revision January 5, 2005.