



Original Article

Determinants of discharge against medical advice from a rural neurosurgical service in a developing country: A prospective observational study

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ABSTRACT

Background: In low-resource regions of the world, discharge against medical advice (DAMA) is one empiric contributory factor to poor in-hospital outcome that is not often mentioned. This study aims to investigate the determinants of DAMA from a rural neurosurgical service in a developing country.

Methods: This was a prospective observational study of all patients who discharged against medical advice in our service between November 2018 and October 2019.

Results: There were 88 patients, 67 (76.1%) males, in the study, (M:F = 3.2:1), representing 17.4% of our patient population in the study period. The peak incidence was in the 20–29 years age group which accounted for 37.5% of the cases. About 55% of the patients presented directly to our center; 31.8% were referred from other hospitals, while 3.4% came from traditional caregivers and 1.1% from religious homes. Head injury was the most common indication for presentation (76.1% of the cases). The duration of hospital stay ranged from 2 h to 14 days. Majority of the patients (87.5%) left the hospital within 8 h of presentation. The reason for DAMA was financial constraints in 50% of cases, inadequate health literacy in 20.5%, financial constraints and poor health literacy together in 12.5%, religious misgivings in 4.5%, and traditional belief in 2.3%. Neurotrauma was predictive of early DAMA ($P = 0.001$).

Conclusion: The rate of DAMA was high in our study. Financial constraints with other socioeconomic limitations were the most common causes of DAMA in our environment.

Keywords: Determinants, Developing country, Discharge against medical advice, Rural neurosurgery

INTRODUCTION

Discharge against medical advice (DAMA) is an issue generating some significant concerns in health systems globally.^[11,13,14,29] It is a prominent albeit less often discussed cause of poor health outcome from hospitalized patients. It may result in inadequate treatment and increased rate of hospital readmission, complications, and mortality.^[12,17,26,28,49] The rate of DAMA is approximately 1–2% of all hospital discharges in most of the literature from the West but may range from

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0.3 to 25.9% depending on the setting of the study, social history of the patients, and medical condition among other factors.^[8,17,33,50,51] Note worthily, higher rates of DAMA in developing than developed countries have been documented by some authors.^[9,12,35,39,44]

Several causes of DAMA have been reported, including financial difficulties/lack of health insurance; dissatisfaction with the care received, and/or, the hospital environment; lack of access to skilled and qualified physicians, lack of advanced medical services; and presumed unsatisfactory results from treatment, and presumed unduly prolonged in-hospital stay of patients.^[1,8,20,23,33,35,42] The problem of DAMA is probably more significant in developing countries with fewer medical specialists,^[2] prevailing poor economic power, and, particularly, a global lack of health insurance necessitating out-of-pocket payment for health-care expenses in most cases.^[4] This is even more so for neurosurgical care which notably has a much higher in-hospital costs of care compared to other disease conditions.^[4] In Nigeria, the cost of brain CT/MRI and daily intensive care unit – admission charges are at least double the national minimum wage per month, while the cost of neurosurgical operative procedures is more than the national minimum wage per annum in most cases.

The previous studies on DAMA in our country as well as most studies from other parts of the world were in mixed patients' populations in the medical, psychiatric, or surgical/orthopedic wards.^[1,9,12,17,23,28,29,49,50] None such that we are aware of has been reported from neurosurgical service, not globally, and certainly not from sub-Saharan Africa. This study, therefore, aims to explore for the rate and determinants of DAMA in neurosurgical patients in a rural tertiary care hospital of a resource-constrained African developing country.

MATERIALS AND METHODS

This was a cross-sectional study of all prospective patients who discharged against medical advice in our neurosurgical service over a 12-month period from November 2018 to October 2019. Our neurosurgical practice is a newly inaugurated one in a tertiary level hospital in a rural part of Nigeria, a large country in sub-Saharan Africa. We collected data on the demographic characteristics of the patients, the diagnosis, duration of symptoms, duration of stay in our service before the DAMA, reasons for the DAMA, plus representation in the hospital after the DAMA, as well as the reasons for the representation and the interval between the DAMA and the repeat presentation. Early DAMA (DAMAE) was defined as DAMA within 8 h of admission and late DAMA (DAMAD) as DAMA after 8 h.^[31] Data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 20 (SPSS Science Inc., Chicago, IL, USA) and presented in descriptive categorical variables and

proportions. The Pearson's Chi-square test of associations was used to determine variables associated with early DAMA. Multivariate logistic regression analysis was modeled to determine independent predictors of early DAMA. Variables that attain statistical significance on bivariate analysis were inputted into the regression model. The level of significance for all statistical analyses was set at $P < 0.05$.

RESULTS

There were 88 patients in the study, 67 (76.1%) males and 21 females (M:F = 3.2:1), representing 17.4% of the 506 cases seen in our neurosurgical practice during the study period [Table 1]. The mean age was 33.4 (SD17.7) years and ranged from 35 h to 93 years. The peak incidence was in the 20–29 years age group which accounted for 37.5% of the cases [Figure 1]. Only 10.2% of the patients were children, aged 35 h–17 years. The duration of symptoms ranged from

Table 1: Clinical and demographic characteristics of the patients.

Variables (n=88)	Frequency	%
Age (years)		
Under 5	2	2.3
5–12 (preteen)	2	2.3
13–19 (teenagers)	11	12.5
20–44 (youth)	55	62.5
45–65 (middle age)	12	13.6
>65 (elderly)	6	6.8
Sex		
Male	67	76.1
Female	21	23.9
Level of education		
Primary	12	13.6
Secondary	35	39.8
Tertiary	7	8.0
None	10	11.4
Not applicable	2	2.3
Not stated	22	25.0
Caregiver		
Self	8	9.1
Parents	28	31.8
Friends	13	14.8
Relatives	39	44.3
Health insurance		
No	88	100.0
Diagnosis		
Trauma	77	87.5
Nontrauma	11	12.5
Presence of associated injury		
Yes	36	40.9
No	52	59.1
Duration of staying in hospital before DAMA		
0–8 h (DAMAE)	77	87.5
>8 h (DAMAD)	11	12.5

30 min to 20 years. More than three-fifths (62.5%) of the patients presented directly to our center, 31.8% were referred from other hospitals; 3.4% came from traditional caregivers and 1.1% each from religious and nursing homes [Figure 2]. Head injury was the diagnosis in 76.1% of the cases, spinal cord injury in 9.1%, and myelomeningocele and chronic

subdural hematoma each in 2.3%. Some 1.1% had both head injury and spinal cord injury while brain tumor, hemorrhagic stroke, cerebellar abscess, hydrocephalus, and degenerative spine disease each accounted for 1.1% of the cases [Table 2]. All patients funded their health care with us out-of-pocket: none had health insurance coverage.

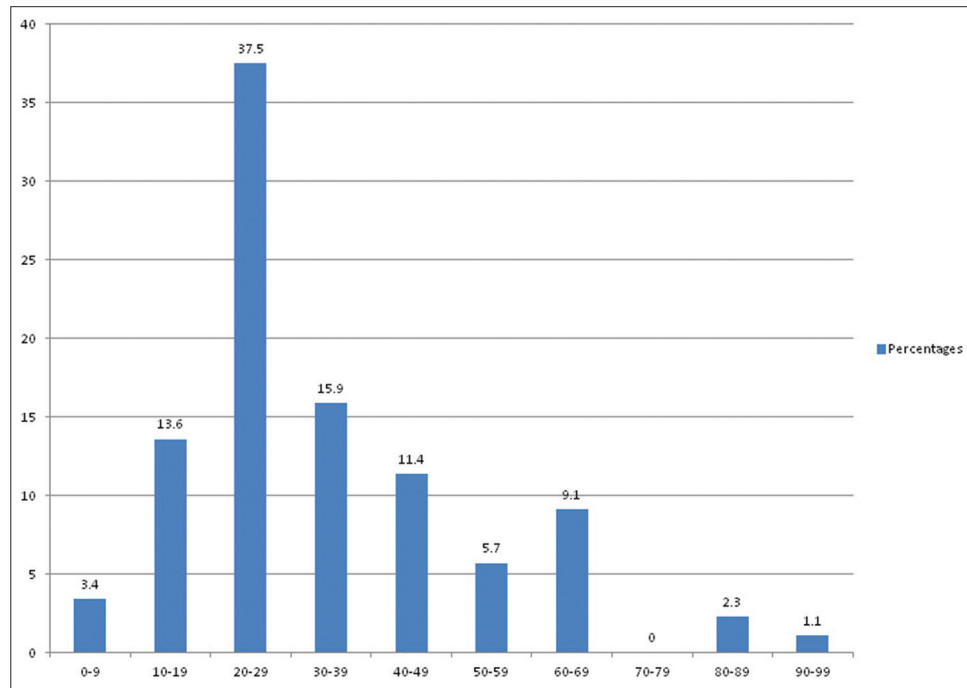


Figure 1: Age distribution of the patients.

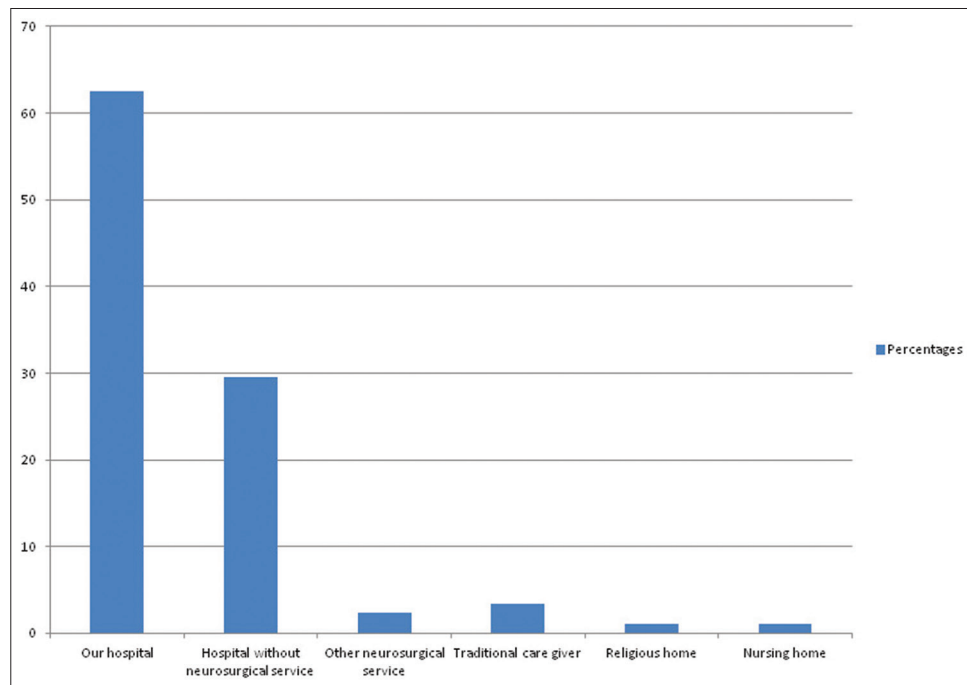


Figure 2: First point of care of the patients.

The median duration of hospital stay in this cohort of patients that discharged AMA was 6.5 h (range = 2 h–14 days). The DAMA was early, within 8 h of admission (DAMAe) in 87.5%, and late, after 8 h (DAMAd) in 12.5%. The reason for DAMA was low income in 50% of cases, low health literacy in 20.5%, low income and health literacy together in 12.5%, long distance in 8.0%, and conflicting religious and traditional beliefs in 4.5% and 2.3%, respectively [Table 3]. Following a bivariate analysis, age <50 years ($P = 0.02$), male gender ($P = 0.01$), neurotrauma ($P < 0.01$), and the presence of associated injuries ($P = 0.02$) attained statistical significance as predictors of early DAMA [Table 4]. The significant variables were selected for multivariate regression analysis. Based on this final model, the only significant risk factors for early DAMA in this study were neurotrauma ($P < 0.01$) [Table 5]. Only 4 patients (4.5%) represented to our hospitals after the DAMA, 2 (50%) because they were compelled by relatives to do so, and the other two because of neurological deterioration. The interval from the DAMA to representation ranged from 1 h to 18 days.

DISCUSSION

DAMA is a well-recognized concern in in-patient health care globally with significant attendant negative economic

and health consequences.^[10,11,14,29] There is hardly any data-driven study known to us about DAMA in a purely neurosurgical patients' population globally, let alone in developing countries in particular. This study interrogates the burden and the determinants of this problem in a cohort of neurosurgical patients' population in a Nigerian rural practice setting. About 17.4% rate of DAMA in our study from this neurosurgical patient cohort was higher than 0.5–2.2% reported in other in-hospital patients from the developed world,^[26,43,44,45,50] and 0.002–5.7% from previous reports from our country.^[9,23,27,35,37,48] A relatively higher rate of 7.2% had also been reported in a population of medical in-patients by Fadare *et al.* working in an environment similar to ours from the same region of our country.^[24] In a cohort of pure neurological patients in India, Lakhotia *et al.* reported a DAMA rate of 14.9%.^[31]

The predominance of male gender in this study is in agreement with trends in other studies locally and abroad.^[7,23,31,34,36,38,44] Female predominance, however, was reported by Jimoh *et al.*^[29] and Hasan *et al.*^[25] More than one-third (37.5%) of our patients were between 20 and 29 years. The predominance of patients in the economically productive age groups and the aforementioned male predominance in this study may be due to the predominance of neurotrauma patients in our study population since it is known that trauma is the leading cause of neurosurgical diseases in these groups.^[3,5,6,22,30] The most common reason for DAMA in this study was financial constraints, occurring alone in 50% of the cases and in combination with low health literacy in another 12.5%. This finding has been widely reported by other authors both in the developing and developed countries.^[13,24,25,29] Poor socioeconomic status and lack of health insurance are probable reasons for this.^[26,28,29,40] Our figure of about 63% regarding the contribution of economic hardships for the cause of DAMA is higher than 32.9% reported by Jimoh *et al.*,^[29] 40.6% by Hasan *et al.*,^[25] and 48% by Fadare *et al.*,^[24] but similar to 61.1% in the study by Lakhotia *et al.*^[31] The variation between our figures and that of Fadare *et al.*^[24] who were working in a setting similar to ours may be due to the significantly higher costs of in-hospital care of neurosurgical patients. Notably, none of the patients in this series had health insurance cover.

Other reasons for DAMA identified in this study were poor medical insight and the need for proximity to relatives/caregivers in some of the patients. About 33% of the patients discharged against medical advice because they felt that they were well while 8% left because of their felt need for proximity to relatives/caregivers despite no access to neurosurgical service at these destinations. These factors have all been documented in the literature.^[13,25,29]

Notably in this study, none of the patients discharged against medical advice because of dissatisfaction with the care

Table 2: Summary of cases.

Diseases	Number	Percentage
Head injury	67	76.1
Spinal cord injury	8	19.1
Head and spinal cord injury	1	1.1
Brain tumor	1	1.1
Degenerative spine disease	1	1.1
Hydrocephalus	1	1.1
Myelomeningocele	2	2.3
Spontaneous ICH	1	1.1
Chronic subdural hematoma	2	2.3
Cerebral abscess	2	2.3
Subdural empyema	1	1.1
Postinfective seizure	1	1.1
Total	88	100

Table 3: Summary of indications for discharge against medical advice.

Reason	Number	Percentage
Financial	44	50.0
Poor health literacy	18	20.5
Financial+Poor health literacy	11	12.5
Distance	7	8.0
Religious belief	4	4.5
Prognosis	1	1.1
Traditional belief	2	2.3
Conflict	1	1.1
Total	88	100

Table 4: Relationship between clinical and demographic status and DAMA.

Variables	Duration of Stay in hospital before DAMA		Chi-square	P-value
	0–8 h (DAMAE) n (%)	>8 h (DAMAD) n (%)		
Age (years)				
<50	63 (87.5)	9 (12.5)	13.098	0.022
≥50	14 (87.5)	2 (12.5)		
Gender				
Male	62 (92.5)	5 (7.5)	6.514	0.011
Female	15 (71.4)	6 (28.6)		
Level of education				
Primary	17 (94.4)	1 (5.6)	4.491	0.481
Secondary	37 (84.1)	7 (15.9)		
Tertiary	6 (85.7)	1 (14.3)		
None	16 (94.1)	1 (5.9)		
Not applicable	1 (50.0)	1 (50.0)		
Caregiver				
Self	8 (100.0)	0 (0.0)	4.031	0.258
Parents	23 (82.1)	3 (17.9)		
Friends	13 (100.0)	0 (0.0)		
Relatives	33 (84.6)	6 (15.4)		
Diagnoses				
Trauma	74 (96.1)	3 (3.9)	41.692	0.000
Nontrauma	3 (27.3)	8 (72.7)		
Presence of associated injury				
Yes	35 (97.2)	1 (2.8)	5.265	0.022
No	42 (80.8)	10 (19.2)		

Table 5: Independent predictor of early discharge against medical advice.

Variables	Standard error (S.E)	Chi-square (X ²)	P-value	Odds ratio	95% confidence interval (95% CI)	
					Lower	Upper
Age (in years)						
<50	2.122	1.139	0.286	0.104	0.002	6.645
≥50	28,208.566	0.000	0.999	0.000	0.000	-
Diagnosis						
Trauma	1.210	10.161	0.001	47.348	4.418	507.449
Nontrauma				1		
Presence of associated injury						
Yes	1.293	0.213	0.645	1.816	0.144	22.896
No				1		
Gender						
Male				1		
Female	1.104	1.252	0.263	0.291	0.033	2.530

received, or the medical staff, or the hospital environment. This finding is contrary to those of other reports which found a proportion of their patients leaving the hospital against medical advice because of dissatisfaction with the medical staff or the hospital environment.^[8,15,16,18,19,32,47] This

may be due to the small sample size of this study subjects or the fact that the prevailing poor economic status and poor level of education of the patients left them with little power of a choice and rather made them accept whatever was offered to them. Another probable reason is the paucity

of neurosurgeons and hence neurosurgical services in our country and the concentration of the available ones in the urban areas, thereby limiting the options available to the poor rural dwellers.^[41]

DAMA because of religious and traditional beliefs was a rather interesting finding in this study. Although the percentage was low in this study (6.8%) despite the prevalence of these two factors in our environment, this finding highlights the challenge these beliefs pose to health care in poor societies with high level of poor health literacy, particularly in the developing world.

More than four-fifth of our patients (87.5%) in this study were of the early DAMA status, leaving the hospital within 8 h of presentation. This figure is significantly higher than the 25.7% reported by Lakhotia *et al.*^[31] Similar to their study, however, we found no significant association between the age of the patients and early DAMA. However, contrary to their report, the gender of the patient was not predictive of early DAMA in our own study, whereas a diagnosis of neurotrauma was significantly associated with early DAMA in this study. This may be due to the predominance of these cases in neurosurgical services in our country.^[21,41] Other reasons may include the aforementioned prevailing poor socioeconomic status and/or poor medical insights among these rural dwellers. This may be particularly so in the mild head injured patients and patients with Frankel E spinal cord injury who felt well and saw no need for the requested investigations and outlined management plan and therefore discharged against advice.

DAMA is one of the leading causes of hospital readmission.^[12,28,49] This may result from deterioration in the clinical condition of the patients while away from the hospital.^[46] Only 4 (4.5%) of our DAMA patients represented to our hospital. In half of these cases, the patients were compelled to do so by family members while the other patients returned to us because of neurological deterioration. One of the patients was a 21-year-old man with Frankel E cervical spine injury who left the hospital without submitting to the requested radiographs. He only represented 18 days after DAMA because of episodes of dizziness and neck stiffness. Cervical spine X-ray showed Type 2 odontoid peg fracture with anterior subluxation of atlas on the axis [Figure 3]. The second was an 18-year-old boy with posterior fossa abscess whose parents DAMA because “the cost of surgery was too much” [Figure 4]. He was brought in dead 4 days after DAMA. One of the patients that were compelled by the relatives to represent had initially been seen at another neurosurgical service before she came to our hospital. She left the first hospital because the relatives felt that the particular hospital was too expensive and came to shop in our hospital for cheaper fees. She represented to our hospital about 2 h after initially signing the DAMA form. Sadly, she



Figure 3: Pre (a) and post (b) reduction cervical spine X-rays of the patient with odontoid peg fracture.

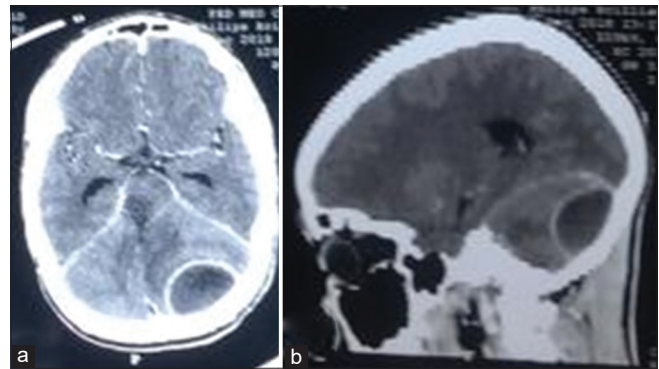


Figure 4: Axial (a) and sagittal (b) postcontrast cranial computed tomography scan images of the patient with cerebellar abscess.

discharged against medical advice yet again within 12 h of representation.

The negative impact of the privately funded model of payment for health care on the outcome of that care, especially as obtains in the low resource settings of many sub-Saharan Africa has been documented. The absence of health insurance covers in all our patients, and the finding of financial constraints as the most common reason for DAMA lends credence to the need to do away with this model of health-care financing. We advocate alternative health-care financing models particularly a functional and sustainable health insurance scheme in other to maximize the health resources available in these settings.^[4]

CONCLUSION

The rate of DAMA was high in our study possibly due to the expensive nature of neurosurgical in-hospital evaluation and treatment in a resource-constrained developing country milieu of privately funded health-care financing. Low

income and level of health literacy were the most common causes of DAMA in this neurosurgical patient population. A diagnosis of neurotrauma significantly predicts early DAMA in this study. Functional health insurance scheme with a wide coverage will go a long way in reducing the incidence of DAMA and improving overall health indices in developing countries like ours.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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Commentary

This is a simple but elegant study. The authors show convincing evidence that financial constraints is the most important factor in refusal of continuation of treatment for DAMA in the developing nation under study, and that this can result in increased morbidity and mortality. But if one were to consider that ability to pay (financial constraints) was the most important factor, as indeed this paper attempts to prove and argue, then one would expect a more equal proportion of males and females, even taking into account that head injuries occur more frequently in men than in women. In fact, head injuries are more common in men than women because of men's aggressiveness and more frequent belligerence. So I tend to believe that aggressiveness of males, especially in head injured patients, could still be an important fact to rival, or even surpass, financial reasons in these cases of DAMA. The author(s) did not find this to be the case.

Another interesting fact is that most of us in the US tend to believe that financial constraint is a problem that one only finds in America — and not the rest of the world — because most of the world, we are told, already has socialized medicine and wonderful “free” health care. In fact, in the US everyone that goes to an emergency facility (virtually every hospital) must be treated, regardless of ability to pay. Moreover, the poor have Medicaid; and those 65 or older (the elderly) have Medicare. No one goes without treatment. Hardest hit with catastrophic hospital bills are those of the middle class who have to buy their own medical insurance or chose not to have it because health insurance admittedly is expensive. But virtually no one, despite what one has been led to believe by the American mainstream or globalist media, goes without medical care.

So, I was particularly shocked a couple of years back when a group of our colleagues from China presented a study of patients who were treated with functional neurosurgery for seizure disorders and other maladies. They have had excellent results. Then it was mentioned in passing that it was a shame that the operations could not be performed more widespread because of inability to pay. “How can this be?” I wrote in a comment published in SNI. The authors wrote back in reply that free health care in China today is only for the cadre. Who is this cadre? The communist party intelligentsia, we

must presume. The authors would not explain any further and the dialogue abruptly ended.

So, once again I am a bit perplexed that this is happening elsewhere in a developing country, presumably in sub-Saharan Africa because “a global lack of health insurance necessitating out-of-pocket payment for health-care expenses.” The authors do not explain why the DAMA rate in their patients was 17.4% but “previous reports from our country was .0002–5.7%.” Why this discrepancy? What national or regional policy can account for this significant difference? Let me play devil's advocate for a moment to ask another question worth raising:

Was there any difference in outcome between similar patients who remained in the hospital and continued medical treatment in the hospital versus the DAMA patients in this study? This is a very important question because if there is no significant difference in outcome, informed DAMA patients were correct to exercise their personal autonomy, regardless of reason for leaving, and may have saved themselves and their families considerable out-of-pocket expenses as well as freed themselves from a heavy financial burden. In fact, “Thirty-three percent of the patients discharged against medical advice felt they were well.” It would have been interesting how many of these patients were found among those who later deteriorated because of DAMA.

Indeed, the authors did find several patients who did not do well and had catastrophic results presumably because of their refusing proper care because of DAMA. Nevertheless, a set of patient controls that could have been compared to the DAMA patients would have resulted in a better study, even without randomization, which of course would have been impossible in this study.

Personal autonomy, we as physicians must recognize, is an important aspect of medical care regardless of cause, as important as informed consent. Presumably, availability of social and economic assistance, as can be provided by the community, could help persuade some of these DAMA patients to accept medical in this study, but it would have been interesting if there had been a control group of patients for comparison of outcome among DAMA and non-DAMA patients.

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