Transferred and Delayed Care of Patients with Colorectal Cancer in a Safety-Net Hospital System—Manifestations of a Distressed Healthcare System

Jessica P. Shah, MD¹, Marisa Valdes, BSN², and Don C. Rockey, MD¹

¹Division of Digestive and Liver Diseases, University of Texas Southwestern Medical Center, Dallas, TX, USA; ²Performance Improvement and Patient Safety, Parkland Health and Hospital System, Dallas, TX, USA.

BACKGROUND: Safety-net hospital systems provide care to a large proportion of United States' under- and uninsured population. We have witnessed delayed colorectal cancer (CRC) care in this population and sought to identify demographic and systemic differences in these patients compared to those in an insured health-care system.

DESIGN, PATIENTS, AND APPROACH/MEASUREMENTS: We collected demographic, socioeconomic, and clinical data from 2005–2007 on all patients with CRC seen at Parkland Health and Hospital System (PHHS), a safety-net health system and at Presbyterian Hospital Dallas System (Presbyterian), a community health system, and compared characteristics among the two health-care systems. Variables associated with advanced stage were identified with multivariate logistic regression analysis and odds ratios were calculated.

RESULTS: Three hundred and eighteen patients at PHHS and 397 patients at Presbyterian with CRC were identified. An overwhelming majority (75 %) of patients seen at the safety-net were diagnosed after being seen in the emergency department or at an outside facility. These patients had a higher percentage of stage 4 disease compared to the community. Patients within the safety-net with Medicare/private insurance had lower rates of advanced disease than uninsured patients (25 % vs. 68 %, $p < 0.001$). Insurance status and physician encounter resulting in diagnosis were independent predictors of disease stage at diagnosis.

CONCLUSIONS: A large proportion of patients seen in the safety-net health system were transferred from outside systems after diagnosis, thus leading to delayed care. This delay in care drove advanced stage at diagnosis. The data point to a pervasive and systematic issue in patients with CRC and have fundamental health policy implications for population-based CRC screening.

KEY WORDS: health disparity; health policy; populations at risk; race; ethnic.

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INTRODUCTION

Colorectal cancer (CRC) is the most common preventable cancer in the United States, posing a major public health challenge. Although evidence supports the concept that screening reduces the incidence of and mortality from colorectal cancer,^{1–3} screening rates for CRC are lower (estimated to be about 60 %) than that for other preventable cancers.^{4–6} Factors that affect CRC screening and cancer prevention include insurance coverage, source of care, income, age, sex, ethnicity, and education.^{5–13}

Safety-net hospitals care for poor and under-served patients, and, thus, manage patients with a greater burden of illness than higher income populations.^{14, 15} Safety-nets are in a unique position to prevent death from CRC because of their service to these underserved patient groups.¹⁴ Although research has demonstrated disparities in quality and access to care for the poor and uninsured,^{16–20} the epidemiology of colorectal cancer incidence *specifically* in a safety-net system has not been described.

We have noticed that many CRC patients seen at our safety-net system were not established within the system, and in addition that many have had advanced CRC (despite the availability of a dedicated primary care network), raising the possibility that the diagnosis of CRC may have been delayed. We hypothesized (1) that patients in the safety-net system had care transferred from other systems, (2) that socio-epidemiological factors were likely to play a role in how patients with CRC presented to the safety-net, and (3) that these factors *may* contribute to an advanced stage at diagnosis (i.e., delayed care). We sought to focus specifically on socio-epidemiological features such as race, insurance status, and process of referral into the healthcare system, comparing these characteristics with those of a community health system and to determine their relationship with stage at diagnosis.

METHODS

This study was conducted with the approval of the University of Texas-Southwestern Medical Center and

Presbyterian Hospital of Dallas Institutional Review Boards.

Study Setting

Parkland Health and Hospital System (PHHS) is the safety-net health system for Dallas County (population: 2.4 million, 30 % of adults uninsured²¹); it offers a tax-subsidized healthcare assistance program for uninsured Dallas County residents known as Parkland Health Plus (PHP). The PHHS includes a primary care network of nine community clinics in addition to outpatient clinics at Parkland Hospital and a state-of-the-art 750-bed hospital. The system supports approximately 750,000 annual adult outpatient visits, 40,000 hospital discharges, and includes approximately 1,500 physicians on its staff (Fig. 1). PHP-eligible patients have access to preventative care, and standard inpatient and specialty care. The overall payor mix at Parkland (FY 2007) follows: Uninsured 45 %, Medicaid 32 %, Medicare 15 %, Private/managed care 8 %.

Presbyterian Hospital of Dallas is a non-profit community health system. The hospital is a member of a larger healthcare network, Texas Health Resources. We chose to study this health system and to compare it to the PHHS system for the following reasons: (1) it serves the local Dallas community in a geographic area similar to the PHHS, (2) it serves as a regional referral medical center, similar to PHHS, (3) it includes a large (866-bed central hospital), similar in size to the PHHS main hospital, and (4) it has a robust network of outpatient services, similar to PHHS. The overall payor mix at the Presbyterian system (FY 2007) follows: uninsured 5 %, Medicaid 5 %, Medicare 45 %, private/managed care 45 %.

Data Collection

We identified all patients with CRC seen at PHHS and Presbyterian Hospital between January 1, 2005 and December 31, 2007 through respective cancer registries. The registries are approved by the American College of Surgeons (ACS) Commission on Cancer. All cancer case abstracting was performed by certified tumor registrars according to standards set by the ACS. Data were cross-referenced with financial databases by identifying all patients with billing codes for CRC to ensure all cases were captured. Per these records, no additional cases were found.

Demographic characteristics, including age, gender, race and insurance type, as well as colon cancer stage (Duke’s stage) and location were abstracted. Race was classified as white, black, Hispanic, or other. CRC stages were categorized into early (1&2) or late stage (3&4) a priori, grouped as early and late based on similarities in 5-year survival between stage 1&2 compared to patients with stage 3&4 CRC; patients with high grade dysplasia or carcinoma in situ (stage 0) were excluded.

Additionally, we collected information about the physician encounter that initiated work-up leading to CRC diagnosis (emergency room, primary care clinic, or outside facility) and the number of physician encounters within the hospital system prior to diagnosis. When abstracting this data, we determined whether patients were established within the health system (we considered patients with >3 visits in the 3 years prior to diagnosis to be established) or presenting de novo. History and type of prior CRC screening, presence of symptoms prior to diagnosis, duration of symptoms and presence of iron deficiency anemia were also abstracted.

Statistical Analysis

Data analysis was performed using SPSS®, version 16.0 (SPSS, Inc., Chicago). A power calculation was not performed a priori since the study was developed primarily as an observational study and the intent was to include all possible CRC patients during the specific duration of study. Comparisons among patient characteristics at the two hospital systems were made using chi-square analysis or Fisher’s exact test (when expected values were <5) for the following variables: gender, race, insurance and stage. Chi-square analysis or Fisher’s exact test (two-tailed) was used for comparisons among patient characteristics and stage of disease at the time of diagnosis. Multivariate forward stepwise logistic regression was performed to identify patient characteristics associated with late stage disease (the following variables were included in the model: age, gender, race, insurance status, initial physician encounter type, iron deficiency anemia). Variables were added stepwise and only statistically significantly different variables are shown. Odds ratios with 95 % confidence intervals were

Figure 1. Overview of the Parkland and Presbyterian health systems. The numbers provided are estimates based on 2007 information. Numbers provided have been rounded for ease of reporting.

determined for patient characteristics found to be statistically significant. A p-value of <0.05 was considered to be statistically significant.

RESULTS

Demographics

We identified 318 and 397 patients at PHHS and Presbyterian, respectively, with CRC. The gender distribution was similar overall (Table 1); however, the mean age of CRC diagnosis was significantly lower for patients at PHHS compared to Presbyterian (56.5±11.4 (SD)) versus 65.9 (SD±14.5 (SD)), respectively, $P<0.0001$). The mean age difference was more pronounced for women (11.5 years; 95 % CI: 8.8-14.3 years) than for men (7.1 years; 95 % CI: 4.5-9.7 years).

The race distribution was significantly different among the two systems (Table 1). There were also significant differences in the type of insurance held by patients in each

hospital at the time of CRC diagnosis. At PHHS, 60 % of patients were uninsured; an additional 15 % had Medicaid; however, only 5 % of patients at Presbyterian were uninsured or had Medicaid and 93 % of patients had either Medicare or private insurance. Of the patients seeking treatment at PHHS, 34 % had stage 4 disease versus 16 % of patients at Presbyterian ($p<0.0001$, Table 1).

Interestingly, 49 % (157/319) of PHHS patients were not established within the system (<3 encounters in the preceding 3 years). For the 258 patients with symptoms (rectal bleeding, change in stool caliber, weight loss, or abdominal pain) at PHHS, they experienced an average of 121 days between the onset of symptoms and diagnosis. For those patients diagnosed as a result of an encounter with an outside hospital, the delay was an average of 147 days and 140 days after an ER encounter.

The Initial Physician Encounter Leading to Diagnosis

Only 25 % of patients in whom the diagnosis of CRC was made within PHHS were diagnosed *as a result* of an encounter with their primary care physician, either via routine screening (i.e., primary endoscopy, or after a positive fecal occult blood test), evaluation of symptoms (i.e., abdominal pain, weight loss, change in stool habit, or hematochezia) or investigation of abnormal laboratory tests (i.e., iron deficiency anemia). The remaining 75 % were diagnosed and/or established care for CRC treatment as sequelae of an emergency room visit at PHHS (45 %) or after a referral from an outside facility to PHHS (30 %). We verified that patients seeking care at PHHS after being seen at outside facilities were not established within PHHS by documenting that they were seen at Parkland <3 times in the 3 years prior to diagnosis. In contrast, 68 % of patients diagnosed at Presbyterian were established patients of the health system. Only 32 % were seen after referral from an outside facility or an acute care visit (Table 2).

We found an association of the stage of CRC at presentation as a function of entry into the PHHS. In this analysis, 25/78 (32 %) of patients diagnosed after an encounter with their primary care physician had late stage disease at the time of diagnosis, compared to 157/240 (65 %) of patients diagnosed after an emergency room or after referral from an outside site (Table 2, $p<0.001$). Patients presenting to the emergency room or from an outside hospital were more likely to be uninsured compared to patients who were diagnosed by a primary care physician within PHHS (Table 2).

For Presbyterian patients, there was no significant difference in the stage of presentation as a function of the portal of entry (i.e. established in the Presbyterian Health System versus referral from an outside facility). Further, the stage of disease and insurance type did not vary as a

Table 1. Patient Characteristics at Parkland Health & Hospital System and Presbyterian Hospital Dallas System

	Parkland	Presbyterian	
Gender			
Male	173 (54)	204 (51)	$P=0.42^*$
Female	145 (46)	193 (49)	
Race			
White	89 (28)	344 (86)	$P<0.0001^*$
Black	146 (46)	30 (8)	
Hispanic	66 (21)	8 (2)	
Other	17 (5)	15 (4)	
Age at Diagnosis			
Overall	56.5 (11.4)	65.9 (14.5)	$P<0.0001^\dagger$
Male	55.9 (11)	63.1 (14.3)	$P<0.0001^\dagger$
Female	57.2 (12)	68.8 (14.1)	$P<0.0001^\dagger$
Insurance**			
Uninsured	192 (60)	19 (5)	$P<0.0001^\ddagger$
Medicaid	49 (15)	2 (0)	
Medicare	66 (21)	187 (47)	
Private	11 (4)	182 (46)	
Unknown	0 (0)	7 (2)	
Stage			
Stage 1	40 (13)	88 (22)	$P<0.0001^*$
Stage 2	79 (25)	90 (23)	
Stage 3	72 (23)	94 (24)	
Stage 4	110 (34)	66 (16)	
Unknown	17 (5)	59 (15)	
Total	318 (100)	397 (100)	

Note: Please see the text and Figure 1 for descriptions and an overview of the Parkland Health & Hospital and the Presbyterian Hospital Dallas systems, respectively. All values expressed as n (%). Age at Diagnosis is expressed as mean (SD)

*Chi-Square Test

†Students t-test, unequal variance

‡Fisher's Exact test

**Insurance was classified as Medicaid, Medicare (Medicare alone or Medicare+ supplement), uninsured (self-pay, charity, and PHP), and private (health maintenance organizations, preferred provider organizations, and private or military insurance)

Table 2. Initial Physician Encounter Leading to Colorectal Cancer Diagnosis

	Primary Care Clinic	Outside Facility [#]	
A. Parkland Health System			
Race			
White	19 (21)	70 (79)	P=0.113*
Black	45 (31)	102 (69)	
Hispanic	11 (17)	55 (83)	
Other	3 (18)	14 (82)	
Stage			
Early	46 (39)	73 (61)	P<0.0001 [†]
Late	25 (14)	157 (86)	
Insurance			
Uninsured	35 (18)	157 (82)	P<0.0001*
Medicaid	8 (16)	41 (84)	
Medicare	30 (46)	36 (54)	
Private	5 (45)	6 (55)	
Total	78 (25)	240 (75)	
B. Presbyterian Health System			
Race			
White	239 (69)	105 (31)	P<0.001*
Black	18 (60)	12 (40)	
Hispanic	4 (50)	4 (50)	
Other	10 (53)	7 (40)	
Stage[‡]			
Early	122 (69)	56 (32)	P=0.38 [†]
Late	112 (70)	48 (30)	
Insurance			
Uninsured	20 (77)	6 (23)	P=0.102*
Medicaid	1 (50)	1 (50)	
Medicare	124 (66)	63 (34)	
Private	124 (68)	58 (32)	
Total	269 (68)	128 (32)	

Note: Values expressed as n (% of row). [#]Outside facility includes emergency room and other medical facilities not associated with PHHS

*Fisher's exact test

[†]Chi Square test

[‡]CRC stages were categorized into early (1&2) or late stage (3&4), and were defined as follows: stage 1—The cancer has grown through the muscularis mucosa or into the muscularis propria, but has not spread to nearby lymph nodes or distant sites. Stage 2—The cancer has grown through the wall but not into nearby tissues/organs and not to lymph nodes or distant sites. Stage 3—The cancer has grown through the wall and may or may not have attached to or grown into other nearby tissues or organs. It has spread to nearby lymph nodes or into areas of fat near the lymph nodes, but not to distant sites. Stage 4—The cancer has spread to one distant organ (such as the liver or lung) or set of lymph nodes

function of the portal of entry. Finally, a larger percentage of patients from all races at PHHS presented from outside facilities than at Presbyterian facilities (Table 2).

Differences in CRC Stage and Patient Demographics

We noted differences in CRC stage between the safety-net and community health systems as a function of demographic characteristics, in particular, age (Fig. 2). While the age distribution of both populations was bell shaped, PHHS patients were substantially younger. For patients <60 years

old, 59/191(31 %) of PHHS patients versus 56/133(43 %) of Presbyterian patients had their colorectal cancer diagnosed at an early stage. In contrast, of patients >60 years old, 60/127 (47 %) of PHHS patients and 121/264(46 %) of Presbyterian patients had early stage disease. Additionally, nearly one-half of patients with stage 4 disease were black. Thus, the notable proportion of younger and black patients at PHHS and their presentation with later stage disease raises the possibility of inherent differences in these populations.

Patients with early stage CRC at Presbyterian were more likely to have private insurance or Medicare (93 %) compared to the Parkland system (35 %) (Table 3). Patients with late stage CRC were also more likely to have private insurance or Medicare than at the Parkland system. We did not find differences in stage among patients in the Parkland system with Medicaid or no insurance. However, within the Parkland system, patients with Medicaid or without insurance had a significantly increased rate of late stage disease versus those with Medicare or private insurance ($p<0.0001$). In contrast, there was no significant difference in the presence of early or late stage disease within the Presbyterian system based upon insurance type (Table 3).

Predictors of Disease Stage

Regression analyses to identify demographic characteristics associated with CRC stage at diagnosis (combined, PHHS alone, and Presbyterian alone, Table 4) revealed that for the combined analysis, being black slightly increased the odds of presenting with late stage disease compared to being white (but the numbers were too small in the Presbyterian system alone to demonstrate a difference). Having private insurance (but not Medicare) decreased the odds of having late stage disease compared to lack of insurance, regardless of race. At Presbyterian, neither the effect of race, insurance status, or portal of entry significantly changed the odds of presenting with late stage CRC. At PHHS, having Medicare or private insurance significantly reduced the odds of presenting with late stage disease (OR 0.66, 0.35-1.23 95 % CI and OR 0.18, 0.04-0.89 95 % CI, respectively). Importantly, compared to being diagnosed by an encounter with a primary care physician, having a diagnosis made via the emergency room or at an outside hospital significantly increased the odds of presenting with late stage disease (Table 4, OR 3.31, $p<0.001$ and 3.67, $p<0.001$, respectively).

DISCUSSION

Here, we have identified a distressing issue in U.S. healthcare—that of delayed and transferred care for an important medical condition, namely CRC. In patients with CRC in a safety-net health system, we found that there was

Figure 2. Distribution of patients with CRC at PHHS (a) and Presbyterian (b) by age group. Bars represent the total number of patients in each age group. Lines represent the number of patients within each age group with early and late stage CRC. The total number of patients with early and late stage CRC within each age group are provided in the tables below each graph. The sum of early and late stage CRCs does not equal the total because some patients had unknown staged CRC.

a striking delay in presentation (i.e., with advanced stage disease in a presumably preventable cancer) and a pervasive transfer of care to the safety-net facility; 75 % of patients with CRC at the PHHS were either transferred to this facility or presented through the ED, typically after being seen at an outside facility and being instructed to present to the PHHS for further care.

The cause of the shift of care to the PHHS is likely to be highly complicated, and could be due to a number of factors. For example, one possibility was that advanced

CRC patients were referred to the Parkland Health System because it was in fact serving as a safety net system for uninsured individuals (Table 3), and was thus functioning as intended. Whether appropriate or not, patients were transferred to Parkland. This process has some analogies to “dumping” of patients from one system to another for financial reasons. However, it is important to emphasize that it is virtually impossible to prove that “dumping” due to financial motives occurred. Secondly, what is considered dumping by one person, may be considered appropriate

Table 3. Colorectal Cancer Stage Distribution and Health Insurance Type

	Parkland	Presbyterian
Early Stage		
Uninsured	69 (58)	10 (6)
Medicaid	9 (8)	2 (1)
Medicare	33 (28)	88 (49)
Private	8 (7)	78 (44)
Total	119 (100)	178 (100)
Late Stage		
Uninsured	116 (64)	12 (8)
Medicaid	37 (20)	0 (0)
Medicare	27 (15)	74 (46)
Private	2 (1)	74 (46)
Total	182 (100)	160 (100)

Note: Fisher's exact test differences for different types of insurance within the health systems, in both early and late stage CRC were highly statistically significantly different ($P < 0.0001$)

transfer of care by another. In its classic sense, dumping or unprincipled transfer of a patient from one hospital to another for financial reasons²² most often refers to transfer of an unstable patient from one emergency room to another. Its practice led to enactment of the Emergency Medical Treatment and Active Labor Act (EMTALA).^{23–25} Regardless of the motivation for the pervasive transfer of care depicted here, this practice appears to have many downstream effects, including confusion and disorganization on the part of the patient and family, likely resulting in fracture and splintering of care, and ultimately delay in care.

Our finding that 34 % of patients in PHHS had stage 4 CRC, compared to only 16 % of patients in the Presbyterian

system ($p < 0.001$) is consistent with previous literature indicating a differential burden of cancer in certain populations, including racial and ethnic minorities and the medically underserved.^{26–31} As might be predicted, PHHS patients were more likely to belong to an ethnic minority group and were more likely to be uninsured or have Medicaid when compared to patients at a community health system. The finding of far greater late stage disease in the Parkland cohort raises many issues about the cause for this disparity. On one hand, there may be socioeconomic factors at play (i.e., differences in education leading to differences in environmental risk). On the other hand, there may be inherent differences in the biology of CRC in different races. Indeed, since approximately one-half of those with late stage disease were black, we cannot exclude the possibility that blacks may possibly have biologically more aggressive CRC.

When examining transferred care, we found that 75 % of patients were diagnosed with CRC and/or established care for CRC treatment after referral from an outside facility to PHHS or a PHHS emergency room visit. In most instances, these patients were not established PHHS patients. In many safety net systems, including the local PHHS, there is no direct method for physicians in the community to directly set-up follow-up. This leaves patients without a reasonable approach to access the safety-net system. While some may argue that care for un- and under-insured individuals is the responsibility of the safety-net system, it is also likely that asking patients to transfer care (typically without good communication), poses a burden on the patient to independently navigate multiple health systems.

Table 4. Effect of Demographic Characteristics on CRC Stage at Presentation

	Combined		Parkland		Presbyterian	
	OR (95 %CI)	P-value	OR (95 %CI)	P-value	OR (95 %CI)	P-value
Age	0.98 (0.96-0.99)	0.012	0.97 (0.95-0.99)	0.014	0.98 (0.97-1.0)	0.02
Gender						
Male	1.00		1.00		1.00	
Female	1.08 (0.79-1.47)	0.65	1.13 (0.71-1.8)	0.60	1.11 (0.72-1.71)	0.65
Race						
White	1.00		1.00		1.00	
Black	1.56 (1.07-2.27)	0.02	1.19 (0.68-2.07)	0.54	1.12 (0.49-2.57)	0.79
Hispanic	1.38 (0.83-2.31)	0.22	1.04 (0.54-2.02)	0.9	0.84 (0.18-3.81)	0.82
Other	1.62 (0.72-3.67)	0.25	1.02 (0.35-2.94)	0.97	2.23 (0.55-9.11)	0.26
Insurance						
Uninsured	1.00		1.00		1.00	
Medicaid	1.94 (0.92-4.3)	0.08	2.46 (1.1-5.51)	0.03	n/a	n/a
Medicare	0.73 (0.44-1.2)	0.21	0.66 (0.35-1.23)	0.02	0.38 (0.13-1.15)	0.09
Private	0.53 (0.34-0.81)	0.003	0.18 (0.04-0.89)	0.04	0.43 (0.14-1.3)	0.14
Initial Physician Contact						
Primary Care Physician	n/a		1.00		n/a	
Emergency Room	n/a		3.31 (1.76-6.2)	<0.001	n/a	
Outside Facility	n/a		3.67 (1.84-7.33)	<0.001	n/a	

Note. Odds ratios are presented according to likelihood of late stage disease. Reference values for each category have OR of 1.00

There are several opportunities to enhance transfer of care between patients seen in different health systems, some of which might have helped improve the care of patients in this study. For example, the PHHS could provide urgent clinic appointment slots for certain types of disorders (i.e. such as cancer), and publicize these within the region. Further, previous studies have demonstrated that awareness of a safety-net healthcare system improves care among minorities.³² Additionally, a nationalized healthcare system could improve care; other such systems have resulted in decreased mortality of socioeconomically disadvantaged persons.³³ Finally, integrated health systems such as the Veteran's Administration system may lead to higher quality of care compared to community health systems.³⁴

We recognize limitations of our study. First, we examined only one safety net system, and one comparison system. It is possible that these are not representative of other national entities. However, both are both large and situated in a major urban area, so we speculate that they are representative. Additionally, we lacked individual-level data on measures of socioeconomic status, specifically education and income. However, our cohort matches closely previously published studies examining Parkland in terms of demographics (i.e., age, gender, education level, etc...)^{35,36} and thus is likely reflective of the safety net. Additionally, education and income often correlate with lack of insurance.³⁷⁻³⁹ Since we collected race data based on self-report, we may have underestimated the number of Hispanic patients in both populations. As race did not appear to be a significant factor in outcomes at either hospital, it appears unlikely that the results were systematically biased by the self-reporting of race. Finally, there is potential for unmeasured confounding variables, perhaps related to local physician practices or patient behaviors.

In summary, we have identified several novel issues related to transfer of care and underutilization of primary care services in patients with CRC. Importantly, patients from outside of a safety-net hospital had care transferred when it became evident that they had cancer, possibly because they did not have funding with which to pay private physicians and hospitals, emphasizing a syndrome of "delayed care". While not surprising, this phenomenon has been poorly documented previously. Thus, investments in access to care for at-risk populations, particularly Medicaid and uninsured patients may have substantial benefits in terms of morbidity, mortality, quality of life, and even healthcare costs.

Conflict of Interest: Disclosure information: The authors certify that we have no financial arrangements (e.g., consultancies, stock ownership, equity interests, patent-licensing arrangements, research support, major honoraria, etc.) with a company whose product figures prominently in this manuscript or with a company making a competing product. To the best of our knowledge, no conflict of interest, financial or other, exists.

Corresponding Author: Don C. Rockey, MD; Division of Digestive and Liver Diseases, University of Texas Southwestern Medical Center, 5323 Harry Hines Blvd., Dallas, TX 75390-8887, USA (e-mail: don.rockey@utsouthwestern.edu).

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