

MEDICAL COMMAND CODER STUDY

Lee B Smith, MD, JD, Theodore Avtgis, PhD, David Kappel, MD, Alison Wilson, MD,

Jennifer Knight, MD, E Phillips Polack, MD

OBJECTIVE: This study sought to assess the communication exchange between field personnel and medical command personnel, assess the effectiveness of the MISER acronym, as the ability to determine Priority I or Priority II status of the patient based on the information given, and whether redundancy in the communication system would result in improved information exchange/coding.

This study was an experimental design where coder and condition were randomized to control for any systematic error that could be present based on coder ability or interest.

- Coders underwent two iterations of training in the MISER acronym and Priority classification of trauma patients.
- Coders were then randomly assigned into one of three conditions; C1 = transcripts of the communication, C2 = audio of the communication, and C3 = both transcript and audio versions of the communication. Each coder was provided the white-washed cases in four different batches at four different times throughout a two month period. The coders used the coding sheet (see attached) designed to assess the degree to which the field personnel and medical command; a) addressed each of the MISER categories, b) were effective in the communication exchange, c) were appropriate in their communication exchange, and d) the overall quality or synchrony of the communication exchange.

GENERAL FINDINGS

The general findings indicate that overall, particular aspects of the MISER acronym are not being effectively relayed. In fact, this lack of information exchange was present throughout all

three experimental conditions. The tables that follow illustrate the data indicating such deficiencies.

The Medical Command Coder study was a quasi-experimental design where coder and condition were

- The Audio condition was by far the most effective format in terms of priority designation and overall information for each of the MISER categories. However, all conditions were relatively low in addressing all of the MISER categories.
- Dividing of the data by correct priority designation appears to be most fruitful in determining effective from ineffective information exchange. As indicated by the data, when controlling for incorrect responses, all three conditions improved on their ability to identify MISER and rated the overall effectiveness, appropriateness and quality as significantly better than those who incorrectly identified the priority status of the patient.

Recommendations based on this data set:

1. The audio only transmission of information between the field and medical command personnel is the most effective medium of those tested and technological improvement should be based on enhancing the existing audio technology as opposed to pursuing entirely new technology. As can be seen in the analyses, the lowest performing group was those in the transcript and audio (i.e., both) condition. One can speculate that too much information may confound the effective identification of MISER criteria and further, given that the audio group far out performed the transcript group, there are paralinguistic indicators that are vital in the information exchange process and need to be included in the information exchange process. For

example, tentative inflection may trigger a follow-up question from the medical command operator.

2. There needs to be training in priority designation. As indicated by the data, there needs to be more/relevant information exchanged in order for proper designation of priority status. The lack of information, according to the protocol for determining priority status, adversely affects the accuracy of the priority determination. This is evidenced in the 71% correct designation rate for the audio only condition as opposed to the 69% and 48% for the transcript only and audio and transcript (i.e., both) conditions respectively. The over all MISER total (based on a total possible score of 150) indicated means of 102.22 (68% out of 100%) for audio, 94.00 (63% out of 100%) for transcript, and 68.06 (45% out of 100%) for both audio and transcript. Table 1.1 reports these results.
3. In breaking down the sample distinguishing between correct priority designation and incorrect priority designation, the following findings were observed.
 - a. For correct priority designation the following were observed:

The audio condition was significantly higher in the overall MISER (96.24), injury (23.94), signs (23.62), and response (15.35) than transcript and/both. Table 1.14 reports the results. Across MISER categories the audio condition yielded significantly higher levels of overall quality (31.59), effectiveness (32.20), and appropriateness (32.45) than both and/or transcript. Table 1.15 reports the results.
 - b. For incorrect priority designation the following were observed:

The only significant difference was that of environment (transcript higher than audio and both, this finding was not particularly strong). All of the findings were not statistically significant. There were also no significant differences observed across all MISER categories.

COMPARISON OF CORRECT PRIORITY VERSUS INCORRECT PRIORITY DESIGNATION

Priority designation indicated significant differences in MISER total ($F[1, 1256] = 5.39, p < .05$), environment ($F[1, 1257] = 9.43, p < .01$), overall quality ($F[1, 1257] = 4.77, p < .05$), effectiveness ($f[1, 1257] = 5.07, p < .05$), and appropriateness ($F[1, 1257] = 5.76, p < .05$) with correct priority scores being significantly higher means on each of these criteria.

SPECIFIC DIFFERENCES REGARDING MISER COMPONENTS

Mechanism: The transcript condition yielded significantly lower quality of information (6.70) and lower effectiveness than audio and/or both. Table 1.2 reports the results.

Injury: The audio condition yielded significantly higher quality of information (7.92), effectiveness (7.98), appropriateness (8.05), and overall performance (23.95) than transcript or both. Table 1.3 reports the results.

Vital Signs: The transcript condition yielded significantly lower quality of information (6.87), and overall performance (21.40) than both and/or audio. Table 1.4 reports the results.

Environment: The audio and transcript conditions yielded significantly higher quality of information (2.94, 2.86), effectiveness (3.15, 2.98), appropriateness (3.16, 3.17), and overall performance (9.25, 9.00) than both. Table 1.5 reports the results.

Table 1.1 PRIORITY DESIGNATION BY CONDITION

Audio Only

Correct priority designation = 71%

Miser Total	M = 102.22	SD = 32.36*
Mechanism	M = 21.55	SD = 9.19
Injury	M = 21.50	SD = 7.34
Signs	M = 21.43	SD = 8.46
Environment	M = 16.94	SD = 11.62*
Response	M = 20.79	SD = 8.13

Transcript Only

Correct priority designation = 69%

Miser Total	M = 94.00	SD = 33.55*
Mechanism	M = 19.44	SD = 8.55*
Injury	M = 21.69	SD = 6.96
Signs	M = 20.28	SD = 9.48
Environment	M = 12.14	SD = 11.86*
Response	M = 20.52	SD = 8.10

Both Audio and Transcript

Correct priority designation = 48% correct

Miser Total	M = 68.06	SD = 21.91*
Mechanism	M = 21.19	SD = 9.58
Injury	M = 22.60	SD = 7.11
Signs	M = 21.56	SD = 8.42
Environment	M = .19	SD = 1.83*
Response	M = 2.54	SD = 6.50

Table 1.2 ANOVA FULL SAMPLE MECHANISM

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of Information	1259	2, 1257	7.86	<.001	transcript (6.70) significantly less quality than audio (7.29) and both (7.48) p<.05
Information Effectiveness	1259	2, 1257	4.26	<.05	Transcript (6.94) significantly less effectiveness than audio (7.49) no differences with both (7.42) p<.05
Information Appropriateness	1259	2, 1257	.90	=.41	ND
Mechanism Total	1259	2, 1257	3.70	<.05	ND

Table 1.3 ANOVA FULL SAMPLE INJURY

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of Information	1258	2, 1256	11.62	<.001	Audio (7.92) significantly higher than transcript (7.08) and both (7.45) p<.05
Information Effectiveness	1258	2, 1256	11.34	<.001	Audio (7.98) is higher than both transcript (7.18) and both (7.40) p<.05
Information Appropriateness	1259	2, 1257	4.72	<.01	Audio (8.05) higher than both (7.49) no difference with transcript (7.80) p<.05
Injury Total	1258	2, 1256	7.83	<.001	Audio (23.95) is higher than both (22.35) and transcript (22.06) p<.05

Table 1.4 ANOVA FULL SAMPLE VITAL SIGNS

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of Information	1259	2, 1257	8.05	<.001	Transcripts (6.87) less than audio (7.51) and both (7.65)
Information Effectiveness	1259	2, 1257	4.13	<.05	ND
Information Appropriateness	1259	2, 1257	.46	=.63	ND
Vital Signs Total	1259	2, 1257	3.53	<.05	Transcript (21.40) less than both (22.92) no difference for audio (22.64)

Table 1.5 ANOVA FULL SAMPLE ENVIRONMENT

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of Information	1259	2, 1257	28.08	<.001	Transcript (2.86) and audio (2.94) were higher than both (1.28)
Information Effectiveness	1259	2, 1257	32.29	<.001	Transcript (2.98) and audio (3.15) higher than both (1.26)
Information Appropriateness	1258	2, 1256	32.81	<.001	Transcript (3.17) and audio (3.16) higher than both (1.29)
Environment Total	1258	2, 1258	31.23	<.001	Transcript (9.00 and audio (9.25) higher than both (3.84)

Table 1.6 ANOVA FULL SAMPLE RESPONSE

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of Information	1259	2, 1257	6.94	<.01	Audio (4.90) higher than transcript (4.00) and both (4.03)
Information Effectiveness	1259	2, 1257	6.50	<.01	Audio (4.97) higher than transcript (4.20) and both (4.01)
Information Appropriateness	1259	2, 1257	4.40	<.05	Audio (5.03) higher than transcript (4.60) and both (4.15)
Response Total	1259	2, 1257	5.63	<.01	Audio (14.90) higher than transcript (12.80) and both (12.19)

Table 1.7 ANOVA FULL SAMPLE MISER COMBINED TOTAL

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
MECHANISM	1259	2, 1255	9.10	<.001	Audio (93.04) higher than transcript (86.18) and both (83.62)
INJURY	1258	2, 1256	7.83	<.001	Audio (23.95) higher than transcript (22.06) and both (22.35)
VITAL SIGNS	1259	2, 1257	3.52	<.05	ND
ENVIRONMENT	1258	2, 1256	31.23	<.001	Audio (9.25) and transcript (9.00) higher than both (3.84)
RESPONSE	1259	2, 1257	5.63	<.01	Audio (14.90) higher than transcript (12.80) or both (12.19)

Table 1.8 ANOVA IF PRIORITY WAS INCORRECTLY DETERMINED

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
MISER	454	2, 452	1.19	= .31	ND
MECHANISM	455	2, 453	.88	= .42	ND
INJURY	455	2, 453	2.79	= .06	ND
SIGNS	455	2, 453	1.02	= .36	ND
ENVIRONMENT	454	2, 452	3.49	<.03	Transcript (7.27) higher than both (4.18) no audio (6.67)
RESPONSE	455	2, 453	2.52	= .08	

Table 1.9 ANOVA IF PRIORITY WAS INCORRECTLY DETERMINED ACROSS MISER CATEGORIES

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of MISER	455	2, 453	1.62	= .19	ND
Effectiveness of MISER	455	2, 453	1.62	= .20	ND
Appropriateness of MISER	454	2, 452	1.28	= .28	ND

Table 1.10 CONDITION BY PRIORITY MEANS AND STANDARD DEVIATIONS
 CONDITION AUDIO/INCORRECT PRIORITY
 Sample size = 150

MISER Total	M = 87.93	SD = 34.61
Mechanism	M = 22.02	SD = 9.60
Injury	M = 23.93	SD = 7.74
Signs	M = 21.08	SD = 10.62
Environment	M = 6.67	SD = 11.00
Response	M = 14.19	SD = 12.26
Quality Total	M = 28.91	SD = 11.62
Effectiveness Total	M = 29.41	SD = 11.68
Appropriateness Total	M = 29.61	SD = 11.47

Table 1.11 CONDITION BY PRIORITY MEANS AND STANDARD DEVIATIONS
 CONDITION TRANSCRIPT/INCORRECT PRIORITY
 Sample size = 178

MISER Total	M = 83.61	SD = 32.33
Mechanism	M = 20.61	SD = 9.64
Injury	M = 22.36	SD = 6.48
Signs	M = 22.14	SD = 8.29
Environment	M = 7.27	SD = 11.41
Response	M = 11.27	SD = 12.25
Quality Total	M = 26.80	SD = 10.64
Effectiveness Total	M = 27.66	SD = 10.77
Appropriateness Total	M = 29.21	SD = 11.28

Table 1.12 CONDITION BY PRIORITY MEANS AND STANDARD DEVIATIONS

CONDITION BOTH AUDIO AND TRANSCRIPT/INCORRECT PRIORITY

Sample size = 127

MISER Total	M = 82.49	SD = 26.96
Mechanism	M = 21.39	SD = 9.78
Injury	M = 22.09	SD = 8.08
Signs	M = 22.64	SD = 9.28
Environment	M = 4.18	SD = 7.85
Response	M = 12.18	SD = 10.75
Quality Total	M = 27.55	SD = 9.34
Effectiveness Total	M = 27.31	SD = 9.16
Appropriateness Total	M = 27.63	SD = 9.13

Table 1.13 ANOVA IF PRIORITY WAS CORRECTLY DETERMINED

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
MISER	802	2, 800	9.34	< .001	Audio (96.24) higher than transcripts (87.67) and both (84.18)
MECHANISM	803	2, 801	3.24	< .05	ND
INJURY	802	2, 800	5.33	< .01	Audio (23.94) higher than transcripts (21.88) no both (22.47)
SIGNS	803	2, 801	6.91	< .01	Audio (23.62) and both (23.06) higher than transcript (20.97)
ENVIRONMENT	803	2, 801	32.56	<.001	Both (3.67) lower than audio (10.87) or transcript (10.00)
RESPONSE	803	2, 801	4.37	< .05	Audio (15.35) higher than both (12.20) no both (13.69)

Table 1.14 ANOVA IF PRIORITY WAS CORRECTLY DETERMINED ACROSS MISER CATEGORIES

Variable	N	Degrees of Freedom	F-Ratio	P	Univariate means and p-values
Quality of MISER	802	2, 800	9.41	< .001	Audio (31.59) higher than transcript (27.97) or both (28.08)
Effectiveness of MISER	802	2, 800	10.89	< .001	Audio (32.20) higher than transcript (28.84) or both (27.97)
Appropriateness of MISER	803	2, 801	10.00	< .001	Transcript (30.83) and audio (32.45) lower than both (28.14)

Table 1.15 CONDITION BY PRIORITY MEANS AND STANDARD DEVIATIONS
 CONDITION AUDIO/CORRECT PRIORITY
 Sample size = 239

MISER Total	M = 96.24	SD = 31.76
Mechanism	M = 22.46	SD = 8.67
Injury	M = 23.94	SD = 6.80
Signs	M = 23.62	SD = 8.12
Environment	M = 10.87	SD = 12.38
Response	M = 15.35	SD = 11.92
Quality Total	M = 31.59	SD = 10.81
Effectiveness Total	M = 32.20	SD = 10.60
Appropriateness Total	M = 32.45	SD = 10.63

Table 1.16 CONDITION BY PRIORITY MEANS AND STANDARD DEVIATIONS
 CONDITION TRANSCRIPT/CORRECT PRIORITY
 Sample size = 305

MISER Total	M = 87.67	SD = 36.73
Mechanism	M = 21.05	SD = 8.83
Injury	M = 21.88	SD = 6.85
Signs	M = 20.97	SD = 8.89
Environment	M = 10.00	SD = 12.29
Response	M = 13.69	SD = 12.03
Quality Total	M = 27.97	SD = 12.18
Effectiveness Total	M = 28.84	SD = 12.24
Appropriateness Total	M = 30.83	SD = 12.64

Table 1.17 CONDITION BY PRIORITY MEANS AND STANDARD DEVIATIONS

CONDITION BOTH AUDIO AND TRANSCRIPT/CORRECT PRIORITY

Sample size = 259

MISER Total	M = 84.18	SD = 25.45
Mechanism	M = 22.78	SD = 8.37
Injury	M = 22.47	SD = 8.47
Signs	M = 23.06	SD = 9.56
Environment	M = 3.67	SD = 7.90
Response	M = 12.20	SD = 11.62
Quality Total	M = 28.08	SD = 8.46
Effectiveness Total	M = 27.97	SD = 8.51
Appropriateness Total	M = 28.14	SD = 8.77