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**TITLE: Teledermatology**

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**CONTRACTING ORGANIZATION: Walter Reed Army Medical Center  
Washington, DC 20307-5001**

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13. ABSTRACT (Maximum 200 words) The project consisted of four major requirements: Teledermatology Evaluation, Senior Support & Software Upgrades, Teledermatology Quality Assurance Plan (JACHO) and Clinical Practice Guidelines. The Teledermatology Evaluation consisted of 404 patients, each of whom was seen initially via the Teledermatology System and subsequently by a dermatologist in person. Evaluations from both methodologies were compared and results were presented at the American Telemedicine Association (ATA) Annual Conference in Phoenix, AZ. The evaluation will be submitted for publication. The Senior Support & Software Upgrades requirements incorporated 22 system modifications. The Teledermatology Quality Assurance Plan (JACHO) requirement identifies, implements and documents measures of the Teledermatology System. The final requirement, Clinical Practice Guidelines, resulted in the production of a Teledermatology Information Web Site outlining such major topics as deployment requirements, lessons learned and preliminary clinical business practices. The Web Site was presented at the ATA Annual Conference.				
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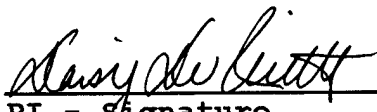
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N/A In the conduct of research involving hazardous organisms, the investigator(s) adhered to the CDC-NIH Guide for Biosafety in Microbiological and Biomedical Laboratories.

 28 July 2000  
PI - Signature Date

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## INTRODUCTION:

This project is part of the Telemedicine Directorate and Advanced Technology Research Center (TATRC) Teledermatology sustainment effort. Accomplishments provided by this award were identified and requested by TATRC and completed at the North Atlantic Regional Medical Command, Telemedicine Directorate and Walter Reed Army Medical Center, Dermatology Service.

## BODY:

This MIPR supported four requirements: Teledermatology Evaluation, Senior Support & Software Upgrades, Teledermatology Quality Assurance Plan (JCAHO) and Clinical Practice Guidelines.

The **Teledermatology Evaluation**, See Appendices A and B, individually examined 404 patients initially via a stand alone Teledermatology System than a comparative consultation was made in person with a dermatologist. The results of this study were presented at the American Telemedicine Association (ATA) Annual Conference in Phoenix, AZ. See Appendix B: "Teledermatology, Intra-observer Diagnostic Correlation: The Final Saga

The **Senior Support & Software Upgrades** effort constituted the migration, monitoring, maintenance, enhancements, back-up and recovery of both systems at TRICARE Region One, located at WRAMC, and AMEDD Teledermatology, located at TATRC. TRICARE Region One system resulted into 21 modifications of the Teledermatology System, See Appendix C: Listing of Engineering Changes (ECPs). Major areas of modifications were: user problem resolution, server enhancement and communications troubleshooting. The modifications included the following:

Task #	Abbreviated Title
ECP-0220	Trouble Report – Registration Form Missing Field
ECP-0223	Trouble Report – Modify Patient Follow Up Questionnaire
ECP-0225	New Feature – Search By Consultant Physician
ECP-0225	New Feature – Modify SQL statements in page to use SQL Stored Procedures (NARMC System)
ECP-0227	New Feature – Modify SQL statements in page to use SQL Stored Procedures (South Regional Medical Command System)
ECP-0228	New Feature – Modify SQL statements in page to use SQL Stored Procedures (Northwest Regional Command System)
ECP-0229	New Feature – Modify SQL statements in page to use SQL Stored Procedures (Great Plains Medical Command System)
ECP-0230	New Feature – Modify SQL statements in page to use SQL Stored Procedures (Europe Regional Command System)
ECP-0231	New Feature – Add text data fields for medications, diagnosis, and treatment in NARMC System
ECP-0232	New Feature – Add field "TRICARE Status" with pull down options
ECP-0233	New Feature – Add Patient Insurance Information
ECP-0234	New Feature – Add field "Patient's Home Address"
ECP-0235	New Feature – Add field "Birth Date" Calculate Age
ECP-0236	New Feature – Add fields "Clinic Address"
ECP-0237	New Feature – Add field "Pay Grade"
ECP-0238	Trouble Report – SF 513 Under Print Option Does Not Work
ECP-0239	Trouble Report – Problem with QA/PI Notification Email
ECP-0240	New Option – Create QA/PI Web Page
ECP-0242	New Feature – Consult Response Tracking

ECP-0243    Trouble Report – Security Problem wit Cookie Files  
ECP-0244    Trouble Report – Modify Minimum Browser Requirements Bulletin

AMEDD Teledermatology resulted in seven modifications, See Appendix H. The following is a list of the enhancements:

ECP-0260    Store Procedure used to enhance the performance  
ECP-0262    Reference for diagnosis and Recommendations  
ECP-0263    Password Length Checked  
ECP-0261    Database backup mechanism  
ECP-0264    Truncate Transaction Log  
ECP-0265    The steps to apply and install the CA certificate on O'Reilly Web  
Server  
ECP-0248    Trouble Report – Fix for BAMC site information and minor  
modification  
ECP-0251    Trouble Report – Fix for BAMC Email notification

The **Teledermatology Quality Assurance Plan (JCAHO)** See Appendix C identified, implemented, and documented quality assurance measures for the Teledermatology System. The QA Plan was based on the Eliasson & Poropatich (Performance Improvement in Telemedicine: The Essential Elements, Military Medicine 1998;163,8:530), See Appendix J.

The final requirement, **Clinical Practice Guidelines**, See Appendicies E and F, resulted in a Teledermatology Information Web Site that depicts the overall planning and implementation of the system. The guidelines outline deployment, lessons learned, and basic business practices of a dermatology clinic. The following URL list the Web Site presented at the ATA Annual Conference and consists of 23 pages. Copies of the Web Pages are in Appendix D and available on line at:  
<http://www.wramc.amedd.army.mil/departments/tmed/projects/telederm/>

In addition, four Computer Based Training Modules, See Appendix G, were developed in CD-ROM to support Teledermatology Patient Information, Consult Management System Tutorial, Digital Camera and Dermatology Atlas.

#### **KEY RESEARCH ACCOMPLISHMENTS:**

A comparative analysis of interobserver and intraobserver diagnostic correlation and diagnostic correlation of store and forward to the web-based Teledermatology system resulted in a 90 percent overall diagnostic correlation

All category of skin conditions can be diagnosed adequately using the web-based Teledermatology system.

#### **REPORTABLE OUTCOMES:**

“Teledermatology, Intra-observer Diagnostic Correlation: The Final Saga”, Hon S. Pak, MAJ, MC, Annual Telemedicine Association Conference, Phoenix, AZ, 24 May 2000  
“A Web-Enabled Tele-Dermatology Central Medical Resource”, Mr. Thomas Bigott, Annual Telemedicine Association Conference, Phoenix, AZ, 24 May 2000

#### **CONCLUSIONS:**

The tasks covered under this MIPR have increased the acceptance, performance, capability, reliability, and information available on the Teledermatology System for use within the Army Medical Command.

## REFERENCES:

1. Philips et al (J Am Acad Dermatol 1997;37:398-402)
2. Loane et al (J Telemed Telecare 1998;4:95-100)
3. Lowitt et al (Arch Dermatol. 1998;134:471-476)
4. Phillips et al (Telemedicine Journal 1998;4:5-9)
5. Leshner et al (J Am Acad Dermatol 1998;38:27-31)
6. Oakley et al (Diag. accuracy in teledermatology. NZ Med J;110:51-3)
7. Lowitt et al (Teledermatology & in-person exam, Arch Dermatol 1998;134:471-6)
8. Loane et al (Prelim result... UK Multi-center T-derm Trial, J Telemed Telecare 1998;3(supp. 1):73-5)
9. Oakley et al (Practising derm via telederm, NZ Med J 1998;111:296-9)
10. Gilmour et al (Comparison of teleconsultations & face-to-face consultations ... Br J Dermatol 1998;139:81-7)
11. Harrison et al (Teledermatology-high tech or not), J Telemed Telecare 1998;4(suppl. 1):31-2)
12. Zelickson & Homan (Telederm in nursing home, Arch Dermatol 1997;133:171-4)
13. Kvedar et al (The substitution of digital images for dermatologic physical exam, Arch Dermatol 1997;133:161-7)
14. Whited et al (Reliability and accuracy of dermatologist's clinic based and digital image consultations, J Am Acad Dermatol 1999;41:693-702)
15. Whited et al (A Pilot trial of digital imaging in skin cancer, J Telemed Telecare 1998;4:108-112)
16. Eliasson & Poropatich (Performance Improvement in Telemedicine: The Essential Elements, Military Medicine 1998;163,8:530)

## APPENDICES:

Appendix A – Abstract: “Teledermatology, Intra-observer Diagnostic Correlation: The Final Saga”

Appendix B -- “Teledermatology, Intra-observer Diagnostic Correlation: The Final Saga”

Appendix C – List of Engineering Change Proposals

Appendix D – Teledermatology Project Performance Improvement

Appendix E – Abstract: Screen Scrapes of Teledermatology Information Web Page

Appendix F – Screen Scrapes of Teledermatology Information Web Page

Appendix G – Computer Based Training Module

Appendix H – AMEDD Teledermatology Engineering Change Proposals

Appendix I – Eliasson & Poropatich (Performance Improvement in Telemedicine: The Essential Elements, Military Medicine 1998;163,8:530)

Appendix J Participants

Appendix K Financial Data

## **Appendix A**

### **Abstract**

**“Teledermatology, Intra-observer Diagnostic Correlation:  
The Final Saga”**



## Abstract

### **“Teledermatology, Intra-observer Diagnostic Correlation: the Final Saga”**

*Background:* Many studies have been published recently on the diagnostic correlation of teledermatology consultations; however, much of the data comes from live two-way video-conferencing (VTC) consultations and very little from store and forward (S & F) consultations. Moreover, most studies compared diagnoses from two different dermatologists(inter-observer variability), and given the lack of baseline comparative data on inter-dermatologist diagnostic variability in the literature, the interpretation of diagnostic correlation data is somewhat difficult.

*Objective:* To measure the degree of concordance between a dermatologist seeing a patient via our teledermatology consult system and the same dermatologist seeing the same patient face-to-face. Our secondary goal was to measure diagnostic certainty and to correlate it with diagnostic correlation.

*Setting:* Outpatient dermatology clinic at a tertiary medical center.

*Participants:* Random sample of 404 patients selected from patients who had routine appointments in our dermatology clinic.

*Main Outcome Measure:* The diagnostic concordance between a dermatologist seeing a patient via our teledermatology consult system and the same dermatologist seeing the same patient face-to-face.

*Results:* The diagnostic correlation between teledermatology and in-person consultation was 70% complete agreement (95% confidence level,  $\pm 4.5\%$ ), 20% partial agreement, and 10% disagreement. The diagnostic certainty level between the two groups differed significantly (Teledermatology-7, In-person 9), and this difference held true in every category of disease ( $p \leq 0.0065$ ). Unlike other studies, we found that there was a 10% higher recommendation for biopsies by a teledermatologist.

*Conclusion:* Our diagnostic agreement rate is similar to previous published studies, and therefore confirms that teledermatology appears to be an effective method of delivering dermatologic care in the appropriate setting.

## **Appendix B**

### **“Teledermatology, Intra-observer Diagnostic Correlation: The Final Saga”**

# **Teledermatology, Intra-observer Diagnostic Correlation: The Final Saga**

**Hon S Pak MAJ MC  
Dermatology Service, DACH  
Fort Hood, Texas  
24 May 2000**

# Background

- Diagnostic Correlation 57-92%\*
- Mostly Inter-observer correlation
- VTC and S&F Teledermatology
- Phillips, Loanes, Oakley, Leshner, Lowitt, Loane, Gilmour, Kvedar, Whited, et al.

| \*See References

# Background

## ■ Limitations

- Dx from Face-to-Face: TRUE Gold Standard?
  - | Pathology  $<>$  Gold standard
  - | Alternatives ?

## ■ Meaning of Dx Correlation:

- | Correlation is not Accuracy
- | Interobserver(T-derm v. In-Person) Dx Correlation
  - Lack of baseline face-to-face interobserver correlation for comparison

# **Inter v. intraobserver**

- Loane et al (J Telemed Telecare 1998;4:95-100)
  - ┆ VTC (n=351) diagnostic correlation study found higher correlation with intra-observer comparison.
    - 64% with different dermatologists
    - 72% with the same dermatologist
- To what degree is the lack of correlation due to the baseline face-to-face inter-observer variability ?

# Study/ Objectives

- Prospective, Direct Comparison Study
- **Primary**
  - Measure diagnostic concordance
    - Intra-observer comparison
- **Secondary**
  - Correlate level of diagnostic certainty with type of diagnostic correlation (agreement).

# Methodology

## ■ *Study Population*

- Patients scheduled for a routine appointment in the dermatology clinic @ a tertiary referral medical center
- Each patient was evaluated by the same dermatologist- first via T-derm then in-person.



# Methodology

- One primary dx and up to two ddx given for both T-derm and in-person eval.
- An independent dermatologist compared the diagnoses from each case & categorized into 3 types of agreement
  - | Complete- exact match
  - | Partial- dx in ddx
  - | Disagreement

# Methodology

- Clinical Significance (*partial agreement +disagreement*)
  - Mild: Different dx whose tx is same or similar (e.g. nevus v. seborrheic keratosis)
  - Moderate: Different dx whose tx is significantly different (e.g. Tinea v. Dyshidrosis)
  - Severe: Cutaneous malignancy was missed on T-derm

# Methodology

## ■ Hardware:

- PC with monitor (1024x768x24 bits, .28 dpi)
- Nikon Coolpix 900 (1280x960x 24 bits)
- Olympus D-600L (1280x1024x24 bits)

## ■ Software:

- Stand alone version of web-enabled teledermatology consult system (Walter Reed)
- Netscape 4.5 with image viewer

# Statistical Analysis

## I Principle Outcome

- I Level of diagnostic agreement (complete, partial, or none) by an independent evaluator or the dx's received by each patient under the two modalities:
  - Teledermatology
  - In-person Evaluation
- I A two sided 95% confidence interval for a single proportion
  - +/- 4.5% of the true complete agreement proportion

# Statistical Analysis

## ■ Secondary Outcome

- Comparison of the confidence levels (1-10) among types of diagnostic agreement
  - Paired t-test

## ■ Correlation of Biopsy Rates

- McNemar's Paired Chi-square test

# Demographics

- N= 404 Cases
- Patients
  - Mean Age: 59 (18-92)
  - Sex- Male: Female ratio 1.3:1
  - Race: White 82%, Blacks 13%, Asian/Hispanics 5%
- Dermatologists: 28 Total
  - 14- Staff board certified
  - 14- 2nd/3rd year residents

# Type of Skin Condition

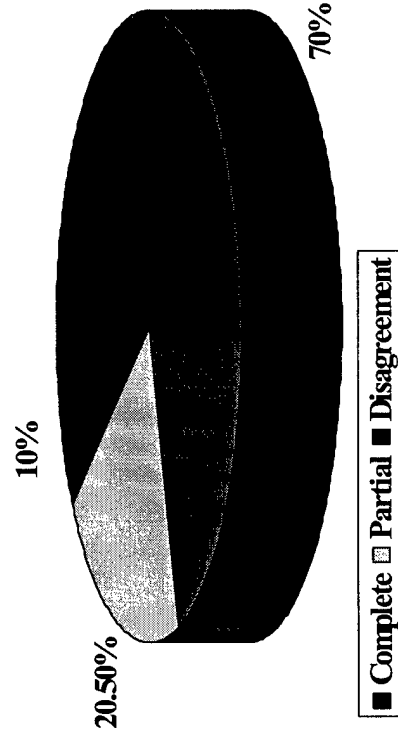
<u>Category</u>	<u>Frequency</u>
Papulosquamous	26.0 %
Benign Tumors	20.0 %
Malig/Pre-malignant	13.4 %
Eczematous	10.9 %
Pigmented Lesions	8.4 %
Infections/Infestations	7.7 %
Acneiform	6.9 %

# Result: Diagnostic Correlation (n=404)

## ■ Intra-observer

### Agreements

- Complete 70% (283)\*
- Partial(ddx) 20.5% (83)
- Disagreement 9.5% (38)



■ \* 95% confidence level, +/-4.5%



# Leshner et al (VTC, n=60)

Type of Visit	Complete agreement	Partial agreement	Disagreement
Telemedicine/ Local	78%	21%	1%
Local/Local	94%	6%	0%

J Am Acad Dermatol Jan 1998

# Diagnostic Correlation

- Oakley et al (Diag. Accuracy of Teledermatology, NZ Med J 1997;110:51-3)
  - VTC (n=104) 75% dx correlation and 82% when ddx included.
- Whited et al (Reliability and Accuracy of Dermatologist's clinic based and digital image consultations, J Am Acad Dermatol 1999;41:693-702)
  - S&F (n=126)
    - | proportion of agreement among clinic-based examiners for a single dx: 54%. When differentials were included: 92%
    - | No difference between clinic-based examiner and teledermatologist

# Dx Correlation by category

<u>Category</u>	<u>Dx Correlation Rate</u> (Partial + Complete)
Eczematous	97.7 %
Infections/Infestations	96.7 %
Benign Tumors	91.4 %
Malig/Pre-malignant	92.6 %
Pigmented Lesions	94.1 %
Acneiform	96.4 %
Papulosquamous	85.7%

\* P=0.027 Difference in distribution of level of agreement

# Clinical Significance of Non-complete agreements

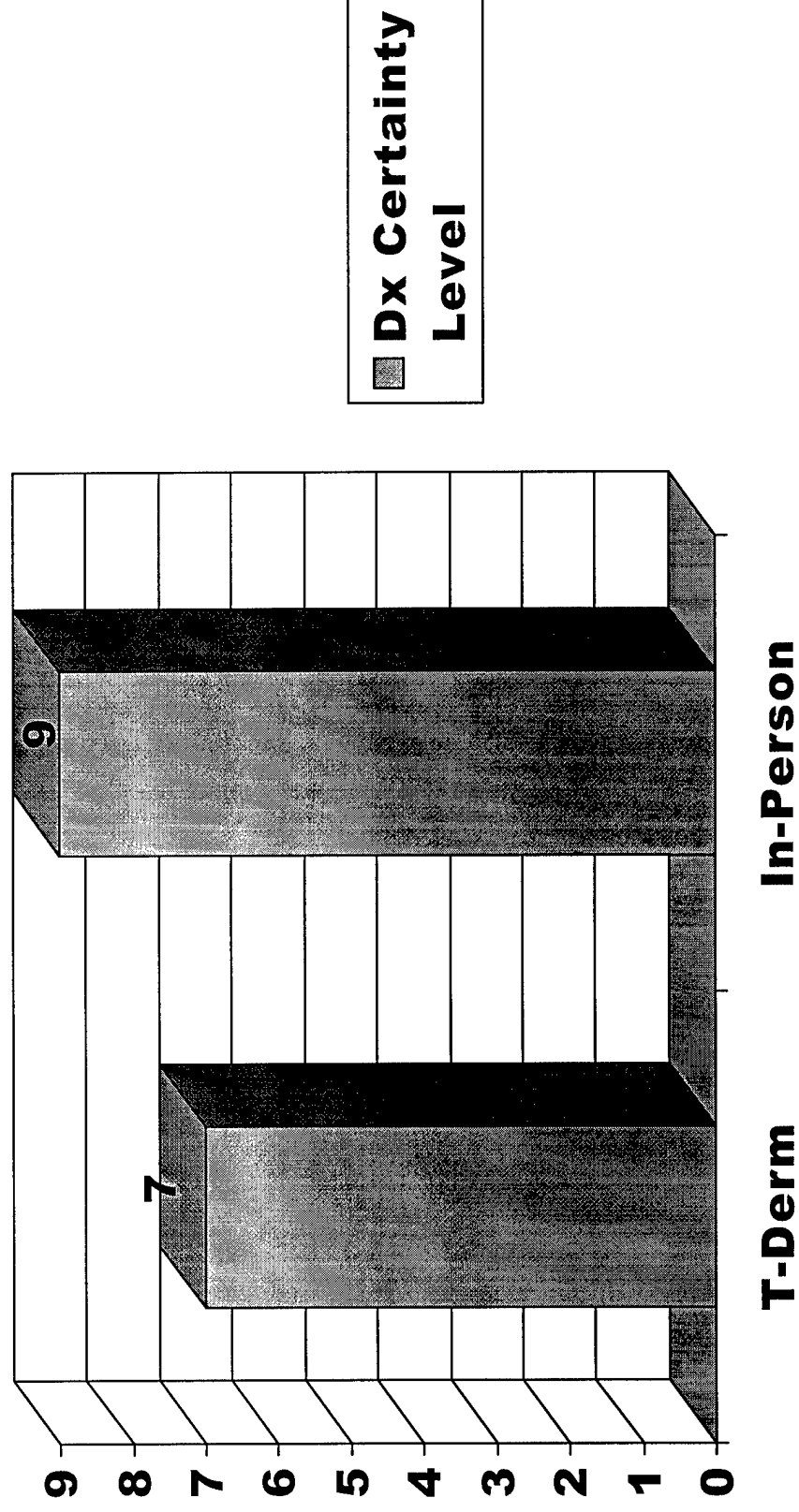
## ■ Clinical Significance of Partial agreement + disagreement of 29.8 %(n=121)

■ Minimal	70	17.3%
■ Moderate	50	12.3%
■ Severe	1	0.2%

## ■ Assumption: (Face-to-Face) Diagnosis is CORRECT

# Diagnostic Certainty Level

( $p=0.0001$ )



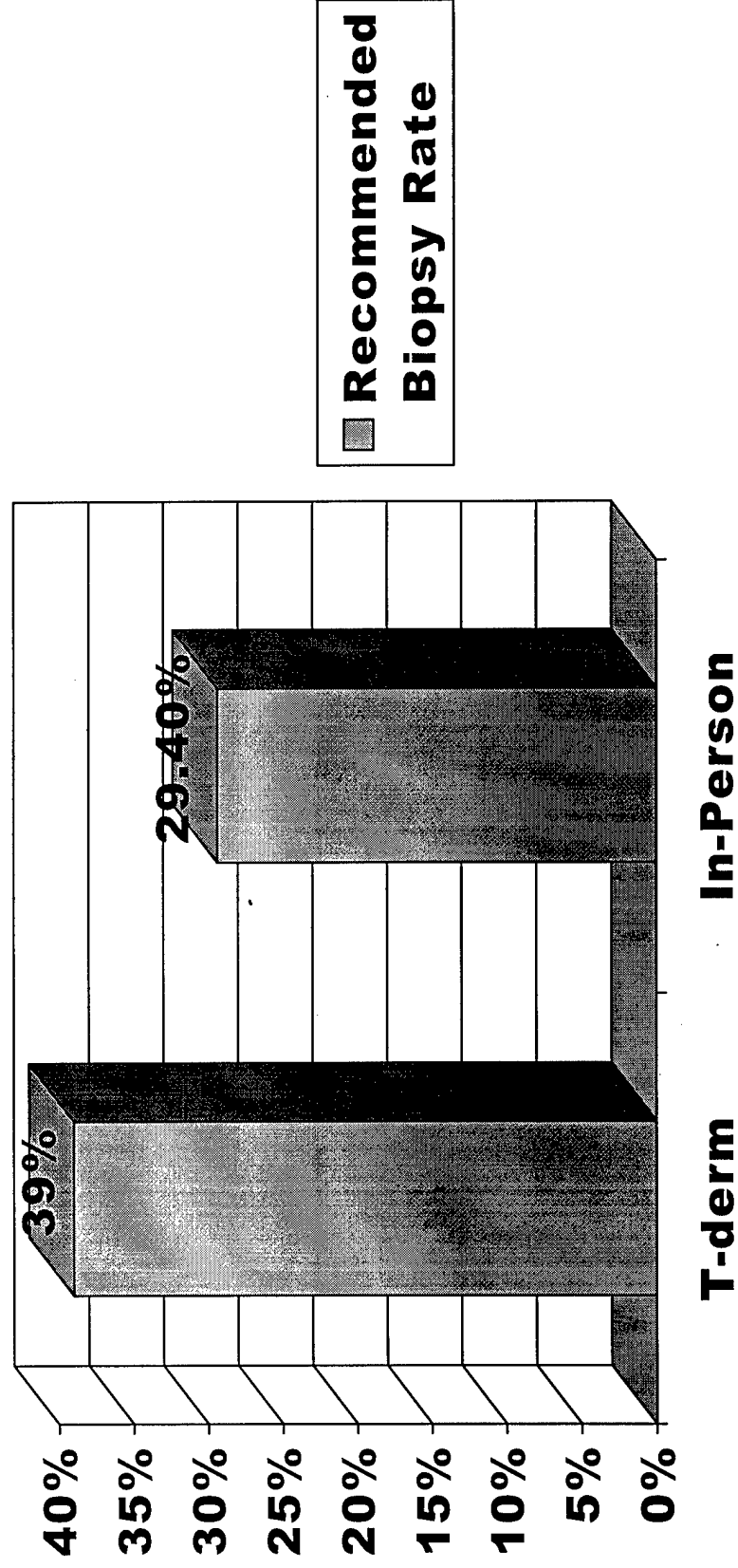
# Diagnostic Certainty per Agreement type

Agreement Category	N	In-Person	T-derm
Complete	283	9.0	7.7
Partial	83	9.0	5.9
Disagreement	38	9.1	5.0

# Diagnostic Certainty by category of disease

Category	N	CL T-derm	CL In-person
Acneiform	28	7.7	9.6
Benign Tumor	81	7.5	9.0
Infectious	31	7.5	9.2
Pigmented Lesion	34	7.4	9.2
Premalig/malig	54	7.2	8.9
Other	27	7.1	9.0
Papulosquamous	105	6.8	9.0
Eczematous	44	5.7	9.0

# Comparison of Bx Rate





# Agreement on Bx Recommendations

## In-Person

	Recommend Bx	Do Not Recommend Bx
--	-----------------	---------------------------

T-TERM Recommend Bx	91(TP)	69(FP)
---------------------------	--------	--------

T-TERM Do not recommend Bx	28(FN)	216(TN)
----------------------------------	--------	---------

FN-Potential for missing malignancy or correct Dx: 6.9 %  
FP-Potential Unnecessary biopsy: 17%

## Bx Correlation by Category of skin disease with highest biopsy rates

Category	(FP)	(FN)
	Potentially Unnecessary	Potentially Miss a Dx
Eczematous	20.45 %	4.55 %
Papulosquamous	28.57 %	6.7 %

# Biopsy Rate

## ■ Phillips et al

### ■ (Telemedicine Journal 1998;4:5-9)

- | 107 skin tumors; 59% Correlation rate
- | No difference in Bx rates

## ■ Explanation

- | Tumor only v. All skin conditions
- | Lack of familiarity/confidence with T-derm system

# Summary

- 90% Overall Diagnostic Correlation
  - Interobserver ~ Intraobserver Dx Correlation
  - Dx Correlation of S&F similar to VTC T-derm
- Approx 12.5 % risk of clinically significant misdiagnosis or recommending a wrong treatment.
- **Theory:** This 12.5% probably represent baseline % of face-to-face evaluations in which a single diagnosis cannot be rendered with certainty

# Summary

- All category of skin conditions can be dx'd adequately via T-derm consult system
  - | Slightly more difficult with Papulosquamous and Eczematous categories.
- Diagnostic certainty (confidence) level
  - Statistically higher with In-Person
  - Type of agreement correlate well with T-derm level
- Potential morbidity from increased biopsy rate (10%).

# The Question...

- To what degree is the lack of correlation due to the baseline face-to-face inter-observer variability ?
  - ANS: minor
    - | Majority is the baseline % of face-to-face evaluations in which the diagnosis is not certain.

# Contributors

- David Harden, CPT MC
- Mark Welch, LTC MC
- Paul Benson, COL MC
- Leonard Sperling, COL MC
- Linda McKnight
- Ron Poropatch, COL MC
- WRAMC Telemedicine Team

## Review of the Literature

- Philips et al (J Am Acad Dermatol 1997;37:398-402)
- Loane et al (J Telemed Telecare 1998;4:95-100)
- Lowitt et al (Arch Dermatol. 1998;134:471-476)
- Phillips et al (Telemedicine Journal 1998;4:5-9)
- Leshner et al (J Am Acad Dermatol 1998;38:27-31)



## Review of Literature

- Oakley et al (Diag. accuracy in teledermatology. NZ Med J;110:51-3)
- Lowitt et al (Teledermatology & in-person exam, Arch Dermatol 1998;134:471-6)
- Loane et al (Prelim result... UK Multi-center T-derm Trial, J Telemed Telecare 1998;3(supp. 1):73-5)
- Oakley et al (Practicing derm via telederm, NZ Med J 1998;111:296-9)

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- Gilmour et al (Comparison of teleconsultations & face-to-face consultations ... Br J Dermatol 1998;139:81-7)
- Harrison et al (Teledermatology-high tech or not), J Telemed Telecare 1998;4(suppl. 1)31-2)
- Zelickson & Homan (Telederm in nursing home, Arch Dermatol 1997;133:171-4)
- Kvedar et al (The substitution of digital images for dermatologic physical exam, Arch Dermatol 1997;133:161-7)

# Review of Literature

- Whited et al (Reliability and Accuracy of dermatologist's clinic based and digital image consultations, J Am Acad Dermatol 1999;41:693-702)
- Whited et al (A Pilot trial of digital imaging in skin cancer, J Telemed Telecare 1998;4:108-112)

## **APPENDIX C**

### **Listing of Engineering Change Proposals**



Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0220

Priority:

Immediate

Abbreviated Title: **Trouble Report - Registration Form Missing Field**

Date

Submitted: 14-Jul-99

Date

Assigned: N/A

Assigned

To: N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

User Registration Form does not work. Getting error message:

Error Occurred While Processing Request

Error Diagnostic Information

An error has occurred while processing the expression:

#Form.otherfacility# IS NOT "

The error occurred on (or near) line 54 of the template file D:\HTML\telederm21\registration\newdoctor.cfm.

47:

48:

49:

50:

51:

52:

53:

54:

55:

56:

Error resolving parameter FORM.OTHERFACILITY

The specified form field cannot be found. This problem is very likely due to the fact that you have misspelled the form field name.

Date/Time: 07/14/99 08:26:31  
Browser: Mozilla/4.0 (compatible; MSIE 4.01; Windows NT)  
Remote Address: 160.151.90.156  
HTTP Referer: https://tmed1-region1.tricare.osd.mil/telederm21/registration/index.cfm  
Template: D:\HTML\telederm21\registration\newdoctor.cfm

---

Comments:

Call from Consult Manager at Fort Drumm Connor stating they can not get the registration form to work and they have many new doctors to register.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0223

Priority:

Immediate

**Abbreviated Title: Trouble Report - Modify Patent Follow Up Questionnaire - Biopsy**Date  
Submitted: 30-Aug-99Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Mr. Tom Bigott / Dr. Paul Benson

## Task Description:

Modify the Patient Follow Up Questionnaire to include two new fields.

Patient Biopsy Required (Yes | No)

Patient Biopsy Performed (Yes | No)

## Comments:

The Chief of Dermatology is very concerned about patients getting required biopsys when they are required through the consult request. We need to ask the patient these questions to ensure the follow up is correct.

&lt;&lt; Back



## Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0225

Priority:

High

Abbreviated Title: **Search By Consultant Physician**

Date

Submitted: 01-Sep-99

Date

Assigned: N/A

Assigned

To:

N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

Add a new search engine to allow a user to search consult by a consultant physician's name. The Page address is :Consult/search\_by\_consultant.cfm.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0226

Priority:

Immediate

Abbreviated Title: **Modify SQL statements in page consultstep3.cfm using SQL stored procedure**

Date  
Submitted: 24-Sep-99

Date  
Assigned: N/A

Assigned To: N/A

Date Started: N/A

Date Completed: N/A

Estimated  
Time: N/A

Actual  
Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

Change the SQL statements in page consultstep3.cfm to speed up the database processing. The original page is consultstep3.cfm and the modified pages is consultstep3\_modify\_990923.cfm

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0227

Priority:  
Immediate**Abbreviated Title: Modify the SQL Statements in page consultstep3.cfm in South Reginal Medical Command using stored procedure**Date  
Submitted: 24-Sep-99Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

Modify the SQL statements in page consultstep3.cfm using SQL stored procedure to speed up the processing. The original page is consultstpe3.cfm and modified page is consultstep3\_Modify\_990923.cfm

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0228

Priority:  
Immediate

Abbreviated Title: **Modify the SQL statements in page consultstep3.cfm in Northwest Reginal Medical Command using stored procedure.**

Date  
Submitted: 24-Sep-99Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

Modify the SQL statements in consultstep3.cfm using SQL stored procedure to speed up the processing. The original page is consultstep3.cfm and the modified page is consultstep3\_modify\_990923.cfm.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0229

Priority:

Immediate

Abbreviated Title: **Modify the SQL statements in page consultstep3.cfm in Great Plains Medical Command Using Stored Procedure**

Date  
Submitted: 24-Sep-99

Date  
Assigned: N/A

Assigned To: N/A

Date Started: N/A

Date Completed: N/A

Estimated  
Time: N/A

Actual  
Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

Modify the SQL statements in consultstep3.cfm using stored procedure to speed up the processing. The original page is consultstep3.cfm and the modified page is consultstep3\_modify\_990923.cfm.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0230

Priority:

Immediate

Abbreviated Title: **Modify the SQL statements in page consultstep3.cfm in Europe Reginal Medical Command Using Stored procedure.**

Date  
Submitted: 24-Sep-99

Date  
Assigned: N/A

Assigned To: N/A

Date Started: N/A

Date Completed: N/A

Estimated  
Time: N/A

Actual  
Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

Modify the SQL statements in page consultstep3.cfm using stored procedure to speed up the processing. The original page is consultstep3.cfm and the modified page is consultstep3\_Modify\_990923.cfm

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0231

Priority:  
Medium**Abbreviated Title: Add text data fields for medication, diagnosis, treatment in tmed1-region1 database.**Date  
Submitted: 28-Sep-99Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Zhengyi Sun

## Task Description:

The data type of columns for medication, diagnosis and treatment was varchar before, this prevents a doctor from enter information with length longer than 255 character. The problem can be solved by changing data type to text.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0232

Priority:  
HighAbbreviated Title: **Add Field "TRICARE Status"**Date  
Submitted: 18-Jan-00Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Add the field "TRICARE Status:" with the following pull down options:

TRICARE PRIME  
TRICARE Standard  
TRICARE Extra  
Prime Eligible  
Over 65  
Other

to the Telederm Patient demographics page

## Comments:

This change was requested by Dr. Paul Benson, Chief, Dermatology.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0233

Priority:

High

Abbreviated Title: **Add Patient Insurance Information (ADS Req)**

Date

Submitted: 18-Jan-00

Date

Assigned: N/A

Assigned

To: N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Mr. Tom Bigott

Task Description:

Add the following to the Patient Demographics page(s):

Private Insurance: (Yes | No)

Insurance Company: [open text]

Telephone Number: [(xxx) xxx-xxxx]

Subscriber's Name: [open text]

Group Name: [open text]

Group Number: [open text]

Prov: [open text]

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0234

Priority:

High

Abbreviated Title: **Add Field "Patient's Home Address" (ADS Req)**

Date

Submitted: 18-Jan-00

Date

Assigned: N/A

Assigned

To: N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Mr. Tom Bigott

Task Description:

Add the required fields to capture the patient's home address:

Street

Extra line

City

State

Zip + 4

Comments:

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Teledermatology

Tricare Region 1

## Teledermatology Engineering Change Proposal

Task # : ECP-0235

Priority:  
MediumAbbreviated Title: **Add Field "Birthdate" (ADS Req)**Date  
Submitted: 18-Jan-00Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Replace the field "Age:" with "Birthdate" in format of ddmmmyy, and modify Telederm program to display the patient's age when the record is displayed or the SF 513 is printed.

## Comments:

This change is required for the ADS system.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0236

Priority:

High

Abbreviated Title: **Add Fields to capture the Clinic Address (ADS Req)**

Date

Submitted: 18-Jan-00

Date

Assigned: N/A

Assigned

To: N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Add the following fields to the Facility Table"

Add field "Clinic Address"

Add field "Clinic City"

Add field "Clinic State"

Add field "Clinic Zip"

## Comments:

Required field for ADS

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0237

Priority:

Medium

Abbreviated Title: **Add Field "Pay Grade" (ADS Req)**Date  
Submitted: 18-Jan-00Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Add field "Pay Grade" to Patient Table and to Patient Demographics screen.

Values are E-1...E-9, O-1...O-9, Civ, Dep, Ret.

## Comments:

Field also needed for cost benefit analysis.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0238

Priority:

Medium

**Abbreviated Title: Trouble Report - SF 513 Under Print Option does not work**Date  
Submitted: 09-Feb-00Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

When selecting the Report option Print SF 513, all you get is a blank page. There is no entry to enter the required SF 513. Please complete this program. Thanks.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0239

Priority:

High

Abbreviated Title: **Trouble Report - Problem with QA/PI Notification Email**Date  
Submitted: 14-Feb-00Date  
Assigned: N/AAssigned  
To: N/A

Date Started: N/A

Date  
Completed: N/AEstimated  
Time: N/AActual  
Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

The QA/PI Notification Email utility is to send an email to the identified individuals for evry fifth completed live consult. However, this process is submitting a notification when every fifth test consult is completed.

## Comments:

This process needs to get fixed so the dermatologist can complete their requirements for Performance Improvement and Quality Control.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0240

Priority:  
HighAbbreviated Title: **Create QA/PI Options (WRAMC Derm req.)**Date  
Submitted: 18-Feb-00Date  
Assigned: N/A Assigned To: N/A

Date Started: N/A Date Completed: N/A

Estimated  
Time: N/A Actual Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Mr. Boocks was provided the screen layouts to be modified in order to provide Quality Control / Performance Improvement to the Teledermatology system.

Comments:

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Teledermatology

Tricare Region 1

## Teledermatology Engineering Change Proposal

Task # : ECP-0242

Priority:  
MediumAbbreviated Title: **Consult Response Tracking (Evaluation)**Date  
Submitted: 28-Feb-00Date  
Assigned: N/A Assigned To: N/ADate Started: N/A Date  
Completed: N/AEstimated  
Time: N/A Actual  
Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Modify the system to log the time a consultant first access a consult to answer it and the time the consultant completes the consult.

## Comments:

This information will be used for the evaluation of consult processing by the consultant.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0243

Priority:

Immediate

Abbreviated Title: **Trouble Report - Security Problem with Cookie Files**

Date

Submitted: 17-Mar-00

Date

Assigned: N/A

Assigned

To: N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Mr. Tom Bigott

**Task Description:**

Review Cold Fusion tags (i.e.: CFAPPLICATION) to see if there is a tag that expires the cookie file when a user exists the browser and modify the system to correct the current security problem.

**Comments:**

Currently the system places a cookie file onto the users system. The cookie does not expire which allows the user to jump into the system without having to log on since the cookie file is there. The cookie file needs to expire when the user exists the browser.

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0244

Priority:

Low

Abbreviated Title: **Modify Minimum Browser Requirements Bulletin**

Date

Submitted: 11-Apr-00

Date

Assigned: N/A

Assigned

To: N/A

Date Started: N/A

Date

Completed: N/A

Estimated

Time: N/A

Actual

Time: N/A

Submitted By: Mr. Tom Bigott

## Task Description:

Currently the Minimum Browser Requirements Bulletin states that Netscape 3.0 is the minimum browser. This should be changed to Netscape 4.5 and to remove reference to Explorer since there may be problems with that browser.

Comments:

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## **Appendix D**

### **Teledermatology Project Performance Improvement**

**Teledermatology Project**  
**Performance Improvement**  
**Revised: 28 July 2000**

1. **PURPOSE:** This document provides information on the Performance Improvement (PI) process for the North Atlantic Regional Medical Command (NARMC) and TRICARE Region I Teledermatology project.
2. **APPLICABILITY:** This pamphlet applies to personnel participating in the NARMC Teledermatology project.
3. **REFERENCE:** Performance Improvement in Telemedicine: The Essential Elements, Military Medicine, Vol 163, 8:530, 1998, by COL Arn H. Eliasson, MC USA and LTC Ronald K. Poropatich, MC USA.
4. **EXPLANATION:** Performance Improvement (PI) for Telemedicine includes five major elements as defined by the authors: (1) Licensing and Credentialing, (2) Data Security and Privacy, (3) Informed Consent, (4) Peer Review, and (5) Tailored Performance Improvement Initiatives.
5. **PERFORMANCE IMPROVEMENT CATEGORY REVIEW:** The following detailed list describes performance improvement categories as they are implemented for the Teledermatology Project for the NARMC and TRICARE Region I:

- A. Licensing and Credentialing – the Military Medical System is exempt from the State limitation requirements as military physicians only practice on patients associated to the military medical system and as such this category does not apply to this system.
- B. Data Security and Privacy – are accomplished through the use multi-level security measures such as:

Encryption:

When using a Web Server to collect and process Telemedicine consults, all Telemedicine application Web Servers under the control of the Telemedicine Directorate will use the VeriSign, Inc. Secure Server ID or digital certificate. The digital certificate works in conjunction with the Microsoft operating system secure socket layer (SSL) and a user's browser such as Netscape's Communicator or Microsoft's Explorer. The digital certificate process provides 56-bit encryption for all data transmitted over the Internet. This encryption methodology meets the Data Encryption Standard (DES) in FIPS PUB 46-3.

### Password Security:

In compliance to the Department of Defense Password Management Guideline, CSC-STD-002-85 the following Password Management Procedures are used for all Telemedicine Web-based applications.

All Telemedicine Web-based applications have a warning message on the initial screen stating that the system that states "This system is restricted to authorized users for legitimate government purposes and is subject to audit. The unauthorized access, identification, use, modification, or destruction of this computer system or the data contained herein is a criminal violation of federal and district laws. Personal Data - Privacy Act of 1974 (PL 93-579)".

Each Telemedicine Web-based application is further protected by a user identification and authentication system. The identification and authentication system provides users a unique Userid and password along with the option to change their password, provides audit reports, and has an automatic expiration of the password with a maximum of a six-month life of the password.

Each user must register to use the system and provide a desired Userid and password. The password must be eight characters long with two of those characters being numbers. The password will be entered twice to confirm the correct entry while being overprint masked so no one observes it as it is entered. Additionally, when registering, each user must provide various facility and personal demographics. The system will automatically capture the user's Internet IP Address, the date and time the user registered, and what browser the user used to register to include its version or release. It is the System Administrator's responsibility to validate and generate the user's account.

If the user's password has expired, a notice will be sent to the user stating the password has expired and that the user must choose another password before proceeding. The system will provide the user a brief summary of the steps required to change the password, including a caution that the user should ensure that no one else is watching what the user is doing. Revalidated passwords will be entered twice with an overprint mask so the system can verify that the user can consistently enter the password correctly. The system will capture the date the password is modified. If the password is not revalidated within seven-days after it expires, a notice will be sent to the System Administrator to review the account.

In the event that a user forgets his/her password, the System Administer has the access to changes the user's password. Once changed, the user must again change the password to a new password. The System Administer does not have access to the user's password once the user changes it.

All passwords will be protected by access controls that restrict access only to the system in order to protect the password database from unauthorized modifications and disclosures.

#### Access Rights:

There are three levels of access or "access rights" for a given Web-based Telemedicine consult application: Level-1, Consult Manager, Level-1 Referring Physician, Level-2 Consulting Physician, and Level-3 System Administrator. The Consult Manager and Referring Physician have the access that allows them to generate and approve a consult along with following up on the consult status. Level-1 users can only see consults from their site, they can not see any other consult activity. The Consulting Physician has the same access as the Consult Manager, but also has the access to respond to the consult. Level-2 access provides access to all consults in the Telemedicine application. The System Administrator has complete access over the system that also includes the ability to authorize or delete accounts and run specialized utility programs.

#### Access Log:

The system contains an access log that records when a user logs on by Userid, what their Internet Protocol (IP) address is to identify where they are coming in from, the type of browser they are using, and the site name of the user. Every time a user accesses a page in the Telemedicine Web-based application, an event record is captured and posted. Only the System Administrator has access to this log.

#### Network Protection:

The Walter Reed Health Care System (WRHCS) has a wide area network (WAN) that connects its various medical facilities together. This WAN provides an additional layer of security in that when a Telemedicine consult is conducted on the Web-based system, the consult does not go across the Internet, but stays within the WAN.

#### Physical Security:

Lastly, physical security is provided by housing the Telemedicine Web Server in the Directorate of Information Management (DOIM) main computer room that is manned 24- hours a day and 7-days a week and has a uninterruptable power supply and backup generator. The computer room is secured and access into the room is controlled through an access-control roster and log. Additionally, the Telemedicine Web Servers are secured in a separate set of cabinets apart from the installation computers controlled by the DOIM. All Telemedicine servers reside on a separate local area network (LAN) segment that keep unwanted LAN traffic away from the servers, adding still an additional layer of security.

- C. Informed Consent – is provided through the use of an official government form (Standard Form 522) which the patient physically signs along with the Consult Manager after the patient has been given a copy of a Telemedicine Information Summary Page outlining the possible risks associated with performing a Telemedicine consult.
- D. Peer Review Evaluation – is pending the set up of the evaluation study.
- E. Tailored Performance Improvement Initiatives – are accomplished through the use of specialized evaluations such as:

- Access to Care and Cost-Effectiveness Analysis
  - First 100 Teledermatology Consult Evaluation
  - Evaluation of live and Teledermatology consults evaluating the effectiveness of Teledermatology
  - Patient Satisfaction and quality of care surveys
  - Quality Improvement emphasis was on finding systemic problems that could be corrected
6. Point of Contact: Mr. Tom Bigott, Project Officer, at 202-782-7918.

THOMAS R. BIGOTT  
Teledermatology Project Officer

## **APPENDIX E**

### **Abstract: A Web-Enabled Teledermatology**



# **A Web-Enabled Teledermatology Central Medical Resource**

Thomas R. Bigott, Ronald K. Poropatich, M.D.  
Walter Reed Army Medical Center, Washington, D.C. 20307-5001

E-mail: Tom.Bigott@na.amedd.army.mil

## **ABSTRACT**

**Background:** The Walter Reed Army Medical Center (WRAMC) has deployed Teledermatology throughout the North Atlantic Regional Medical Command (NARMC) and the TRICARE Region 1. The Teledermatology system is deployed to 28 military medical facilities throughout the North East Coast to include four navel ships. During the development and deployment process a Web site was developed that provides users a number of practical issues and lessons learned on how the Teledermatology deployment and sustainment processes is conducted.

**Methods:** The Web site is a protected site only accessible by authorized users of the NARMC / TRICARE Region 1 Teledermatology user community and is accessible by common Web browsers.

**Results:** Through this Web site, users have a better understanding of the depth of the Teledermatology system and the deployment process.

**Conclusions:** When Teledermatology users have an understanding of the deployment and sustainment process, they more eagerly embrace the technology and support process.

## **APPENDIX F**

### **Screen Scapes of Teledermatology Web-Based System**

[Project Summary](#)

[Project Requirements](#)

[Consult Flow Process](#)

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[The Telederm System](#)

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## Directorate of Telemedicine

Walter Reed Army Medical Center

### Dermatology

Teledermatology provides accurate and rapid diagnosis of dermatological conditions and is becoming widely accepted as a normal business practice. The use of secured Web-based store-and-forward Telemedicine technology to provide diagnostic and consultative evaluation at remote referral hospitals will reduce the need for time-consuming transportation and unnecessary referrals. This is especially important in the case of active duty patients where rapid return to duty is mission essential.

In response, the NARMC and Tri-service Teledermatology consortium requirement, Telemedicine developed a secure system designed to allow medical treatment facilities throughout the Region to submit dermatology consults. The system includes a password protected and encrypted World Wide Web connection to a dedicated Web server housed at Walter Reed Army Medical Center, as well as a computerized patient record. A digital Camera is used to capture the dermatological condition.

When a remote site physician has a case for a Teledermatology consult, the referring physician completes a simple consult request form and has the patient photographed by a Consult Manager who completes the required information collection and processing, entering the information in the Web-based system.

When the consult is entered into the system, dermatologists from the Walter Reed Army Medical Center (WRAMC) access the Teledermatology Web Server from within their organizations or even their homes, and complete their evaluation. Prior studies from WRAMC have shown that up to 50% of all Teledermatology consults can be successfully completed without ever requiring the patient to travel to a dermatologist. It is estimated that this new Web-based technology will be able to reduce patient care costs, increase access to subspecialty care, and provide a teaching tool to general medical personnel throughout the Region. The Teledermatology system was first deployed in the NARMC. It has supported 332 consults in 1998, 350 consults in 1999, and 80 consult as of 30 April 2000.

The system has been deployed throughout the Medical Command, to the Brook Army Medical Center, Eisenhower Army Medical Center, and Madigan Army Medical Center located in CONUS, and to the Landstuhl Army Medical Center located in Europe. A total of 460 consults have been received.

The system is currently undergoing an Independent Validation and Verification (IV&V) as it is being prepared to migrate into the U.S. Army Information Management mainstream for long term sustainment.

COL Paul Benson, MD  
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Walter Reed Army Medical Center  
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Web Site Last Updated: May 19, 2000

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Teledermatology

Tricare Region I

## **Recommended Hardware and Software**

### **Remote Site Work Station:**

#### **PC Recommendations:**

**Operating System: Windows 95 | 98 | NT**  
**Internet Browser: Netscape Communicator 4.0+**  
**20 MB Cache Area**  
**Memory: 32 MB RAM**  
**PCMCIA Card Reader**  
**17" Monitor 1024 x 768 BPI**

#### **Printer Support:**

**Laser Printer Required To Print Out Project Forms.**

#### **Digital Camera Support:**

**Recommend the Nikon CoolPix 950**

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## Teledermatology

Tricare Region I

### Consult Flow Process

#### Consult Initiation Flow

##### Step 1: Initiate Consult

Once a Health Care Provider decides a Patient needs a dermatology consult, he/she uses a special Telemedicine Patient Record (available through the site Telemedicine Consult Manager).

##### Step 2: Health Care Provider Completes Required Forms

The Health Care Provider explains "Telemedicine" to the Patient and asks the Patient if he would like to use this technology.

[Typically the turn around time on a Teledermatology consult is 72 hours. In contrast a dermatology referral may take four to eight weeks for an appointment at the medical center.]

If the Patient elects to participate in the Telemedicine consult process, the referring Health Care Provider completes the two page Teledermatology Consult Request Form and Part -1 of the Referring Physician's Questionnaire while the patient is present. The referring provider then takes the patient and the paper work to the site Consult Manager for further processing.

##### Step 3: Patient Completes Required Forms

The site Consult Manager provides the patient the Patient Telemedicine Consent Form and a Patient Questionnaire to be filled out. The consent form copied with the original being placed into the patient's regular medical record and the copy placed into the Telemedicine Patient Record that is with the remote site Consult Manager. The Patient Evaluation Form is returned to the Consult Manager at the end of the patient's visit.

##### Step 4: Patient is Photographed

The Consult Manager takes the required digital images of the Patient.

##### Step 5: Consult Manager Reviews Clinical Images

The Consult Manager downloads the images into the computer, reviews them, and retakes them if necessary.

**Step 6: Complete Patient Questionnaire**

The Patient completes the Telemedicine Patient Questionnaire and gives it to the Consult Manager who places the form into the site Telemedicine Patient Record.

**Step 7: Entering the Data into the System**

The Consult Manager enters the data from the Teledermatology Consult Request Form, the Requesting Physician's Questionnaire, Part-1 and the Telemedicine Patient Questionnaire into the Teledermatology System.

**Step 8: Print Out Consult Request**

The Consult Manager prints out a Consult Request Form (SF 513) and places it into the site Telemedicine Patient Record.

**Step 9: Consult Verification**

The Health Care Provider reviews the Consult Request Form, and if acceptable, approves its release to be sent to the Dermatologist. If the Health Care Provider is not satisfied with the form, the Consult Manager goes back into the system and makes the required modifications.

**Step 10: Forward Consult Request**

Once the Consult Request Form is approved by the Health Care Provider, the Consult Manager logs into the Teledermatology System and "submits" the consult request to the Dermatologist.

**Step 11: File SF 513**

Once the consult is submitted to the Dermatologist, the Consult Manager files the approved SF 513 into the Telemedicine Patient Record and waits for the Dermatologist's response.

## **Consult Response Flow**

**Step 1: Dermatologist Assignments**

The Teledermatology Project Facilitator (a senior Dermatologist) is responsible for assigning a Dermatologist each day to review and respond to any consult requests in the Telemedicine Consult Management System - Dermatology.



**Step 2: Responding to the Consult Request**

The on-call Dermatologist reviews and responds to both new and pending consult requests once in the morning and once in the afternoon.

**Step 3: Dermatologist Completes Questionnaire**

The on-call Dermatologist completes the on-line Consultant's Questionnaire.

**Step 4: Automated E-mail**

The Telemedicine Consult Management System automatically sends an e-mail message to the requesting site Consult Manager and Referring Health Care Provider informing them that the consult request is complete and the results are in the Teledermatology System.

**Step 5: Site Notification**

The Consult Manager accesses the consult response and prints out a completed SF 513. The SF 513 is placed into the site Telemedicine Patient Record and the record is given to the Health Care Provider for further action.

**Step 6: Patient Follow-Up**

The Health Care Provider notifies the Patient that the consultant's recommendations are in and either sets up an appointment for the Patient or notifies the Patient to pick up the required medication(s) with instructions.

**Step 7: HCP Signs SF 513**

The Health Care Provider will sign the bottom of the SF 513 and indicate the date the Patient was contacted for follow up treatment. The signed SF 513 is placed into the Telemedicine Patient Record.

**Step 8: HCP Completes Questionnaire Part 2**

The Health Care Provider completes the Requesting Physician's Questionnaire, Part-2 and places the questionnaire into the Telemedicine Patient Record. The Telemedicine Patient Record is then given to the Consult Manager.

**Step 9: CM Processes Questionnaire Part 2**

The Consult Manager validates that the SF 513 was signed and if not, returns the Telemedicine Patient Folder to the Health Care Provider for signature. Once the SF 513 is signed, the Consult Manager enters the Requesting Physician's Questionnaire, Part 2 into the Teledermatology System.

**Step 10: CM Stores Telemedicine Patient Record**

**The Consult Manager will store the Telemedicine Patient Record in a secure location where only authorized access is permitted.**

Process Complete.

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## Teledermatology

Tricare Region 1

### Consult Packet Contents

The Telemedicine Patient Record uses a standard patient medical folder with the following documents on either the right or left side of the folder:

On the left side of the Telemedicine Patient Record are the:

1. **Teledermatology Consult Request Form.** This form is a replica of the information found in the secure Web-based Teledermatology System and is filled out by the Health Care Provider.
2. **Requesting Health Care Provider's Questionnaire, Part 1** is filled out before the consult response is received.
3. **Requesting Health Care Provider's Questionnaire, Part 2** is filled out after the consult response is received.

On the right side of the Telemedicine Patient Record are the:

1. **Telemedicine Patient Consent Form (SF 522).** This form is used to get authorization by the Patient for a Telemedicine Consult. The Consult Manager is responsible to ensure the Patient fills out this form.
2. **Patient's Questionnaire.**
3. **SF 513 generated form.**

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## Teledermatology

Tricare Region I

### Deployment Visits & Tasks

There are a number of steps required for a Teledermatology deployment. Each of these step has specific goals and objectives that are required for a successful deployment and to sustain the Teledermatology process at each remote facility.

Typically three site visits are required to get a site completely operational and include:

1. Command Visit and Briefing
2. Technical Site Review and Preparation
3. Training Sessions

Select the above link for goals and objectives of each visit.

---



## Teledermatology

Tricare Region I

### Command Visit & Tasks

The first introduction of Teledermatology to a new site is during the Command visit.

Participants in the Command visit typically include the NARMC Telemedicine Director with the Telemedicine Technicians / Trainers. The objectives of the Command visit are:

1. Explain what Teledermatology is and its effectiveness.
2. Explain what NARMC Telemedicine provides to a new site:
  - Digital Camera
  - Technical Support for Set Up
  - Teledermatology Training
3. Explain local site requirements for Teledermatology:
  - Work Space
  - Consult Manager
  - WINTEL PC
  - Laser Printer
  - Internet Access
4. Explain the role of the Consult Manager.
5. Explain the consult flow process.
6. Discuss the selection of Consult Manager(s).
7. Acquire Command commitment for a Consult Manager and name if possible.
8. Tour the local facility.

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## Teledermatology

Tricare Region I

### Technical Visit & Tasks

The technical visit is designed to prepare the site technically to use Teledermatology.

Participants in the technical visit typically include one or two Telemedicine Technicians / Trainers. The objectives of the technical visit are:

1. Review the area selected for conducting Teledermatology.
2. Ensure Internet Access.
3. Review the WINTEL PC for:
  - Enough Disk Space
  - Adequate Horsepower
  - Appropriate Browser
  - Appropriate Cache Size
4. Load Digital Camera Software.
5. Identify Image Download Options (PCMCIA Card Reader | Direct Cable)
6. Test Digital Camera and Download Procedures.
7. Test Teledermatology Consult Generation.
8. Load software for removing old digital images.

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## Teledermatology

Tricare Region I

### Training Visit & Tasks

The training visit is designed to train the Consult Managers and Referring Physicians on how to use the Teledermatology system.

Participants in the training visit typically include one or two Telemedicine Technicians / Trainers and may include a physician from the medical center. The objectives of the training visit are:

1. Transfer Digital Camera to New Site Property Book.
2. Train Consult Managers on the Digital Camera.
3. Train Consult Managers on how to take Dermatology Images. (Guide Provided)
4. Train Consult Managers and Referring Physicians on Consult Flow Process. (Consult Folder Provided)
5. Train Consult Managers on the Teledermatology Web-Based Application. (Guide Provided)
6. Register Consult Managers and Referring Physicians on Web-Based Application.

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## Teledermatology

Tricare Region I

### Lessons Learned

The following categories provide lessons learned with the NARMC Teledermatology System development, administration, deployment, and training.

Development Lessons Learned

Administrative Lessons Learned

Deployment Lessons Learned

Training Lessons Learned

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Teledermatology

Tricare Region I

## Development Lessons Learned

1. Have a System Modification Tracking System to track all trouble/problem reports on the system as well as all system modification for improvement.
2. Adhere to software testing procedures.
3. Establish and maintain good system documentation which will allow new software engineers to be able to easily get up to speed on the design and implementation plan for the system.

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Teledermatology

Tricare Region I

## **Administrative Lessons Learned**

- 1. Probably the most important aspect of the project is to get Command buy-in. Without Command support, the best technology and business practices are wasted. With Command buy-in, there is support for the project to succeed.**
- 2. Follow up and more follow up is required to keep the sites active. Without genuine concern and support from the medical center, the remote clinics forget about Telemedicine and the technology. We must remember that we are changing the medical normal business practice with Telemedicine.**
- 3. Provide an easy method for feedback from the users and have a system to track that feedback. When users know we truly value their concerns and comments they are far more supportive. To further support this, we have added to the Teledermatology server an Engineering Change Proposal (ECP) system. Any valid user can generate a request for an ECP. All ECPs are reviewed and prioritized for action or discarded based upon their need and effort.**
- 4. A full-time Consult Manager/Administrator is required at the medical center. There are a number of action items that this person is required to perform on almost a daily bases. Without this support, the system quickly is caught up with a number of problems and users loose trust in its support resulting in the project taking a set back.**
- 5. Ensure the Command personnel know the purpose and role of the Consult Manager, and that a full-time Consult Manager is assigned. There should be only one Senior and two Alternate Consult Managers assigned to a site and they need to be registered in the Consult Manager's Email Group to receive the weekly messages.**
- 6. Ensure you have the name and email address of the remote site Command personnel as occasionally, they too, are sent the Consult Manager's weekly message.**
- 7. Communicate, communicate, communicate. As you start working with a new site, make sure that everyone is aware of what you are trying to do and especially the Command personnel.**
- 8. Ensure that all user email accounts are valid and tested, otherwise the system will not work. This includes Consult Managers, Referring Physicians,**

**Consultants, and Command personnel email addresses.**

- 9. Ensure that all consults are monitored and closed out in a timely manner. Frequently consults are responded to by the Dermatologist, but the Consult Manager fails to review and forward them to the Referring Physician for closure. As a result, the Patient suffers.**
- 10. Ensure that the questionnaires are monitored and completed. Without the questionnaires, detailed analysis of the data is impossible and evaluation of the system is skewed.**
- 11. Ensure that the Dermatologists at the medical center have full acceptance of the system. You may need to spend extra time with them, assisting them, and providing additional support to ensure there is a sense of ownership and acceptance of the system. If they are not comfortable with the system, the process will fail. Solicit their ideas for improvement and follow through!**
- 12. Ensure you coordinate with the remote site Property Book Office(PBO) to transfer the equipment and that all your paperwork is in order. Ensure you get the PBO name and phone number for future contact if necessary.**
- 13. The System Administrator must regularly monitor the Consult Status Pop-Ups and notify sites if a consult sits too long in an unanswered status.**
- 14. Ensure that when a user registers, that they enter the site name in the correct format, i.e. Fort Meade, not Ft. Meade. The name format is that which is defined in the facility table. Be sure not to have different formats for the same facility.**
- 15. Ensure that the user has the correct version of Internet browser. Netscape 4.0+**

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Teledermatology

Tricare Region I

## Deployment Lessons Learned

1. Develop an equipment set up check list to ensure that all aspects of the set up are standardized as much as possible.
2. The newer the equipment the better the performance. A site can use a 486/66, but a Pentium II 450 MHz is much better.
3. The software has been optimized for Netscape Communicator version 4.0 or higher. The software will work with Netscape 3.0 or Microsoft Explorer, however, not all features are operational.
4. Ensure the machine running the Teledermatology System has adequate space on the hard drive as it will collect and process a number of image files over a period of time. The image files may be erased once the consult is complete, however, most people do not perform routine file maintenance on their PCs.
5. Ensure that the browser cache size is at least 20 megabytes to allow for browser images to be stored readily. The cache file should be erased on a regular bases to keep the system working at its best performance.
6. Ensure that the remote site computer support personnel are in support of the project as you will need their support for simple types of problems the user may have later on. Make sure you get their names and phone numbers for later use if need be. You may want to include them in the Teledermatology News Briefs to help keep them informed of the project.
7. The PCMCIA Card will need to be reformatted after high usage and eventually replaced. Fort Myer who has done over 200 live consults is having problems with their PCMCIA Card. Upon reformatting the card, the problems were taken care of and the reformat did identify several sector errors. The card will need to be replaced eventually which is the responsibility of end user.

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Teledermatology

Tricare Region I

## Training Lessons Learned

- 1. Training is multifaceted and must be presented to the Command Staff, the Physician Staff, and the Consult Managers.**
- 2. Establish a fixed training plan that is executed at each site. This provides consistency and established a baseline from which all training is given.**
- 3. Training is a reoccurring task and multiple visits are required over time to keep the site engaged in Teledermatology and Telemedicine.**
- 4. Ensure that the equipment going to a remote site is 100% operational! Test it again and again before you take it out in the field.**
- 5. Know your equipment inside and out; be able to troubleshoot it if need be. Nothing like going to the field and finding yourself stuck with bad equipment and you are not able to fix it.**
- 6. Provide the trainees with handouts even if they are not 100% updated. Folks like to have something to fall back on. The handouts are also able to be used for JACHO requirements. Many of the handouts are available on the Teledermatology Web site under the Documentation option.**
- 7. Ensure you coordinate your training with the site personnel before hand to get maximum participation. Nothing like showing up to conduct training and only one person shows up to be trained. Keep the Command informed of what you are doing.**
- 8. Recognition for training carries added benefits for both the trainers and the trainees. Provide a training certificate that outlines the training provided. Identify and recognize those exceptional Consult Mangers going the extra mile, perhaps with a Command Coin or other award.**
- 9. Consult Managers must check the status on consults on a regular basis. A number of referring physicians have stated that they submit a consult and do not get a response back for long periods of time. Frequently, the consult has been responded to and is sitting in the referring sites queue.**

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## Teledermatology

Tricare Region I

# **DRAFT -- Dermatology Business Practice -- DRAFT**

**DEPARTMENT OF THE ARMY**

**HEADQUARTERS, WALTER REED ARMY MEDICAL CENTER**

**WASHINGTON, DC 20307-5001**

**21 January 1999**

### **Medical Services**

#### **TELEMEDICINE: TELEDERMATOLOGY D CLINICAL BUSINESS PRACTICE**

- 1. PURPOSE.** This pamphlet provides guidance for using the World Wide Web for the NARMC Teledermatology program..
- 2. APPLICABILITY.** This pamphlet pertains to personnel for all activities supported by NARMC for Teledermatology consultations.
- 3. REFERENCE.** Initial.
- 4. EXPLANATION.** Teledermatology is available to provide electronic consultative services between the WRAMC Dermatology Service and health care providers throughout the NARMC and other supported commands. Teledermatology will (1) improve doc-to-doc communication, (2) assist in patient care decisions, (3) improve access to dermatologic care, (4) provide medical treatment facilities with on-line second level review and (5) optimize use of dermatologic resources.
- 5. RESPONSIBILITIES.** Responsible organizations for the program will include the offices from the NARMC, WRAMC, NNMCM, MGAFCM, and USUHS.
  - a. Walter Reed Army Medical Center:** is the primary proponent for developing the Teledermatology program and clinical business practice.
    - (1) Department and Service Chiefs:** will ensure Teledermatology consults are answered within 72 hours. Identify the responsible clinician (by a permanent

schedule) who will answer consults on a twice daily basis; others can comment if they desire.

**b. MTF Commanders and Commanders at all levels:**

**(1) Actively support effective and efficient implementation of the Teledermatology program within their area of operation.**

**(2) Manage and review all department participation, coordination and training.**

**(3) Provide oversight of procedures.**

**(4) Ensure the usage of Teledermatology before a patient is referred to a civilian health care provider.**

**6. PROCEDURES. General Clinical Guidance.**

**a. Referring Physician/Case Manager.** Before sending the Teledermatology consult, request assistance from the Dermatologist at your MTF if there is one. If a consult manager exists at the MTF, they are responsible to keep the health care provider informed on the status of the patients consult.

**(1) MTFs that have already been contacted by the Telemedicine Directorate at WRAMC can look up registration and consult procedures in the users guide.**

**(2) MTFs that have not been previously contacted by the Telemedicine Directorate may call the NARMC Telemedicine Directorate (202-782-4028) to schedule a visit and receive further instructions on being connected to the Teledermatology consult system..**

**b. Outside of the NARMC.**

**(1) Attempts are being made to have military dermatologists working within their medical regions answer the teledermatology consults for that region. These doctors would log onto a secured web site specifically for that region to answer the consults from that region. Due to access to care problems and patient travel distances, the doctor answering the consult may not be able to see the patient in-person if that were deemed necessary. The patient would be asked to go through the normal referral process for that region. If the dermatologist thought the patient had a dermatologic condition that was deemed urgent, it would be incumbent upon the primary care provider and referral center to see that the patient was scheduled for that urgent consult.**

**7. ARRANGING FOLLOW-UP FOR TELEDERMATOLOGY PATIENTS.**

**a. Referred to WRAMC Dermatology Service:**

**If it is deemed that the patient needs to be seen at the WRAMC Dermatology**



Clinic after the Teledermatology consult, the MTF should go through the normal referral process (Prime, Standard, Extra) to arrange the appointment. If it is deemed that the patient needs to be seen urgently, the patient should be instructed to call the front desk of the Dermatology Clinic (202-782-6173/6174), stating that they are an "urgent teledermatology referral", and they will be given the earliest appointment available. Special dermatology appointments are set aside for urgent cases.

**b. Referred to the DeWitt Health Care System, Dermatology Clinic:**

If it is deemed that the patient needs to be seen at the DeWitt, Dermatology Clinic after the Teledermatology consult, the MTF should go through the normal referral process (Prime, Standard, Extra) to arrange that appointment. If it is deemed that the patient needs to be seen urgently, the patient should be instructed to call the front desk of the Dermatology clinic at DeWitt (703-805-0383), state that they are an "urgent teledermatology referral", and they will be given the earliest appointment available. c. Referred in General:

Patients should always attempt to get a dermatology appointment at the closest MTF with a dermatology clinic. This is accomplished by going through the normal referral process after the teledermatology consult if it is deemed necessary to have an in-person dermatology visit. If a patient needs to be seen urgently, the patient or the referring physician should call the front desk of the nearest military dermatology clinic (or civilian TRICARE provider), state they are an "urgent teledermatology referral", and they will be given the earliest appointment available.

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Teledermatology

Tricare Region I

## Abstracts

The following abstracts were written about the North Atlantic Regional Medical Command (NARMC) Teledermatology System and data collected from that system.

Preliminary Data from Diagnostic Agreement Study-Telederm vs. In Person Evaluation:

The Web-Based Teledermatology Consult System: Preliminary Results From The First 100 Cases:

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## Teledermatology

Tricare Region I

### **Preliminary Data from Diagnostic Agreement Study-Telederm vs. In Person Evaluation**

**CPT Hon S. Pak, MD, LTC Mark L. Welch, MD, COL Ronald K. Poropatich, MD,  
CPT David Harden, MD, COL Paul M. Benson, MD, Linda McKnight.  
Walter Reed Army Medical Center, Washington, DC.**

The military has deployed a store and forward Teledermatology consult system in the Northeastern United States to a number of health clinics. This effort was in part to improve access to dermatology specialty care and to better utilize the dermatology resources in the new managed care era within the military. Although there have been several reports which show higher than 70% diagnostic correlation rate between dermatologists comparing Teledermatology and in-person evaluation, there were issues of inter-observer variability and how this influences the correlation rate.

This study was designed to eliminate the interobserver variability and evaluate solely the diagnostic agreement rate of one dermatologist evaluating a skin lesion via Teledermatology followed by an in-person examination. 113 randomly selected patients from the dermatology clinic at Walter Reed Army Medical Center have been evaluated to date. The diagnosis, treatment, and biopsy rate from the two methods of evaluation were compared independently. The results revealed there was a 93.8% diagnostic agreement rate which included complete (complete match) and partial agreements (diagnosis listed as a possible differential). The recommended biopsy rate was 14% higher using the Teledermatology system. Among the 113 cases, only 1 case (0.8%) was misdiagnosed via Teledermatology which had clinical significance (defined as delayed care or missed skin malignancy).

In conclusion, this store and forward Teledermatology consult system appears to be fairly effective when looking at diagnostic correlation, confirming previous studies. The increased biopsy rate may be due to the lack of familiarity with and lower confidence level using this new system.

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## Teledermatology

Tricare Region I

### **The Web-Based Teledermatology Consult System: Preliminary Results From The First 100 Cases.**

**CPT Hon S. Pak, MC, LTC Mark L. Welch, MC, LTC Ronald Poropatich,  
MC**

**Walter Reed Army Medical Center, Washington, D.C. 20307**

The military medical department has a unique mission of providing worldwide medical care from the battlefields and peace-keeping missions to ensuring the health of all soldiers, family members, and retirees during peacetime. Hospital closures coupled with a decreased number of military physicians have left many health care beneficiaries without readily available access to specialty care.

As the northeastern United States military health care region (Tricare Region 1) consolidates to meet patient care goals, the need to provide ready access to care from geographically distant medical subspecialties is essential. In order to continue to provide quality healthcare in the face of decreasing resources, the TRICARE Region 1 Teledermatology consortium has developed a secure web-based "store and forward" consult system designed to allow medical treatment facilities throughout the region to submit dermatology consults.

In realizing that there is very little evaluative data on Teledermatology, we have begun to evaluate our system through the integration of questionnaires for patients, referring physicians, and consultants in addition to telephonic patient follow up. We will report the preliminary data from the first 100 cases received in the first four months since partly deploying the web based Teledermatology consult system in the northeastern United States. We will primarily address system effectiveness, acceptance, effect on access to care, and education value to the primary care physicians.

Summary Evaluation of First 100 Cases: Teledermatology, NARMC 18  
August, 1998

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## Teledermatology

Tricare Region I

### Briefings and Presentations

The following links provide access to numerous briefings and presentations on the NARMC Teledermatology Web-based system.

[Meet the Future of Teledermatology: The World Wide Web](#)

[Teledermatology Service in a Military Health Care System - An Access to Care and Cost-Effectiveness Analysis](#)

[The Impact of the Web-Based Store and Forward Teledermatology Consult System in the National Capital Area.](#)

[Summary Evaluation of First 100 Cases: Teledermatology, NARMC 18 August, 1998](#)

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## Directorate of Telemedicine

Walter Reed Army Medical Center

Briefings / Presentations

### Meet the Future of Teledermatology: The World Wide Web, 6/12/98

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Wide Web](#)

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[Consult Overview](#)

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[Answer New and Pending Consults](#)

[Consultants View](#)

[Recommendations, Step 1](#)

[Recommendations, Step 2](#)

[Recommendations, Step 5](#)

[Consult Form SF 513](#)

[Recommendations, Step 6](#)

[End of Day Report](#)

[Network](#)

[WRAMC Tmed Mr. Carl  
Boocks](#)

[LTC R. Poropatich](#)





# Directorate of Telemedicine

Walter Reed Army Medical Center

## Teledermatology Service in a Military Health Care System - An Access to Care and Cost - Effectiveness Analysis

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[Non-Dermatologists Treatment of Skin Diseases](#)  
[Teledermatology Study Intervals](#)  
[Teledermatology Study Summary](#)  
[Referring Physician Evaluation Response](#)  
[PPT Slide](#)

**Author:** [COL Ronald K. Poropatich, MD](#)

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[Download presentation source](#)





# Directorate of Telemedicine

Walter Reed Army Medical Center

## Teledermatology, NARMC 18 August, 1998

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[Teledermatology,  
NARMC 18 August,  
1998](#)

**Email:** [hpak@bethrad.med.navy.mil](mailto:hpak@bethrad.med.navy.mil)

**Home Page:**

<http://www.wramc.amedd.army.mil/departments/medicine/derm>

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Research  
Credit

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## Directorate of Telemedicine

Walter Reed Army Medical Center

### TeleDermatology Sites

#### Army Sites:

##### The Walter Reed Health Care System:

Fort Meade Hospital, MD  
Fort Detrick Clinic, MD  
Carlisle Barracks Clinic, PA  
Aberdeen Proving Grounds Clinic, MD

Fort Belvoir Hospital, VA  
AP Hill Clinic, VA  
Fairfax Clinic, VA  
Pentagon Clinic, VA  
Fort Myer Clinic, VA  
Woodbridge Clinic, VA

Fort Knox, KY

Fort Dix, NJ  
Fort Monmouth, NJ

West Point, NY  
Fort Drum - Connor, NY  
Fort Drum - Guthrie, NY

Fort Hood, TX

Fort Lee, VA  
Fort Eustis, VA

#### Air Force Sites:

Dover Air Force Base, DE  
Bolling Air Force Base, VA

#### Navy Sites & Ships:

**National Navel Medical Center, MD**  
**Annapolis, MD**  
**Pax River, MD**  
**Quantico, VA**  
**Camp Lejeune, NC**

**USS Carl Vinson**  
**USS Enterprise**  
**USS Bonhomme Richard**  
**USS George Washington**

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Teledermatology

Tricare Region I

## Accessing the Teledermatology System

The Web-Based Telemedicine Consult Management System is accessible through the following Universal Record Locator (URL): <http://TMED1-Region1.Tricare.OSD.MIL>

Once you access the URL, you must select the registration option to register to use the live system. Account verification is done through the site Senior Consult Manager or the Commander to ensure that only authorized users are registered to use the system.

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# WELCOME TO THE TELEMEDICINE WWW SERVER



## WWW Telemedicine Consult Management Systems

- Teledermatology v. 2.1

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# Teledermatology

Tricare Region I

## Project Participants

The NARMC Teledermatology Project was developed and deployed by a consortium of Tri-Service members with the Walter Reed Army Medical Center Telemedicine Directorate and Dermatology Service primarily responsible for the project. The following organizations and members participated in this project:

**Walter Reed Army Medical Center  
Telemedicine Directorate**

COL Ron Poropatich, MD  
Ms. Daisy DeWitt  
Mr. Tom Bigott  
Dr. Valdimir Bedanov, Ph.D.  
Mr. Carl Boocks  
Mr. Ellison Bowman  
Mr. Zhengyi Sun  
CPT Andrew Hagemaster  
SGT Brian Robinson  
SGT Terrell Vaughn

**National Navel Medical Center  
Telemedicine Office**

CAPT Rich Bakalar, MD

**Walter Reed Army Medical Center  
Dermatology Service**

Dr. Mark Welch, MD  
MAJ Hon Pak, MD

**Uniformed Services University  
of the Health Sciences  
Dermatology Department**

CAPT Dennis Vidmar, MD  
COL Len Sperling, MD

**National Navel Medical Center  
Dermatology Service**

CDR Jim Powers, MD

**Malcom Grow Medical Center  
Dermatology Service**

Col Brian Davis, MD  
Maj Paul Rolincik, MD

Email the Project Manager

## **Appendix G**

### **Computer Based Training Module (CBTM)**



### **Computer Based Training Modules (CBTM)**

Teledermatology Computer Based Training Modules (CBTM) consist of four information areas. The Patient Information module will survey all the teledermatology resources available within a patient's regional medical command (RCM) and request patient participation consent. The Consult Management System Tutorial is an interactive CBTM which will provide consult managers and referring providers training in uploading dermatology images and text and in transmitting compiled patient data to a MEDECN located client-server, where a consulting dermatologist will make treatment recommendations. A third module -- The Digital Camera Tutorial -- will offer consult managers and referring providers digital imaging training. This instructional tool includes introductory and continuous photography training components that profile three digital cameras. The Dermatology Atlas module will provide targeted diagnosis training to referring physicians.

## **Appendix H**

### **AMEDD Teledermatology Engineering Change Proposals**



# Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0260

Priority: Medium

Abbreviated Title: **Stored procedure used to enhance the performace.**

Date Submitted: 03-Aug-00

Date Assigned: N/A

Assigned To:

N/A

Date Started: N/A

Date Completed:

N/A

Estimated Time: N/A

Actual Time:

N/A

Submitted By: Zhengyi Sun

### Task Description:

1. For the Tmed consult reports, these stored procedures was created to enhance the database performance.

The stored procedures are listed as follows:

A. test\_consults\_leftdate  
test\_consults\_rightdate  
test\_consults\_bothdate  
test\_consults\_nodate

The stored procedures in group A are used to calculate the number of test consults within a period of time.

B. numberofconsults\_bothdate  
numberofconsults\_leftdate  
numberofconsults\_nodate  
numberofconsults\_rightdate

The stored procedures in group B are used to calculate the number of real consults within a period of time.

C. numberofcmg\_bothdate  
numberofcmg\_leftdate  
numberofcmg\_nodate  
numberofcmg\_rightdate

The stored procedures in group c are used to calculate the number of consult managers who have been registered in the system within a period of time.

D. numofphy\_bothdate  
numofphy\_leftdate  
numofphy\_rightdate  
numofphy\_nodate

The stored procedures in group D are used to calculate the number of referring physician who have been registered in the system within a period of time.

E. numofphy\_bothdate  
numofphy\_leftdate  
numofphy\_rightdate

numofphy\_nodate

The stored procedures in group D are used to calculate the number of referring physician who have been registered in the system within a period of time.

F: updatepatient

The stored procedure is used to speed up patient information update.

G: addpatient

The stored procedure is used to speed up adding patient information.

---

Comments:

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## Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0262

Priority: Medium

Abbreviated Title: **Reference for diagnosis and Recommendations**

Date Submitted: 03-Aug-00

Date Assigned: N/A

Assigned To:

N/A

Date Started: N/A

Date Completed:

N/A

Estimated Time: N/A

Actual Time:

N/A

Submitted By: Zhengyi Sun

## Task Description:

## 3. Reference for diagnosis:

Created the reference for diagnosis for doctors on the second options of Telederm menu. This feature is used for training purpose; it allows a person to be familiar with steps of creating consult.

## 4. Reference for Recommendations:

A quick reference for consultant doctors to use to check the information on options for diagnosis, treatment, followup, and disposition.

Comments:

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## Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0263      Priority: Medium

Abbreviated Title: **Password length checked**

Date Submitted: 03-Aug-00

Date Assigned: N/A

Assigned To:

N/A

Date Started: N/A

Date Completed:

N/A

Estimated Time: N/A

Actual Time:

N/A

Submitted By:

## Task Description:

Password length: To check user's password length on the physician information page.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0261

Priority: Medium

Abbreviated Title: **Database backup mechanism**

Date Submitted: 03-Aug-00

Date Assigned: N/A

Assigned To:

N/A

Date Started: N/A

Date Completed:

N/A

Estimated Time: N/A

Actual Time:

N/A

Submitted By: Zhengyi Sun

## Task Description:

2. Created the database and transaction log backup devices and scheduled the database backup every week at 12:00:00 AM.

The database device created is telederm\_data\_backup.

The transaction log created is telederm\_translog\_backup.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0264		Priority: Medium	
Abbreviated Title: <b>truncate the transaction log</b>			
Date Submitted: 03-Aug-00			
Date Assigned: N/A	Assigned To:	N/A	
Date Started: N/A	Date Completed:	N/A	
Estimated Time: N/A	Actual Time:	N/A	
Submitted By: Zhengyi Sun			
Task Description: The telederm transaction log has been truncated periodically to enhance the database performance.			
Comments:			

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## Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task #: ECP-0265

Priority: Medium

**Abbreviated Title: The steps to apply and install the CA Certificate on O'REILLY Web server**

Date Submitted: 03-Aug-00

Date Assigned: N/A

Assigned To:

N/A

Date Started: N/A

Date Completed:

N/A

Estimated Time: N/A

Actual Time:

N/A

Submitted By: Zhengyi Sun

## Task Description:

## I. Generate the CSR.

1. Open Server Properties
2. Click New Key Pair
3. Click Next to start building the DN(Distinguish Name)
4. On the first DN page, select the Common Name (CN) of the server for which you are requesting a certificate from the dropdown list.
5. On the Organization Name page enter the Organization Name and the Organization unit or department.
6. On the Location of Organization page, enter the locality, state, and country where the server is located.
7. On the Requestor Information Page, enter the name of the requestor and the requestor's email address.
8. On the Request Disposition page, specify the file in which to save the certificate signing request for transmission to the CA. The Request will be saved in standard PKCS #10/PEM format.
9. Clicks next to have the wizard generate the key pair and certificate request. The wizard prompts you to type randomly to create the necessary entropy to ensure strong encryption.
10. When the process is completed, the Congratulations page appears, Click Done to exit the wizard.
11. Make a backup copy of the certificate signing request and King Ring database file (\\WebSite\\Admin\\website-key).

## II. Have the Public Key Signed.

1. Open the CSR you just created in Step1 using Notepad, copy the stuff begins from "-----Begin Certificate Request---" till "-----End certificate Request---" (includes "-----Begin Certificate Request---" and "-----End certificate Request---").
2. Paste it to the text area on the CA web page and submit the CSR to CA.

## III. Attach the certificate to the Key Ring.

1. After you receive your server ID from the CA. You will attach it to the Key.
2. Save the certificate portion of the form contents from the CA into a text file. The certificate should be in X.509 / PEM format and start with,  
-----BEGIN CERTIFICATE-----

and end with:

-----END CERTIFICATE-----

Make sure you include the bounding lines in the certificate file. Name the file as filename.pem.

3. Open Server Properties and click Key Ring.
4. Right-click the appropriate certificate request (identified by the key-question mark icon and name of the server for which you requested the certificate)
5. Locate the certificate file you saved in Step 2.
6. Click open to attach the certificate to request in the Key Ring. The file browse window closes and the certificate request changes to a full certificate (green key, no question mark icon) in the Key Ring window.
7. Close Server Properties to update the server.

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0248

Priority:  
High

Abbreviated Title: **Trouble Report - Fix for BAMC site information and minnor modifications**

Date Submitted: 07-Jun-00

Date Assigned: N/A      Assigned To: N/A

Date Started: N/A      Date Completed: N/A

Estimated Time: N/A      Actual Time: N/A

Submitted By: Dr. Hon Pak / Tom Bigott

### Task Description:

Submit Consults

Step 4: Physical Exam

1. Primary Lesion : Include "Other" as a choice and allow a box to type in free text.

Answer Consults Step 1

2. Diagnosis: Add an option to type in a diagnosis here(additional field)

3. Put this underneath the diagnosis in the following layout:

\*Image/Picture is inadequate for diagnosis. Please submit new images.

### Treatment

- No Tx needed:
- Condition is benign/Self limited. No treatment is needed.
- Observe for any changes. Re-consult if lesion changes or symptoms worsen.
- Biopsy required:
- Refer patient to following location for a biopsy:
- Wilford Hall Dermatology Clinic
- BAMC Dermatology Clinic
- Darnall Dermatology Clinic
- Perform
- Shave biopsy
- Punch biopsy

- Excisional biopsy

Answer Consult Step 2

Follow Up(should look like this:)

- No Follow Up Need for this Patient.
- Patient should follow up with you in \_\_ wks at your clinic for a re-evaluation.
- Have the patient call the following clinic for follow up within \_\_days/wks  
BAMC Dermatology, phone: (210) 916-4408  
Wilford Hall Dermatology, phone: (210)292-5378  
Darnall ACH Dermatology, phone: (254)288-8080

---

Comments:

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Teledermatology

Tricare Region I

## Teledermatology Engineering Change Proposal

Task # : ECP-0251

Priority:

Immediate

Abbreviated Title: **Trouble Report - Fix for BAMC Email Notification**Date  
Submitted: 12-Jun-00Date  
Assigned: N/A Assigned  
To: N/ADate Started: N/A Date  
Completed: N/AEstimated  
Time: N/A Actual  
Time: N/A

Submitted By: Dr. Hon Pak / Tom Bigott

## Task Description:

Email notice does not work for except when Dr. Pak submits and replies - not for others. However, when an amendment is submitted, this works. Also further tests seem to indicate that the consult manager and the consultant are getting the notification messages --- NOT the referring physician. Please investigate and correct.

Comments:

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## **Appendix I**

Eliasson & Poropatich (Performance Improvement in  
Telemedicine: The Essential Elements, Military Medicine  
1998;163,8:530)

## Performance Improvement in Telemedicine: The Essential Elements

COL Arn H. Eliasson, MC USA

LTC Ronald K. Poropatich, MC USA

Performance improvement activities in telemedicine may be placed into five categories. (1) Licensing and credentialing. Telemedicine overcomes geographical boundaries, but its reach is constrained by state laws on licensing. Some states require a state license, whereas others grant "consultation exemptions" for out-of-state physicians. Simple renewable licenses do not guarantee quality. Potential solutions include a national telemedicine license or license reciprocity laws for telemedicine. (2) Data security and privacy. Telemedicine technology raises some security concerns. Differences in reporting requirements among states complicate the issue of privacy. Storage of telemedicine consultation records may help physicians document care decisions for risk management, but conventional long-term storage may not be feasible because of cost constraints and may not be required to document the encounter appropriately. (3) Informed consent. Potential failures in security and transmission are new, and should be communicated to the patient. (4) Peer review. Peer review findings encourage thorough, accurate, and legible documentation. Results should be recorded by provider and must be available during the recredentialing process. (5) Tailored performance improvement initiatives. By using established principles and techniques, performance improvement initiatives can gather, analyze, and communicate information about the cost-effectiveness of telemedicine. These performance improvement efforts are the heart of quality management and are critical to the justification of telemedicine. Walter Reed Telemedicine has put into effect a performance improvement plan in accordance with this outline. This article describes the plan and suggests it as a model for other telemedicine programs.

### Introduction

Telemedicine is the use of electronic information and communications technologies to provide and support health care when distance separates the participants.<sup>1</sup> The novelty of telemedicine does not excuse it from traditional standards of medical practice. One such requirement is quality management, for the following reasons: (1) By applying traditional tools of medical practice, we have the greatest hope of ensuring quality. (2). Although few lawsuits provide precedent and guidance for risk management practices in telemedicine,<sup>2</sup> clear and complete documentation of medical information and careful delineation of the decision-making process are the most effective risk management tools. Quality management makes such documentation an expectation rather than happenstance. (3) A proactive anticipatory approach will enhance the regulation and design of tele-

medicine practice. (4) New applications of technology carry the burden of proving cost-effectiveness to the payers, no matter how intuitive this value may appear.<sup>3</sup> Quality management tools emphasize the collection of this type of information for analysis and presentation to aid performance improvement (PI) decisions. The purpose of this paper is to outline and discuss the key elements of our institution's PI plan for telemedicine. It may serve as a model for others embarking on the practice of telemedicine.

### Background

Quality management in medicine has passed through stages of development just as medicine itself has made discrete advances in both knowledge and technology. Early efforts directed predominantly at laboratory testing used techniques of quality control (QC). QC evolved to include the evaluation of clinical practices using quality assurance (QA) methods.<sup>4</sup> This early effort at peer review focused on identifying outliers and determining the basis for the deviation. If such deviation was the result of poor practice, the individuals responsible would be sanctioned. Understandably, QA met some resistance from practitioners who felt vulnerable to this punitive approach. QA embraced a philosophical change as it matured into quality improvement (QI) and attempted to avoid the punitive, outlier-oriented methods.<sup>5</sup> The QI emphasis was on finding systemic problems that could be corrected, thereby identifying ways to shift normative thresholds so that the whole system showed improvements in the quality of care provided. QI then moved to PI, which directs attention toward improving all aspects of the delivery of medical care, including cost-effectiveness, efficiency, and patient satisfaction in addition to technical quality of care. As quality management moved through the various developmental stages, the old ways were not abandoned, but rather were continued as appropriate, and built upon, so that PI includes and incorporates principles of QC, QA, and QI and extends the concept with important innovative PI principles.<sup>6</sup> This complexity has perhaps been a source of frustration for quality managers in medicine who, although the mission grew ever larger, saw no concomitant expansion of resources. In reality, the tools to perform the mission have become more flexible and powerful with PI. The resources to put PI into effect include the entire organization and all its members who are empowered by PI training, tools, and philosophy.

### The Essential Elements

PI activities in telemedicine at Walter Reed Army Medical Center have been organized into five categories: (1) licensing and credentialing, (2) data security and privacy, (3) informed consent, (4) peer review, and (5) tailored PI initiatives. The promise of invasive procedures via telemedicine, currently described as

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The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

This manuscript was received for review in August 1997. The revised manuscript was accepted for publication in December 1997.

virtual surgery,<sup>7</sup> may one day become a reality. This development would engender a sixth PI activity, namely, tracking the four dimensions of invasive procedures: selection and preparation of the patient, performance of the procedure, recovery of the patient, and arrangement for follow-up. Well-delineated programs exist at all teaching hospitals to serve as models for tracking invasive procedures. Because virtual surgery remains a potential but unrealized dimension of telemedicine, it will receive no further attention in this paper. The other dimensions of telemedicine PI activities deserve further discussion and explanation.

### Licensing and Credentialing

For centuries, close inspection of a practitioner's credentials and control of the practice of medicine through granting of licenses formed the backbone of quality management in medicine. Physicians' training and professional recommendations were reviewed and, if accepted, physicians were given lifelong blanket approval to practice medicine as long as they were not convicted of any crimes. Licensing is codified in the Tenth Amendment to the Constitution, which reserves to the states the powers not delegated to the federal government. However, as the nation has seemingly grown smaller by enhanced means of travel and more accessible modes of communication, state sovereignty over certain functions has come into question, especially when it pertains to matters of interstate commerce. Specifically, the principles of medical licensing are coming under new scrutiny. The fundamental shift in thinking occurs in the wake of telemedicine's greatest power, which is the ability to reach out to underserved regions irrespective of geographical and political boundaries. Although radio waves and satellites travel without legal restrictions, regulatory bodies are left pondering the effect of clinical information exchange. The problem arises when the patient lives in one state and the provider lives and practices in another. Licensing can be viewed both as an attempt to maintain quality standards and as a mechanism to preclude competition.<sup>7</sup>

The responses of states to the question of licensing have varied substantially. At least 6 states bar physicians without a state license from practicing telemedicine within their borders, and at least 18 others are considering similar restrictions.<sup>8</sup> The Attorney General for the state of Mississippi, on the other hand, rendered an opinion that an out-of-state physician who is not physically practicing within the state is not required to be licensed.<sup>9</sup> The majority of states are finding partial solutions by providing for "consultation exemptions" for out-of-state physicians who are consulted by physicians licensed in those states.<sup>10</sup> Other solutions may eventually be found in reciprocity among bordering states, granting licenses that are limited to specific practices via telemedicine, or the creation of a national telemedicine license.<sup>7,11</sup> In the final analysis, a medical license in itself does not serve as a quality guarantee. Succinctly put by Gardy, "In reality, a license that can be renewed indefinitely is not an adequate measure of current or future competence. Outcome assessments of a health care provider's activities, which can be measured monthly, half yearly, or other intervals, are likely to be a more relevant and accurate measure of performance."<sup>3</sup>

The issue of credentials runs a parallel course. The Joint Commission on Accreditation of Healthcare Organizations has

declared that telemedicine consultants would not be required to have a certain hospital's credentials so long as the telemedicine consultant does not write orders in the local chart.<sup>8,11</sup>

The issues of licensing and credentialing are not likely to be resolved easily. Recently, the House of Delegates of the American Medical Association adopted a major policy change asserting that physicians practicing telemedicine should be fully licensed in every state where their patients are located, not just the state where they practice.<sup>12</sup> The rationale for this policy is to control profiteering and to avoid federal infringement on state rights. The College of American Pathologists has also declared that limited licenses allowing the physician to perform the same services within the same state creates a double standard. "The physician should be as qualified as those who practice there all of the time."<sup>13</sup> These issues clearly affect the administrative policies of military health care facilities.

The U.S. military system may serve as a model for solutions to some of these problems. Military physicians are required to have one state license, no matter where they provide patient care. The one state license suffices as the license of record and provides the initial QC for every military practitioner. All military practitioners are credentialed in the institution where they provide medical care. Telemedicine consultations are assumed to occur in the home institution where the provider is credentialed. It follows logically that the patient's images or tracings are transported to that institution just as biopsy specimens or electrocardiograms are sent to referral centers. Credentials, therefore, must cover the full spectrum of consultative care, but only at the home institution. This rationale has support in the civilian sector.<sup>7,11</sup>

### Data Security and Privacy

Privacy and security have to be ensured at both ends of the telemedicine consultation. Ultimately, the responsibility for such assurance has to be defined. This security includes barring unauthorized access to medical records, laboratory results, images, conversations, diagnoses, and any other medical information, including patient names, ages, and procedures performed. Furthermore, the chief of the telemedicine service or a suitably qualified representative (such as the director of information management) must survey the security requirements inherent in the communications technologies used to provide telemedicine. Although such a policy is easy to mandate, true security may be difficult to achieve. New methods of authentication and encryption hold promise for preventing access, intervention, and diversion of electronic information such as telemedicine consultations. These security technologies should be put into effect in medicine, where a patient's right to privacy is universally accepted.

Other privacy issues arise because of telemedicine. For example, states differ in their information reporting requirements. Some states require physicians to disclose to the state the names of sexual partners of patients positive for human immunodeficiency virus, whereas other states prohibit the release of such information.<sup>8</sup> When telemedicine bridges these states with dissimilar reporting requirements, a determination will have to be made concerning reporting of the names of sexual partners. These conflicts create questions concerning maintenance of appropriate patient privacy.

Creating a video for consultative medical care constitutes the



creation of evidence for consideration in a legal dispute. Should videos be stored for the same length of time required of medical records? Conventional wisdom is that most malpractice cases are not concerned with what was not done, but rather with what was not recorded. If this holds true, videotapes would provide bolstering evidence for the defense.

However, storage is no small task considering the sheer bulk of videotapes and the difficulties of cataloging these tapes for retrieval. The Interagency Committee on Medical Records (a governmental committee represented by 13 government institutions including Veteran Affairs, National Institutes of Health, and branches of the military) produced a policy statement calling for the destruction of video images after written documentation was complete.<sup>14</sup> This policy assumes that telemedicine consultation is analogous to face-to-face encounter with a health care provider, which is rarely, if ever, videotaped. During the patient-provider encounter, nonverbal clues are observed and considered. Important or contributory clues are recorded in the written record. The record then serves as a distillation of the face-to-face encounter and serves as the provider's account of what occurred. In our Telemedicine Service, only videotapes that are of educational value are saved. All other videotapes are summarized as written records with pertinent still images of video clips appended for archiving in the main record storage system. Videotapes are destroyed after the written documentation is complete.

Telemedicine demands that an electronic medical record of the patient be shared, often across state lines. Federal legislation regulating the confidentiality and privacy of data passing over an interstate network is lacking. For the most part, confidentiality and privacy laws have been enacted on a state or local basis without regard to overlap or consistency across state lines. Patients receive care in more than one state, and information about them is often moved electronically across state borders to obtain payment, which enables providers to operate in many states. In its administrative simplification requirements, the Health Insurance Portability and Accountability Act of 1996<sup>15</sup> calls for uniform standards for electronic transactions in health administration precisely because separate standards developed at other than the national level are not workable. This act established several provisions relating to confidentiality of medical records as they are handled in health insurance, billing and payment data, and the like. How these are worked out will have implications for how data are accessed and processed in health research as well as telemedicine.<sup>15</sup>

Congress has provided for confidentiality protection for a limited class of information if legislation is not enacted. Versions of an omnibus Medical Records Confidentiality Act<sup>16</sup> are being considered by the U.S. Congress, as is a Genetic Confidentiality and Discrimination Act. Some states are revising their medical-privacy laws covering information on mental health, human immunodeficiency virus-acquired immunodeficiency syndrome status, or genetics. All of these will have implications for research and potentially for telemedicine. If Congress does not enact legislation on standards for privacy of health information transmitted in connection with financial and administrative transactions, the Secretary of Health and Human Services must issue regulations with privacy standards for these transactions.

## Informed Consent

It is possible to foresee that a patient may feel that there was inadequate information provided regarding the risks involved in transmitting private information via telemedicine technologies.<sup>8</sup> In most states, failure to obtain informed consent is considered negligence.<sup>2</sup> Traditionally, the requirement for informed consent was limited to invasive procedures beyond placement of intravenous lines, Foley catheters, and nasogastric tubes. However, the high risks involved with certain therapies, such as intensive chemotherapy, have made it necessary to obtain signed, informed consent before administering these medications routinely. Within the last 3 years, informed consent has also become required before transfusion of blood products.<sup>17</sup> It is clear that the trend is moving toward a broader application of the informed consent principle.

Robust arguments can be made regarding whether or not the use of telemedicine should be preceded by informed consent. Some have reasoned that telemedicine has been practiced for decades (consultative phone calls, electrocardiogram transmissions, radiography interpretations) without the burden of informed consent. When patients enroll for care in a system that has links with distant consultants, this fact is generally known and in fact may form the basis for the patients' choice of that system.

Countering arguments focus on recent innovations in telemedicine and the ill-defined risks regarding security of information. Poor fidelity of data transmission could cause poor interpretations and improper recommendations. Even with excellent quality of transmission, misdiagnoses can be made, perhaps as a result of the use of telemedicine. Lack of specific informed consent on these particular issues could set the scene for malpractice suits.

Walter Reed Telemedicine recommends obtaining informed consent. Providing an information sheet and asking a patient to sign a consent form are not especially time-consuming. The information sheet shown in Fig 1 is used by the Walter Reed Telemedicine Service to obtain informed consent.

## Peer Review

Peer review, including an effective feedback mechanism to the reviewed provider, is accepted in medical practice. Practitioners in a health care system tend to recognize the value of participating in peer review as long as they participate in designing the objective review criteria to be used. Feedback through the peer review process can serve as an effective means of achieving accurate and legible documentation.

For a determination of whether the care provided meets the standard in the community or whether it can be assumed that the care of the patient is reflected in the documentation, reviewers should be more reasonable if they too are subject to the same scrutiny. The goal is not to find and suspend the licenses of incompetent practitioners (although this may happen). Rather, the orientation is toward discovering systemic problems that can be corrected with better policies or enhanced staffing patterns. The peer review checklist used by Walter Reed's Telemedicine Service is shown in Fig 2.

Feedback from peer review must be provided in an unambiguous and timely fashion. Results of peer review need to be recorded by provider name and kept in a file for each practitio-

Telemedicine Directorate  
Walter Reed Army Medical Center

July 1997

Dear Patient,

During the course of treatment at your local Medical Treatment Facility (MTF), it may become necessary for you to have a telemedicine consultation with physicians at Walter Reed Army Medical Center (WRAMC). This memo provides information on telemedicine (TMED) and the potential benefits and risks of its use in your medical care.

**DEFINITION:** Telemedicine is the use of telecommunications (such as FAX or video teleconferencing) to enhance the clinical information exchange between your local health care provider (HCP) and one located at WRAMC. TMED is a new way to help patients get expert care from medical specialists who are not available locally by using special computers and cameras.

**EXAMPLE:** You have a rash on your arm that is not getting better despite various treatments provided by your local HCP. A photograph is taken of your rash and sent electronically to WRAMC for review by a dermatologist. The dermatologist at WRAMC discusses the rash with your local HCP outlining possible diagnoses and treatment options. Some outcomes of this exchange of information could be that new medicines are prescribed for the rash, or it may be recommended that you be evaluated in person by a dermatologist.

**BENEFITS of TMED CONSULT:** Since February 1993, TMED consultations from remote sites (i.e. Somalia, Haiti) as well as local MTF's in the USA have been performed at WRAMC. From approximately 300 consultations generated (Feb 93-Feb 96), certain conclusions can be made. In 10% of the cases, the patient did not require transfer to another hospital for management of the problem. It is important to note that these patients were scheduled for evacuation but after the TMED consultation was completed, the travel could be canceled. This means that you may not need to travel to another hospital for your medical problem, and can save travel time as well as possible CHAMPUS costs. In addition, in 60% of the cases, a change in treatment was made based on review of the medical pictures and discussion with your local HCP. A change in treatment could mean quicker resolution of your medical problem.

**POTENTIAL RISKS of TMED CONSULT:** The photographic equipment used in TMED are products which you may already be familiar with (such as a video camera for motion picture recording). There are no direct harmful effects of this equipment. There are possible security violations whereby the electronic record of your medical image may be "pirated" or stolen during transmission. This is a theoretical concern and has not been seen in our experience. All medical records collected via the TMED consultation are secured in the TMED Imaging Center at WRAMC. Only medical personnel concerned with your care have access to the records.

**CONSENT FORM:** A consent form (see attached sheet) must be completed for all TMED consultations which transfer medical images from one MTF to another. It is the responsibility of your MTF to counsel you and help you complete the consent form.

**QUESTIONS:** The Telemedicine Directorate at WRAMC is available at (202) 782-4028 to answer other questions which you may have about TMED consultations.

Fig. 1. Information sheet on telemedicine consultation.

ner. This information must be readily available to the chief of the clinical service so that it may be reviewed at times of career counseling, consideration for promotion, and recertification. Renewal of privileges should be based on peer-reviewed, performance-based information. Moreover, the practitioner being reviewed should know the criteria being used to measure performance and be provided with feedback about his or her compliance with the criteria. Properly performed, peer review is far more valuable than the licensing process to verify the quality of work.

Telemedicine presents unique challenges for peer review. Live, interactive videoteleconferences tend to be 15 to 30 minutes long, and interactions of this duration may discourage peer review, especially for an active provider seeing a large number of patients. A sampling procedure may be necessary to make the task more manageable. On the other hand, a "store-and-forward" teleconsultation constitutes an edited version of the consultation and may provide a more manageable length for the

reviewer.<sup>18</sup> The store-and-forward teleconsultation furnishes a computerized patient record with history and physical findings, digital images, and video clips if appropriate. Information condensed in a store-and-forward teleconsultation may be more easily used for a tailored PI initiative as well.

#### Tailored PI Initiatives

Performance improvement initiatives are the heart of quality management. Tailored PI initiatives have the potential to overcome barriers of tradition, conventional wisdom, and departmental organizational structures, all of which represent resistance to change.<sup>19</sup> PI initiatives should be based on proven methods such as FOCUS-PDCA,<sup>6</sup> where the Plan-Do-Check-Act (PDCA) cycle follows Shewhart's concept for effecting improvement.<sup>19</sup> The acronym FOCUS stands for: "F," find a process that needs to be addressed or fixed; "O," organize a team composed of all important owners of the process being addressed; "C," clarify current knowledge about the chosen improvement project, and

# PHYSICIAN CLINICAL SKILLS AUDIT -- TELEMEDICINE CONSULTATION RECORD REVIEW FOR CLINICAL PERTINENCE

Physician Reviewed: \_\_\_\_\_ Clinic \_\_\_\_\_

Patient Initials: \_\_\_\_\_ SSN (Last 4) \_\_\_\_\_

	YES	NEEDS IMPROVEMENT	NO	N/A
1. Is quality of medical images adequate for consultation?	---	---	---	---
2. Does the record readily provide information regarding the:				
Diagnosis (es)	---	---	---	---
General history	---	---	---	---
Pertinent physical exam	---	---	---	---
Medications	---	---	---	---
Lab results	---	---	---	---
3. Do history and database support the diagnosis and management plan?	---	---	---	---
4. Would your approach to this patient or community standards be similar enough to have resulted in essentially the same management?	---	---	---	---
(A NO ANSWER TO #4 REQUIRES EXPLANATION IN ITEM #7, BELOW AND REFERRAL OF THIS FORM (WITH CHART) TO SERVICE CHIEF.)				
5. Conclusions:				
Overall rating acceptable.	---	---	---	---
Record is referred to service chief for further review.	---	---	---	---
6. Were the services rendered within the scope of privileges granted this provider?	---	---	---	---
7. Additional comments:	---	---	---	---

Reviewer: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Note: A copy of this will be retained by the service chief and serve as an ongoing monitor of each HCP and also may provide insight into the practice standards of the reviewing physician.

Fig. 2. The peer review checklist used by Walter Reed's Telemedicine Service.

if current knowledge is insufficient, gather more information before the next step; "U," understand the causes of variation by using a number of useful tools such as fishbone diagrams, organizational charts, and Pareto diagrams; and "S" stands for solution. The team is obliged to choose a solution from the range of possibilities. This solution is implemented with the support and participation of higher authorities in the medical culture. The solution is then subject to the Plan-Do-Check-Act cycle, which should be used to evaluate the success of any PI initiative or major area of concern to the organization. It is yet to be empirically determined whether telemedicine patient-provider encounters are as good as, better than, or worse than one-on-one conventional face-to-face patient encounters. A tailored PI project could provide answers to questions such as this.

PI initiatives are of importance to the survival of telemedicine. It is through well-organized PI initiatives that the cost-effectiveness of telemedicine can be proven, and it is only with cost-effectiveness data that huge outlays of resources can be justified.<sup>3</sup> An important initiative is under way to describe and promulgate new techniques for standardization of cost-effectiveness analysis to enhance comparisons across studies and to improve our ability to interpret cost-effectiveness studies.<sup>20,21</sup>

Telemedicine services would be well advised to embrace these suggestions for standardization. So far, most information in the telemedicine literature has been speculative about cost efficiency,<sup>7</sup> although some telemedicine PI initiatives have provided estimates of cost savings.<sup>22</sup> In one paper, a PI project measured compliance with self-imposed response times to the telemedicine consultations.<sup>18</sup> Through changes in established protocols and software upgrades, the PI team showed an improvement in compliance with expected response times from 86% to 96%. Although this report is noteworthy, to be truly convincing, data need to be gathered and presented to the satisfaction of accountants of the bill payers at the same time that patient satisfaction and good clinical outcomes are verified.

Most telemedicine projects to date have been funded by research grants and pilot programs. With a few exceptions, third-party payers have yet to pay for all telemedicine services, especially consultations.<sup>7</sup> Historically, these organizations have reimbursed only the classic, in-person doctor-patient encounter. Proof of the cost-effective practice of telemedicine will surely get the attention of managed care groups, which would endorse cost-saving initiatives that also provide improved patient satisfaction and convenience.

California appears to be in the vanguard regarding reimbursement issues with the passage of the Telemedicine Development Act of 1996 on August 23, 1996.<sup>23</sup> This act stipulates that insurers will reimburse medical claims resulting from telemedicine and specifically states that "no disability insurance contract . . . shall require face to face contact between a health care provider and a patient for services appropriately provided through telemedicine. . . ."

In July 1997, Congress approved Medicare payments for telemedicine consultations for rural health professional shortage areas. Under the agreed-upon provisions, reimbursement will be established for all eligible part B Medicare services at normal copayment rates. No facility fees or transmission costs will be eligible for reimbursement. It is estimated that this will yield \$100 to \$200 million per year for telemedicine reimbursement starting no later than January 1, 1999.

This legislation, coupled with the earlier provisions in the Telecommunications Act of 1996 and subsequent actions by the Federal Communications Commission, represents two major public policy decisions to help ensure access to health care for all Americans via telemedicine, regardless of geographic location or socioeconomic status.

Tailored PI initiatives should focus on areas of medical practice that are high volume, problem prone, or high cost. By paying attention to these important areas, PI initiatives have a greater likelihood of improving quality and showing that telemedicine is a cost-effective, self-sustaining form of medical practice. The first tailored PI project at Walter Reed Army Medical Center involved the Dermatology Service. The Dermatology Service's work load accounts for more than one-third of all consultations completed, and approximately 95% of the dermatology consultations in telemedicine are store-and-forward type records, which simplifies review of archived cases. After reviewing a portion of dermatology consultations (44 cases) from overseas telemedicine sites, it was found that 20 consultations (45%) resulted in significant changes in diagnosis and 23 (52%) resulted in significant changes in treatment. In 91% of the cases, high-resolution digital images alone were sufficient for consultative purposes.<sup>24</sup> Unanswered from this PI review was whether patients' problems were definitively treated or ultimately required referral to a treatment facility after the remote consultation. Because this project was so effective in demonstrating the utility of telemedicine in dermatology, the institution is planning a follow-up project to measure cost savings, diagnostic accuracy, and therapeutic efficacy. Such information will be used to justify the expansion of telemedicine services to other clinical applications.

### Conclusions

Telemedicine is a rapidly growing field in which quality management now plays a pivotal role. The effectiveness with which quality management is pursued will have an important effect on

issues that are currently being debated, such as licensure, credentialing, and informed consent. Security is a serious issue in view of demonstrated risks from disgruntled employees and information pirates. Privacy issues are also evolving in the face of legal discrepancies between and among the states whose borders telemedicine crosses. The need for reliable peer review is obvious, and if properly implemented and documented, peer review complements medical licensing in establishing quality medical care. Perhaps paramount is the demonstration to health care systems, primary care providers, and third-party payers that telemedicine is a cost-effective and efficacious means of providing medical care. Tailored PI initiatives can gather, analyze, and disseminate this type of information.

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## **Appendix J**

### **Participants**

## PARTICIPANTS

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