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Telemedicine and dermatology hospital consultations during the COVID-19 pandemic: a multi-centre observational study on resource utilization and conversion to in-person consultations during the COVID-19 pandemic

J Trinidad

C K Gabel

J J Han

L Bonomo

A Cartron

See next page for additional authors

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Authors

J Trinidad, C K Gabel, J J Han, L Bonomo, A Cartron, S Chand, W Coburn, S Daveluy, M Davis, K L DeNiro, L M Guggina, K Hennessy, M Hoffman, K Katz, J J Keller, S J Kim, Sasank Konda, E Lake, F N Lincoln, J A Lo, A Markova, E K Marvin, R G Micheletti, S Newman, F N U Nutan, C V Nguyen, V Pahalyants, J Patel, S Rahnama-Moghadam, Pranita V. Rambhatla, M Riegert, R E Reingold, D B Robinson, R Rrapi, J C Sartori-Valinotti, L Seminario-Vidal, Z Sharif-Sidi, J Smogorzewski, N Spaccarelli, J R Stewart, S D Tuttle, M N Ulrich, K A Wanat, F Di Xia, B Kaffenberger, and D Kroshinsky

LETTER TO THE EDITOR

Telemedicine and dermatology hospital consultations during the COVID-19 pandemic: a multi-centre observational study on resource utilization and conversion to in-person consultations during the COVID-19 pandemic

Dear Editor,

As of 1 November 2021, COVID-19 has caused 47.6 million infections and over 770 000 deaths in the United States.[1] In response to the pandemic, patient care rapidly shifted to a telemedicine model to provide uninterrupted care, conserve scarce PPE and prevent nosocomial disease spread.[2–6] Studies have demonstrated teledermatology to be safe and efficacious.[7–9]

An inpatient store-and-forward teledermatology (SAFT) algorithm was designed and disseminated through the Society of Dermatology Hospitalists and the Medical Dermatology Society.[10] This study assessed the utility of SAFT for inpatient consults and quantified resulting PPE conservation.

This multi-centre retrospective study was conducted from March to June 2020. A REDCap survey was distributed to participating institutions. Data were collected for inpatient dermatology consultations in which telemedicine was used. Institutional review board approval was obtained for all institutions.

Inpatient encounters were evaluated for the primary outcome of diagnosis concordance (i.e. discharge diagnosis identical or within the initial differential diagnosis). PPE conservation was estimated using a minimum team rounding size.

Correlations between discrete-valued scores were evaluated by the Spearman rank correlation coefficient, with significant correlations having a correlation coefficient significantly different from 0, using R (v4.0.4, Vienna, Austria). Descriptive statistics were performed using GraphPad Prism software (v8.3.0; GraphPad Software, LLC, San Diego, CA, USA).

1536 separate encounters including 1220 patients were analysed (Table 1). 520 encounters (33.9%) were converted to in-person evaluation, predominately to confirm diagnosis (n = 270, 51.0%), or because the condition warranted in-person evaluation and treatment (n = 200, 38.5%) (Table 2). Diagnostic certainty was either highly or moderately certain in 79.4% of encounters. 77.8% of encounters reported high or moderate comfort with teletriage. Quality of photos were scored high or moderate in 89.9% of encounters. Diagnostic confidence and photo quality positively correlated (Spearman's rho = 0.35, $P < 0.001$; Table 2).

86.2% of initial diagnoses matched the final discharge diagnosis. When assessed independently, telemedicine-only encounters had 93.2% concordance of diagnoses, whilst consultations requiring in-person evaluation had 73.6% of initial telemedicine diagnoses matching the final diagnoses. 5225 units of PPE were estimated to be conserved by triaging patients through teledermatology (Table 2).

This study demonstrates that dermatology hospitalists are able to implement telemedicine for hospital consultations and appropriately triage patients to in-person evaluation. Two-thirds of encounters were completed without conversion to in-person whilst maintaining a high degree of diagnostic certainty and comfort. Photo quality and certainty of diagnosis were positively correlated.

This study also demonstrated high concordance of initial and final dermatology diagnosis at encounter close. For encounters requiring in-person evaluation, concordance was lower, likely reflecting initial uncertainty with photos provided and/or increased patient complexity. These data demonstrate that dermatology hospitalists can effectively utilize teledermatology to triage patients, determine diagnosis and convert to a face-to-face visit when necessary.

Our study also demonstrated conservation of a mean of 4.0 units of PPE per teledermatology encounter during a time of global PPE shortages,[2] highlighting the utility of telemedicine in preserving valuable PPE.

Table 1 Demographical data

Patient characteristics, *n* (%)	Total unique patients (*n* = 1220)
Demographics:	
Age, mean (SD)	53.9 (18.7)
Female	606 (49.7)
Male	614 (50.3)
Ethnicity	
Hispanic or Latino	155 (12.7)
Not Hispanic or Latino	1011 (82.9)
Unknown	46 (3.7)
Estimated Fitzpatrick skin type based on skin tone	
I–II	625 (51.2)
III–IV	304 (24.9)
V–VI	211 (17.3)
Unknown	79 (6.5)

Table 2 Personal protective equipment utilization, assessment of diagnostic concordance, need for an in-person visit and assessment of provider perception of teledermatology for each patient encounter

Total PPE conserved by teledermatology†	**5225**
Gloves	1489 (28.5)
Eye protection	1174 (22.5)
Surgical mask	1205 (23.1)
Gown	851 (16.3)
N95	503 (9.6)
PAPR	3 (0.06)
Total PPE used due to converting teledermatology to an in-person visit†	**2279**
Gloves	734 (32.2)
Surgical mask	633 (27.8)
Eye protection	470 (20.6)
Gown	307 (13.5)
N95	130 (5.7)
PAPR	5 (0.2)
Precautions of cases seen in-person	
Airborne	42 (8.1)
Droplet	89 (17.1)
Contact	106 (20.4)
Contact-plus	6 (1.2)
Neutropenic	26 (5.0)
Radiation	0 (0.0)
None	283 (54.4)
Other	31 (6.0)
Precautions of cases seen by teledermatology	
Airborne	221 (21.7)
Droplet	145 (14.3)
Contact	255 (25.1)
Contact-plus	18 (1.8)
Neutropenic	22 (2.2)
Radiation	0 (0.0)
None	524 (51.6)
Other	51 (5.0)
	Total (*n* = 1536)
Ultimately seen in-person?	
Yes	520 (33.9)
No	1016 (66.1)
Days after initial teletriage seen in-person, median (IQR)	0.0 (0.0–1.0)
Reason for being seen in person	
Unable to confirm diagnosis	270 (51.0)
Essential condition warranting in-person evaluation or treatment	200 (38.5)
Not improved with initial teletriage recommendation	21 (4.0)
Other	128 (24.6)
Dermatology's initial diagnosis matched final diagnosis	
Yes	1324 (86.2)
No	212 (13.8)
Of patients needing to ultimately be seen in-person, did initial diagnosis match final diagnosis?	
Yes	377 (73.6)
No	135 (26.4)
Of patients not ultimately seen in-person, did initial diagnosis match final diagnosis?	
Yes	947 (93.2)
No	69 (6.8)
	Total (*n* = 1536)
Certainty of diagnosis based on initial information provided, *n* (%)	
Highly certain	771 (50.2)
Moderately certain	449 (29.2)
Somewhat certain	147 (9.6)
Neutral	74 (4.8)
Somewhat uncertain	38 (2.5)
Moderately uncertain	28 (1.8)
Highly uncertain	22 (1.4)
Diagnostic certainty unknown	7 (0.5)
Level of comfort with teletriage, *n* (%)	
Highly comfortable	1000 (65.1)
Moderately comfortable	195 (12.7)
Somewhat comfortable	69 (4.5)
Neutral	40 (2.6)
Somewhat uncomfortable	23 (1.5)
Moderately uncomfortable	25 (1.6)
Highly uncomfortable	73 (4.8)
Comfort level unknown	111 (7.2)
Quality of photos provided, *n* (%)	
High quality, I am able to see everything I need to make a diagnosis	1051 (68.4)
Moderate quality, I find it somewhat difficult to utilize the photo but am still able to make a diagnosis	330 (21.5)
Low quality, I find it difficult to utilize the photo in coming to a diagnosis	53 (3.5)
Minimal quality, I am unable to use this photo to make a diagnosis	13 (0.8)
Photo quality unknown	89 (5.8)
Number of photos provided per patient assessment, mean (SD)	5.4 (5.7)

†Assuming that two dermatologists would be involved in staffing the patient (one attending, one resident). ‡Calculated based on the actual number of individuals reported to have seen the patient.

Given the retrospective nature, bias may exist in data entry affecting diagnostic concordance, although this is mitigated by utilizing provider documentation. Appropriate differential diagnoses were considered correct for the purposes of analysis as they corresponded to treatment and final outcome, which may overestimate concordance. Teledermatology consultations were not compared to face-to-face assessment. The amount of PPE conserved was likely underestimated as many institutions have larger teams.

Although in-person evaluation remains the care gold standard, SAFT can be an important tool in preserving high-quality access

to care for the sickest patients and may provide an option for delivering initial expert dermatology hospitalist care to resource poor areas or hospitals without inpatient dermatologists.

IRB approval status

Reviewed and approved by The Ohio State University IRB Study ID #2020H0157.

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Conflict of interest

Dr. John Trinidad holds leadership positions for JAAD, the Ohio Dermatological Association, and Congresional Policy Committee of the AAD. Dr. Eden Lake holds leadership positions for the Women's Dermatologic Society, JAAD, and Chicago Dermatologic Society. Dr. Alina Markova has led a Consultant/Advisory Role for Astrazeneca Pharmaceuticals LP and Alira Health and receives research funding from Incyte. Dr. Lucia Seminario-Vidal has received grants/contracts from Eli Lilly, Soligenix, Helsinn, Eisai, Boehringer Ingelheim, Novartis, AbbVie, BMS, Celgene, Glenmark, Kyowa Kirin, Amgen, AnaptysBio, and Innate Pharma; has received consulting fees for Aptis Partners; has received payment from Helsinn and Kyowa Kirin; has participated in data or safety monitoring for Novartis, Boehringer Ingelheim, Helsinn, Kyowa Kirin, Regeneron, and Blueprint; and has held leadership positions for committees in the SDH and MDS. All other authors have no conflicts of interest to disclose.

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Data availability statement

The full data can be provided by the authors upon reasonable request.

J. Trinidad,[1,2] C.K. Gabel,[3] J.J. Han,[4] L. Bonomo,[5] A. Cartron,[6] S. Chand,[3] W. Coburn,[7] S. Daveluy,[8] M. Davis,[9] K.L. DeNiro,[5] L.M. Guggina,[10] K. Hennessy,[11] M. Hoffman,[12] K. Katz,[13] J.J. Keller,[14] S.J. Kim,[15] S. Konda,[16] E. Lake,[4] F.N. Lincoln,[20] J.A. Lo,[3] A. Markova,[17,18] E.K. Marvin,[9] R.G. Micheletti,[12] S. Newman,[7] F.N.U. Nutan,[19] C.V. Nguyen,[20] V. Pahalyants,[3] J. Patel,[15] S. Rahnama-Moghadam,[21] P.V. Rambhatla,[16] M. Riegert,[4] R.E. Reingold,[17,22] D.B. Robinson,[1] R. Rrapi,[3] J.C. Sartori-Valinotti,[9] L. Seminario-Vidal,[11] Z. Sharif-Sidi,[13] J. Smogorzewski,[23] N. Spaccarelli,[1] J.R. Stewart,[9] S.D. Tuttle,[9] M.N. Ulrich,[1] K.A. Wanat,[13] F. Di Xia,[3] B. Kaffenberger,[1,2] D. Kroshinsky[3,*]

[1]The Ohio State University College of Medicine, Columbus, OH, USA, [2]Division of Dermatology, Department of Internal Medicine, The Ohio State University Wexner Medical Center, Columbus, OH, USA, [3]Department of Dermatology, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA, [4]Division of Dermatology, Loyola University Medical Center, Maywood, IL, USA, [5]Division of Dermatology, Department of Medicine, University of Washington School of Medicine, Seattle, WA, USA, [6]Department of Dermatology, University of Maryland School of Medicine, Baltimore, MD, USA, [7]Department of Dermatology, University of Colorado School of Medicine, Aurora, CO, USA, [8]Dermatology, Wayne State University, Dearborn, MI, USA, [9]Department of Dermatology, Mayo Clinic, Rochester, MN, USA, [10]Department of Dermatology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA, [11]Department of Dermatology and Cutaneous Surgery, University of South Florida Morsani College of Medicine, Tampa, FL, USA, [12]Department of Dermatology, University of Pennsylvania School of Medicine, Philadelphia, PA, USA, [13]Department of Dermatology, Medical College of Wisconsin, Milwaukee, WI, USA, [14]Department of Dermatology, Oregon Health and Science University, Portland, OR, USA, [15]Department of Dermatology, Baylor College of Medicine, Houston, TX, USA, [16]Dermatology, Henry Ford Health System, Detroit, MI, USA, [17]Dermatology Service, Department of Medicine, Memorial Sloan Kettering Cancer Center, New York, NY, USA, [18]Department of Dermatology, Weill Cornell Medical College, New York, NY, USA, [19]Department of Dermatology, Virginia Commonwealth University, Richmond, VA, USA, [20]Department of Dermatology, Northwestern University Feinberg School of Medicine, Chicago, IL, USA, [21]Dermatology, Indiana University, Indianapolis, IN, USA, [22]Albert Einstein College of Medicine, Bronx, New York, NY, USA, [23]Division of Dermatology, Harbor-UCLA Medical Center, Torrance, CA, USA

*Correspondence: D. Kroshinsky. E-mail: dkroshinsky@mgh.harvard.edu

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