Comparative Effectiveness Review Disposition of Comments Report

Research Review Title: *Telehealth for Acute and Chronic Care Consultations*

Draft review available for public comment from May 29, 2018 to June 26, 2018.

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Comments to Research Review

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The tables below include the responses by the authors of the review to each comment that was submitted for this draft review. The responses to comments in this disposition report are those of the authors, who are responsible for its contents, and do not necessarily represent the views of the Agency for Healthcare Research and Quality.

Commentator & Affiliation	Section	Comment	Response
Peer Reviewer 1	General Comments	Very thorough and I think complete. Overall questions asked were good. Please note that I am a neurologist at the VAMC who uses teleneurology to see follow up patients around the state of New Mexico.	Thank you for reviewing the report and providing comments.
Peer Reviewer 2	General Comments	The results are presented in a generally useful manner with a couple of exceptions. First, the report uses NS to mean Not Significant. While NS is sometimes used, the use of NS over the specific p-value is not recommended. First, NS may represent different values depending on the Type I error rate used by the original study. Second, there is a large difference in interpretation when the p-value is 0.96 vs. 0.06. The of NS obscures the findings. It is possible that many articles reported NS for non-significant findings, but that should be footnoted. The second major issue with this report is the reporting of mean values for some outcomes without reported any measure of variation. Standard error or standard deviation are necessary to give the reader a sense of the dispersion of the variable. While the statistical results (i.e., p-value) provide some indication of the dispersion, STD or SE are useful.	Thank you for your comments. When reported, actual p-values and/or confidence intervals are included in the full evidence tables in the Appendixes. We did not include all p-values in the summary tables within the report in an effort to summarize data for easier review considering the breadth of included studies. Similarly, we included standard deviation and/or standard error in the appended evidence tables when studies reported them.
Peer Reviewer 3	General Comments	the report is definitely clinically meaningful, providing relevant observations about the types of telehealth models and their evidence	Thank you for reviewing the report and providing comments.
TEP 1	General Comments	The report is clinically meaningful and the key questions are appropriate. While the topic of Telehealth for Acute and Chronic Consultations is a very broad topic, the report does a good job of organizing and categorizing the literature.	Thank you for reviewing the report and providing comments.
TEP 2	General Comments	Telehealth is an important topic and clinically meaningful given the shortage of clinicians in remote areas.	Thank you for reviewing the report and providing comments.
TEP 3	General Comments	This is a well designed study and analysis to evaluate data on clinical and economic outcomes of inpatient, outpatient and emergency telemedicine consultations. There are few large volume studies from which to inform the analysis and as such the authors were required to compare data from different types of clinical studies, in different countries, informed by different study designs.	Thank you for reviewing the report and providing comments.
TEP 4	General Comments	The report is clinically meaningful, not only for telehealth but for the larger field of CER. The key questions are clear, appropriate, and answered both at a high level and in detail where appropriate.	Thank you for reviewing the report and providing comments.
TEP 4	General Comments	The analysis of specialty consultation key findings by setting (inpatient, ER, outpatient) on the basis of telehealth infrastructure was particularly useful here and was explained clearly after what must have been a lot of discussion by the team. I hope that future studies by this team and others will highlight and reuse this three-setting approach.	Thank you for the comment. We are glad you found the structure of the report useful.
TEP 4	General Comments	The rationale behind the organization and analytic decisions as laid out in the Applicability section (starting on page 101) was clear and very well done.	Thank you for reviewing the report and providing comments.

Commentator & Affiliation	Section	Comment	Response
TEP 4	General Comments	One of the most important contributions of this report in my view is to help reframe telehealth as infrastructure as being similar to EHR's and HIE, and in looking for similarities (e.g., use of video) rather than looking at use of modalities separately. This is especially useful because of the previous AHRQ report's findings that telehealth modalities are often used in combination based on clinical need and not just on the availability of modalities or reimbursement.	Thank you for your comment and insight into this aspect of telehealth consultations.
TEP 4	General Comments	Another major contribution to CER broadly is the finding that the comparisons to "usual care" were not seen as particularly strong methodologically, often because usual care was not described specifically. I would guess that it's not just that research journals don't particularly encourage clinical specificity, but also there is so much variability in "usual care" that it would be near impossible to describe, even within individual institutions. And for the reviews of systematic reviews, that information would not be available.	Thank you for the comment. As you note, it was often difficult to identify what authors of included studies meant by "usual care."
TEP 4	General Comments	I hope this is enough to justify my evaluation of the contribution of the report as being clinically meaningful. It reflects what's happening in the real world, and not just in the world of research.	Thank you for reviewing the report and providing comments.
Public Commenter 1, Alan Lee	General	See above	Thank you.
Public Commenter 4, Judd Hollander	General	It would be most helpful if this report was presented consistent with the August 2017 NQF document on a framework of measures of telehealth. Breaking the discussion into the 4 major domains would allow consistency and reinforce the importance of the access, cost, experience and effectiveness as important components to be assessed in future research.	Thank you for pointing us towards this report. While we are unable to restructure the report to align exactly with the National Quality Forum report, our key questions do include the primary framework domains, and we cited the NQF report in the introduction. We also added some references to the NQF report in the Scope and Discussion sections.
Public Commenter 5, Kathy Dowd	General	My hope is that AHRQ and healthcare is including the silent epidemic of hearing loss in patient care. Hearing impairment will have a negative impact on understanding directions, patient compliance and patient outcomes. Hearing loss is also associated with the major chronic diseases such diabetes, cardiovascular disease, chronic kidney disease and infectious diseases. At all points of care (intensive care, hospital, skilled nursing) a hearing loss will cause confusion, depression and isolation. It is confounding that major US healthcare agencies turn a deaf ear on the integral need for a patient to hear. And as an invisible handicap, it must be always checked when the patient checks into the hospital and again when they are discharged. No excuses	Thank you for your comment. We did not exclude any studies based on condition, and would not exclude studies about hearing impairment if they met other inclusion criteria.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 6, Juhi Israni, MS	General	The heterogeneity of outcomes in telehealth research makes it difficult to generalize across institutions or use cases. The most glaring knowledge gap identified both in the 2016 and most recent review by AHRQ is on the diverse and limited data regarding cost and utilization metrics. While outcome measurements undoubtedly varies across organizations (i.e., based on coverage policies, operational differences, etc.), this is also what makes it difficult for payers and policy makers to assess the effectiveness of telehealth. As noted by AHRQ, a key priority for future research is the need for multi-site studies in clinical areas and populations likely to benefit from telehealth. One area in particular was on the potential impact of telehealth in serving the healthcare needs of the geriatric population, an age group predicted to account for approximately 20% of the population by 2030. Moving forward, future research should view measurement in telehealth from a broader perspective, focusing on overall health impact (i.e., health care systems, payers, patients, or society) rather than the delivery model (i.e., modality), specific clinical use case, or service itself, all of which may only increase inconsistency in the evidence base. - Juhi Israni, MS Telehealth Informatics Analyst West Health Institute	Thank you for reviewing our report and providing comments.
Public Commenter 8, Diane Millman on behalf of Lucy McDonough and Philips Healthcare	General	See attached comments of Philips Healthcare.	Thank you for your letter. We reviewed the articles you referenced and added relevant ones that met inclusion criteria to the report. We also pooled results from included ICU studies to determine the effect on ICU and hospital length of stay and mortality, and forest plots are included in the results.
Public Commenter 1, Alan Lee	Key Messages	This is a good report of status of telehealth.	Thank you for reviewing the report and commenting.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 2, Latoya Thomas on behalf of the American Telemedicine Association	Key Messages	We are particularly concerned about the highlighted need for future research on the potential 'harm' and 'unintended consequences' of telemedicine consults. Indeed, the agency contradicts its own findings. If, as you indicate, "…too few studies reported …. harm…," then it cannot be concluded that the evidence was "insufficient." A more reasonable interpretation of these findings is the lack of any evidence of harm. It should also be noted that the author's methodology excluded a significant body of work on diagnostic and treatment concordance between in-person and telemedicine consults by specialists that could provide insight into the extent to which there is non-concordance and associated risk of "harm." However, in-person consults are not necessarily better than telemedicine consults by specialists, therefor studies of "harm" must also take into consideration the harm and unintended consequences that occur in traditional care settings for comparable services. In proposing more research on "harm," the agency provides no definition of "harm." We are also concerned about the use of the term "harm" in this context, as the term represents a negative implication for telemedicine that overshadows the more positive findings of the report.	Thank you for your comment. Our assessment of the literature related to potential harms of telehealth points to an insufficient number of studies reporting harms to make any clear conclusions. By far the majority of studies made no mention of harms or adverse events. Had they instead reported that there were no specific harms related to telehealth consultations in individual studies, we could then potentially state that there is evidence of no harms of telehealth. In the updated report, we included a number of new studies and some do report harms, for instance, in telestroke consultations, though as a whole body, the literature does not consistently report on potential harms of telehealth. Regarding the use of the word harms, while we agree there are positive findings associated with telehealth, there is the potential for negative consequences that have yet to be studied, which may result in harms to patients. Also, looking through the report there do seem to be some studies that do report harms, in some cases the team does report this (no difference in harms with telestroke consultation for example). May be good to point this out in the response too.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 3, Suzanne Gillespie	Key Messages	I appreciate the approach and content of this summary of the evidence related to Telehealth for Acute and Chronic Care Consultations. I comment to raise my concern related to the omission of the small but emerging evidence on telehealth as a tool in the post acute and long term care continuum. There are many drivers for the use of telemedicine in post-acute care including the need to improve timely access to care by nursing home providers and specialty care consultants. I refer you to several studies which describe experiences to date in nursing facilities and senior living communities. (see below). Several studies have explored the impact of telemedicine on ED/hospitalization by nursing home residents. Of the four of the studies which explore the impact of telehealth on ED use, three show reduction in ED visits (9%-37%). Similarly, four studies have demonstrated impact on hospitalization. A CMMI project (RAVEN) has also reported an impact. I had the pleasure of working with MN Shah and colleagues in an AHRQ funded study of the impact of access to telemedicine urgent care visits on ED visits, hospitalization and health care costs by older adults in senior living communities. EDs are a common, costly, and hazardous setting for care of the older adult. This important series of studies demonstrates the positive impact of telemedicine on decreasing unnecessary ED visits. I have listed key references below and recommend you include them in your synthesis of the community based literature.	Thank you for your comment. Some of these suggested references did appear in our searches and were assessed but did not meet our inclusion criteria. We assessed the suggested references that were not in our search for inclusion, but did not identify additional includable studies.
Public Commenter 4, Judd Hollander	Key Messages	It would be most helpful if this report was presented consistent with the August 2017 NQF document on a framework of measures of telehealth. Breaking the discussion into the 4 major domains would allow consistency and reinforce the importance of the access, cost, experience and effectiveness as important components to be assessed in future research.	Thank you for pointing us towards this report. While we are unable to restructure the report to align exactly with the National Quality Forum report, our key questions do include the primary framework domains, and we cited the NQF report in the introduction. We also added some references to the NQF report in the Scope and Discussion sections.
Public Commenter 1, Alan Lee	Structured Abstract	Abstract is clear to the point.	Thank you for reviewing the report and commenting.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 2, Latoya Thomas on behalf of the American Telemedicine Association	Structured Abstract	Overall, the draft report is a well-done systematic review of the studies that meet the inclusion criteria, which are consistent with other evidence-based literature reviews. However, it would be helpful to understand who did the review and selection of literature used in this study. Moreover, the narrow methodology poses some significant challenges and raises several concerns. We recognize that many of the thousands of articles published would not necessarily meet the "evidence" requirements associated with this review, and that the agency intended to only include in their review, primary articles and not syntheses. However, the report would have been greatly enhanced if it included a summary section on the results from prior syntheses to provide background and perspective, especially in the areas highlighted by the systematic review. It is worth noting that this field is rapidly changing, and reviews, such as this one, run the risk of being out of date once they are printed. Profound changes in the healthcare system overall are also rapidly impacting the costs and delivery options available. Noting this rapid evolution and the implications, we must be concerned with patient and provider alike, assessing the needs, desires and demands of all stakeholders.	Thank you for your comment. We did not include the many systematic reviews due to differences in inclusion criteria and outcomes. We did, however, review relevant systematic reviews for primary studies for inclusion that may have been missed in our search. Our inclusion criteria were developed based on input from clinical and technical experts. We appreciate your comment, but with such a large volume of included studies, we can not effectively include summaries of other reviews. We agree that the field is rapidly changing, and that it is important to complete systematic reviews in a timely manner.
Public Commenter 1, Alan Lee	Evidence Summary	Agree with the evidence summary - however, it may need to clarify that data analyses conducted on published literature and some gray data may exist where telehealth benefits and harm are not reported.	Due to space constraints, we are not able to put as much detail into the evidence summary. Details regarding the limitations of our search and the literature base are presented in the full report.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 3, Suzanne Gillespie	Evidence Summary	I appreciate the approach and content of this summary of the evidence related to Telehealth for Acute and Chronic Care Consultations. I comment to raise my concern related to the omission of the small but emerging evidence on telehealth as a tool in the post acute and long term care continuum. There are many drivers for the use of telemedicine in post-acute care including the need to improve timely access to care by nursing home providers and specialty care consultants. I refer you to several studies which describe experiences to date (see below). Grabowski DC, O'Malley AJ. Use of telemedicine can reduce hospitalizations of nursing home residents and generate savings for medicare. Health affairs (Project Hope) 2014;33:244-50. Hex N, Nick Harrop D, Tuggey J, Wright D, Malin R. Telemedicine in care homes in Airedale, Wharfedale and Craven. Clinical Governance: An International Journal 2015;20:146-54. Hofmeyer J, Leider JP, Satorius J, Tanenbaum E, Basel D, Knudson A. Implementation of Telemedicine Consultation to Assess Unplanned Transfers in Rural Long-Term Care Facilities, 2012-2015: A Pilot Study. Journal of the American Medical Directors Association 2016;17:1006-10. Hsu MH, Chu TB, Yen JC, et al. Development and implementation of a national telehealth project for long-term care: a preliminary study. Computer methods and programs in biomedicine 2010;97:286-92. Hui E, Woo J, Hjelm M, Zhang YT, Tsui HT. Telemedicine: a pilot study in nursing home residents. Gerontology 2001;47:82-7. I additionally refer you to the description of the CMMI Project, RAVEN. Raven "Reduce AVoidable hospitalizations using Evidence-based interventions for Nursing facilities in western Pennsylvania", delayed telemedicine carts in nursing facilities as a means of avoiding hospital transfer. The project evaluation is published here https://innovation.cms.gov/files/reports/irahnfr-finalevalrpt.pdf; it notes an estimate that 51 percent of telemedicine cart consultations and 12 percent of telephone consultations resulted in avoiding hospital transfers during this time period.	Thank you for your comment. We assessed the suggested references for inclusion: Grabowski - We reviewed this article and have included it in the report. Hex -This article did not meet our inclusion criteria for telehealth consultations. Hofmeyer- This article did not meet our inclusion criteria for telehealth consultations. Hsu -This article did not meet our inclusion criteria for telehealth consultation. Hui-This article did not meet our inclusion criteria for telehealth consultation. The CMMI Project is of interest, though we were unable to include this as the results are estimates of avoided utilization rather than rates from comparable groups.
Public Commenter 4, Judd Hollander	Evidence Summary	It would be most helpful if this report was presented consistent with the August 2017 NQF document on a framework of measures of telehealth. Breaking the discussion into the 4 major domains would allow consistency and reinforce the importance of the access, cost, experience and effectiveness as important components to be assessed in future research.	Thank you for pointing us towards this report. While we are unable to restructure the report to align exactly with the National Quality Forum report, our key questions do include the primary framework domains, and we cited the NQF report in the introduction. We also added some references to the NQF report in the Scope and Discussion sections.

Commentator & Affiliation	Section	Comment	Response
Peer Reviewer 1	Introduction	I think the project may have too narrow a focus. In rural states like New Mexico specialized physicians are scarce. I work at the only VH hospital in NM and there are few neurologists outside three small cities. Thus, specialists have a real challenge to see their remote patients. Use of telehealth is becoming more common. At our VA in Albuquerque, we have now followed over 1200 patients coming to local clinics throughout the state to be seen by teleneurology. At those visits, I do not deal with other local physicians or nurses but just focus on the actual patient. This likely will become more popular in remote states where patients have difficulty driving long distances to see their specialist. In my system, I first see the patient face to face in the Albuquerque clinic and then do the follow ups remotely.	Thank you for your comment and for sharing your concern regarding the scope. We recognize there are different applications of telehealth, and this particular review focuses on the use of telehealth to facilitate consultations between health care providers. There is, indeed, a rather large body of literature about telehealth used to provide care directly to patients. This, however, was outside the scope of this particular review.
Peer Reviewer 2	Introduction	If the results are not statistically significant, then claims that the intervention has benefit should not be made. See second bullet under Emergency Care Telehealth Considerations.	In these cases, we are summarizing similar results across studies within a given setting and providing a statement on the overall strength of evidence. In this particular case, some studies did report statistically significant changes while others did not. Thus, while the results in this case generally show improvements in clinical outcomes, the overall strength of evidence is low, partially due to the fact that not all articles showed statistically significant improvements.
Peer Reviewer 3	Introduction	excellent introduction to the field of telehealth including a framework for considering and accounting for the types of telehealth	Thank you for reviewing the report and providing comments.
TEP 1	Introduction	The "Introduction" is adequately concise but also informative.	Thank you for reviewing the report and providing comments.
TEP 2	Introduction	Acceptable.	Thank you for reviewing the report and providing comments.
TEP 3	Introduction	The authors provided a sufficient overview of the charge of the study and the challenges faced in the evaluation.	Thank you for reviewing the report and providing comments.
TEP 4	Introduction	The background sections (p. ES-1 and pages 1-2) are clear, concise, and appropriately balanced between big picture questions and detail. The framework sets up the responses to key questions quite well and all of the sections are consistent.	Thank you for reviewing the report and providing comments.
Public Commenter 1, Alan Lee	Introduction	Good	Thank you for reviewing the report and commenting.
Peer Reviewer 1	Methods	Methods seem fine for the purpose of this review.	Thank you for reviewing the report and providing comments.
Peer Reviewer 2	Methods	There is no justification for limiting the search to 20 years. There may have been important early studies that guided future research. In addition, there was not a mention (that I noticed) about using references from the articles to ensure that all studies were identified.	As described in our research protocol, we chose the search date limit in order to focus on studies of systems that rely on more current technology. We did review articles and systematic reviews for additional studies. This is mentioned in the report on pages 7, 131 and 134.

Commentator & Affiliation	Section	Comment	Response
Peer Reviewer 3	Methods	excellent and standard criterial.	Thank you for reviewing the report and providing comments.
TEP 1	Methods	No specific comments.	Thank you for reviewing the report.
TEP 2	Methods	Page 26,lines 3-9 (and related text in the abstract) The definition of "Comparator" is vague and may include "no intervention". More explicit criteria regarding the benefits of Telehealth versus specific "active intervention" alternatives would be useful.	Thank you for your comment. We employed a wide definition of comparator as the literature often does not provide adequate descriptions of the non-telehealth comparison, and we did not want to be overly exclusive in our criteria.
TEP 3	Methods	The inclusion and exclusion criteria were carefully explained and search strategies and analytic methodologies were logical.	Thank you for reviewing the report and providing comments.
TEP 4	Methods	Inclusion/exclusion criteria are appropriate and well-explained (p. 6). Search strategies are explained in detail, and also are readable for non-experts (p. 6-7). The rationale for the combined study with the exploratory cost model for neurosurgical consultations was well-justified (p. 9, pp. 100-101) and explained.	Thank you for reviewing the report and providing comments.
Public Commenter 1, Alan Lee	Methods	Good	Thank you for reviewing the report and commenting.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 2, Latoya Thomas on behalf of the American Telemedicine Association	Methods	The selected tele-ICU studies are generally the most relevant. However, the agency's comments about a lack of financial tele-ICU studies appear to be erroneous, unless they have concluded that the eight published studies in the 2013 synthesis by Kumar et al. did not include studies that met the criteria for inclusion (Kumar G et al., The Costs of Critical Care Telemedicine Programs, A Systematic Review and Analysis. Chest 2013;143(1):19-29) [see attached]. We would ask the authors to review these studies again. Also, when the authors update and finalize their report, we recommend that they include the study by Lilly et al. on ICU Telemedicine Program Financial Outcomes that appeared in the journal, (Chest 2017;151(2):286-97). This study explicitly addresses the financial implications of ICU telemedicine [see attached]. The exploratory cost model presents an interesting, albeit a very basic, approach to addressing situations where information is lacking, but no conclusions should be drawn from the model presented. The justification for choosing TBI in the model development requires more justification. Generally, in testing the predictive value of models, one chooses applications where there is a body of data against which one can test a model. In this case, the authors appear to have strangely chosen TBI because there is no systematic body of evidence. On a positive note, however, the exploratory cost model does provide a framework for looking at many issues including questions regarding costs and outcome of care, when and if certain data is collected and becomes available in the future. Most cost studies are based on the increasingly obsolete system of fee-based services provided by traditional healthcare systems. However, today's environment is moving swiftly toward value-based payments and services delivered by non-traditional providers and automated systems that upend the financial structure upon which the costs of healthcare delivery are measured. As we look to future systems, we need to focus our research and evaluation of costs in evolving payment structures and this report can help to point the way by creating a standardization for evaluating cost studies. More specifically regarding the review of telestroke studies, we would like to note that some of the studies included are quite old and much has changed in stroke care. Moreover, most of the telestroke studies measure differences in tPA and survival and show that the use of tPA increases with telestroke services, but survival does not. However, survival is a very "blunt" instrument for measuring the effect of tPA, thus the main problem is that the telestroke studies use a poor outcome measure that can be modified and should be mentioned as an area for future research.	Thank you for your suggestions. We included five of the eight studies included in the Kumar review. Thank you for pointing us to the Lilly study. This was not included in our original search due to the date, and others have also suggested this particular paper; it did appear in our update search, and we did include it in the updated report. Regarding the cost model, we acknowledge that this is not a typical approach. We were exploring methods for how to integrate decision models into systematic reviews. We do agree that it is helpful in its framework despite the atypical approach, particularly because it allows for incorporating different payment models. We added details to describe why we chose TBI in the model. Finally, we agree that mortality may not be the best measure for telestroke and have indicated this in the revised report.
Peer Reviewer 1	Results	Results were thorough and appear broken down into useful sections.	Thank you for reviewing the report and providing comments.

Commentator & Affiliation	Section	Comment	Response
Peer Reviewer 2	Results	Satisfaction by nursing staff. The paragraph mentions that satisfaction was improved - but what does "higher" satisfaction represent? This is an ambiguous statement - difficult to interpret without having any information on what type of satisfaction was measured and how it was measured, and how much it changed with telehealth interventions.	This study was originally not included in the in-text tables, but we have since added it, and the results appear in Table 3. We believe the results are clearer in this version of the report.
Peer Reviewer 2	Results	At times the report does not specify the current being reported (see page 21). Please be consistent with use of currency symbols.	We have updated the summary tables to specify the currency being used in economic outcomes.
Peer Reviewer 3	Results	the report is very consumable by a reader; particularly if the reader is interested in one type of telehealth application over others.	Thank you for your comment. We tried to organize the report in a way that would make sense to a wide array of readers.
TEP 1	Results	Datta, et al., JAMA Dermatol 2015;151(12):1323-1329 would seem to be a manuscript that is relevant for inclusion. Because it is a fairly obvious omission that seemingly should have turned up in the literature search - unless the authors have a good rationale for its exclusion - it raises the question of other un-included manuscripts.	Thank you for bringing this to our attention. The Datta article did not appear in our search results, and we have since included it. It is possible other includable studies are not in the report although we have made multiple efforts to identify articles outside of our search strategy for inclusion.
TEP 2	Results	Acceptable.	Thank you for reviewing the report and providing comments.
TEP 3	Results	The results are well presented and the key messages entirely applicable. The authors appropriately noted a limitation in study design attributable to low numbers of studies of similar design for purposes of comparison. The figures, tables and appendices are well described and appropriate. The authors did not include any systematic reviews by design. I did not see inclusion or exclusion of the 2016 Craig Lilly paper in Chest "ICU Telemedicine Program Financial Outcomes" or the 2014 Robert Kruklitis Paper, Clinical and financial considerations for implementing an ICU telemedicine program also in Chest.	Thank you for your suggestions. The Lilly paper was published after the search dates used for the draft report. We have included it in our final report. We reviewed the Kruklitis abstract based on your suggestion, but it is not a study nor a systematic review and therefore does not fit into our inclusion criteria.
TEP 4	Results	The description of included studies (p. 12-14, with tables and figures) was clear, helpful, and had the appropriate level of detail. The organization of results by setting was clear and made it much easier to process the level of detail in each section. Key points on p. 16, 25, and 35 were particularly helpful to this reader, especially as they occurred before the detailed findings for each setting. Just one example: the findings that justify clinical and cost savings from not transporting critical care patients is only one example of pointing out a limitation in the available studies (coming from one hospital) while still pointing out the importance of taking the findings at face value and starting to do more systematic studies. Here, the authors' framework of findings by setting and their finding similarities in function (e.g., neonatal and frail elderly consultations) will be helpful in supporting new investments in telehealth without having to do an RCT with every patient population, every modality, and every condition. That's a huge contribution.	Thank you for your comments. We are happy you found the structure and organization of the report useful.

Commentator & Affiliation	Section	Comment	Response
Public Commenter 1, Alan Lee	Results	Good	Thank you for reviewing the report and commenting.
Public Commenter 4, Judd Hollander	Results	It would be most helpful if this report was presented consistent with the August 2017 NQF document on a framework of measures of telehealth. Breaking the discussion into the 4 major domains would allow consistency and reinforce the importance of the access, cost, experience and effectiveness as important components to be assessed in future research.	Thank you for pointing us towards this report. While we are unable to restructure the report to align exactly with the NQF report, our key questions do include the primary framework domains, and we cited the NQF report in the introduction. We also added some references to the NQF report in the Scope and Discussion sections.
Peer Reviewer 1	Discussion/ Conclusion	Only comment would be to create a checklist for authors to consider before doing their telehealth study. The ideas for a good study are scattered throughout this long manuscript. A check list for what to consider with references back to the complete part of the article could really help new authors organize their study before they start collecting data or seeing patients.	We have updated our discussion and the future research needs section in addition to updating the strength of evidence, based on newly included studies. While we do not provide a full checklist, we do hope the updated text is sufficiently clear for others to design strong studies to improve the evidence-base.
Peer Reviewer 2	Discussion/ Conclusion	The decision model appears as an after thought. The explanation and conduct of the model, including the appendix, rudimentary. Definitely not state-of-the art techniques. While the authors try to justify using TBI as clinical condition of interest, this selection doesn't appear to be justified based on the evidence reviewed. Many other conditions or situations could have been selected where there is evidence. The report contains few details on the results of the analysis, and lacks a probabilistic sensitivity analysis. Also, the impacts of TBI go beyond 30 days, so the use of a simple decision tree is problematic in my opinion. There is no information concerning the impacts of delays in NSI on patient outcomes.	With the decision model, we sought to look for unanswered questions from the literature that could be partially informed by the literature and also investigate uncertainty. The comment about lacking a probabilistic analysis is well-taken. However, the simplicity of a cost-minimization analysis did not warrant a probabilistic sensitivity analysis; we feel the one-way sensitivity analysis adequately characterized the large amount of uncertainty in the available literature. Our review team carefully considered how best to present the decision model in the context of the systematic review. The decision model appears in the report appendix, in recognition that the evidence underlying the decision model and the level of confidence in the results was not equivalent to the evidence and analyses in the systematic review.
Peer Reviewer 3	Discussion/ Conclusion	the discussion and conclusion were very helpful to guide needed research to fill in the gaps related to telehealth, including prioritizing the areas for figure research	Thank you for reviewing the report and providing comments.
TEP 1	Discussion/ Conclusion	Overall, a good summary of the report.	Thank you for reviewing the report and providing comments.
TEP 2	Discussion/ Conclusion	Acceptable.	Thank you for reviewing the report and providing comments.
TEP 3	Discussion/ Conclusion	Yes, the implications are clearl stated and well described. Future research considerations were clear.	Thank you for reviewing the report and providing comments.

Source: https://effectivehealthcare.ahrq.gov/products/telehealth-acute-chronic/research

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Commentator & Affiliation	Section	Comment	Response
TEP 4	Discussion/ Conclusion	In my opening comments above, I spoke about the value of the authors' interpretation of their findings in light of larger research questions for the field. In this section, similarly, I think their section on the "limitations of the evidence base" is appropriately critical of the state of the literature without undermine their conclusions. That's because their SOE discussions are so well-justified and documented.	Thank you for reviewing the report and providing comments.
TEP 4	Discussion/ Conclusion	The section on Future Research needs, beginning on page 104, is masterful	Thank you for reviewing the report and providing comments.
Public Commenter 1, Alan Lee	Discussion	Good	Thank you for reviewing the report and commenting.
Public Commenter 2, Latoya Thomas on behalf of the American Telemedicine Association	Discussion	The authors rightly acknowledge the need for rigorous, multi-site studies that collect information that consistently measures a more comprehensive range of economic impacts and costs using standard practices. Reviews of current studies are limited due to a lack of standardized risk stratification methodology and a common framework for tying outcome measures to costs. We now have an opportunity to begin to measure outcomes and costs in a consistent way. The need to develop a common vocabulary and design for multi-site studies is greatly needed.	Thank you for your comment and noting your agreement with our assessment of future needs in the field.
Public Commenter 3, Suzanne Gillespie	Discussion	In my opinion, the work to date supports the ongoing need for additional study of telemedicine in post acute long term care continuum.	Thank you for your comment. We agree that additional studies may be warranted in post-acute long-term care facilities in addition to other settings and conditions.
Public Commenter 1, Alan Lee	Implications and Conclusions	The implications to practice, research, and education points to cost analyses and additional models. There are additional issues including lack of reporting by providers (some providers deem the GQ/GT modifiers in the past to be a burden and they do not like to use it in telestroke consultations),lack of practitioner education prompting inaccurate coding/reporting (OIG report April 2018 - Medicare), and lack of infrastructure/telehealth networks that will diffuse the use of telehealth. Thus, I would expand on the literature about current limitations versus lack of harm alone.	We recognize the importance of data quality and accuracy and that inaccurate reporting and coding likely leads to biased results. However, the literature upon which this report is based did not make this explicit. Our report suggests that future research should include more explicit descriptions of the contexts within which telehealth consultations are delivered.
Public Commenter 3, Suzanne Gillespie	Implications and Conclusions	In my opinion, the work to date supports the ongoing need for additional study of telemedicine in post acute long term care continuum.	Thank you for your comment. We agree that additional studies may be warranted in post-acute long-term care facilities in addition to other settings and conditions.
Peer Reviewer 1	Clarity and Usability	Overall it is thorough and helpful. See above for my few additional ideas	Thank you for reviewing the report and providing comments.
Peer Reviewer 2	Clarity and Usability	Generally acceptable.	Thank you for reviewing the report and providing comments.
Peer Reviewer 3	Clarity and Usability	report is very well structured; appreciate the buckets of type of telehealth and its clearly defined definitions. Provides a good framework that can be replicated as a foundation for future research studies.	Thank you for reviewing the report and providing comments.

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TEP 1	Clarity and Usability	While I don't know that the conclusions drawn from this literature synthesis were novel based on either prior reviews or the source literature, it nonetheless can serve as a good summary. While it may not be clear to all readers why a decision analysis model was appended, I think it serves as a useful adjunct to the report as it illustrates a more applied approach to using existing literature/data to answer important questions.	Thank you for your review. We are glad that you found the decision analysis model useful and agree that models present an opportunity to incorporate the literature and evaluate possible scenarios prior to implementation.
TEP 2	Clarity and Usability	More targeted policy implications could be provided.	Thank you for the suggestion. The review is to provide the evidence base for decisionmakers, including policy. Therefore, while we propose certain considerations that may be important, we stop short at making direct policy suggestions.
TEP 3	Clarity and Usability	This is a well structured report and while additional multicenter studies would be useful to further define economic outcomes, in truth the outcomes of this analysis were quite positive. I do not necessarily see the need for a harms analysis in light of the positive outcomes (both financial and clinical) as articulated.	Thank you for your comment. While the results are generally positive, the lack of reporting on potential harms makes it difficult to weigh the benefits of telehealth consultations against potential adverse events.
TEP 4	Clarity and Usability	This report has certainly helped to reframe my thinking about the evidence base and need for future research, and I'm on the TEP! I hope that AHRQ will help to promote and disseminate some of the key findings from this report - not just the setting-specific or specialty-specific findings, but the bigger frame about the value of telehealth, which is amply supported here.	Thank you for participating as a TEP member and commenting on the report. We are glad to hear the report was impactful to you.
Public Commenter 1, Alan Lee	References	Good	Thank you for reviewing the report and commenting.

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Public Commenter 3, Suzanne Gillespie	References	I additionally refer you to the description of the CMMI Project, RAVEN. Raven "Reduce AVoidable hospitalizations using Evidence-based interventions for Nursing facilities in western Pennsylvania", delayed telemedicine carts in nursing facilities as a means of avoiding hospital transfer. The project evaluation is publised here https://innovation.cms.gov/files/reports/irahnfr-finalevalrpt.pdf; it notes an estimate that 51 percent of telemedicine cart consultations and 12 percent of telephone consultations resulted in avoiding hospital transfers during this time period. Additional references related to telemedicine in nursing facilities: Grabowski DC, O'Malley AJ. Use of telemedicine can reduce hospitalizations of nursing home residents and generate savings for medicare. Health affairs (Project Hope) 2014;33:244-50. Hex N, Nick Harrop D, Tuggey J, Wright D, Malin R. Telemedicine in care homes in Airedale, Wharfedale and Craven. Clinical Governance: An International Journal 2015;20:146-54. Hofmeyer J, Leider JP, Satorius J, Tanenbaum E, Basel D, Knudson A. Implementation of Telemedicine Consultation to Assess Unplanned Transfers in Rural Long-Term Care Facilities, 2012-2015: A Pilot Study. Journal of the American Medical Directors Association 2016;17:1006-10. Hsu MH, Chu TB, Yen JC, et al. Development and implementation of a national telehealth project for long-term care: a preliminary study. Computer methods and programs in biomedicine 2010;97:286-92. Hui E, Woo J, Hjelm M, Zhang YT, Tsui HT. Telemedicine: a pilot study in nursing home residents. Gerontology 2001;47:82-7. Telemedicine in Senior Living Communities: Shah MN, Wasserman EB, Wang H, Gillespie SM, Noyes K, Wood NE, Nelson D, Dozier A, McConnochie KM. High-intensity telemedicine decreases emergency department use by senior living community residents. Telemedicine and e-Health. 2016; 22(3):251-8. Shah MN, Wasserman EB, Gillespie SM, Wood NE, Wang H, Noyes K, Nelson D, Dozier A, McConnochie KM. High-intensity telemedicine decreases emergency department use for ambulatory care sensitive conditions by older adult senior living community residents. J Am Med Dir Assoc. 2015; 16(12):1077–1081. Gillespie SM, Shah MN, Wasserman EB, Wood NE, Wang H, Noyes K, Nelson D, Dozier A, McConnochie KM. Reducing emergency department utilization through engagement in telemedicine by senior living communities. Telemedicine and e-Health. 2016; 22(6): 489-496 (https://doi.org/10.1089/tmj.2015.0152).	Thank you for your comment. Some of these suggested references did appear in our searches and were assessed for inclusion. We assessed the suggested references that did not appear in our search for inclusion. Grabowski - We reviewed this article and have included it in the report. Hex -This article did not meet our inclusion criteria for telehealth consultations. Hofmeyer- This article did not meet our inclusion criteria for telehealth consultations. Hsu - This article did not meet our inclusion criteria for telehealth consultations. Hui - This article did not meet our inclusion criteria for telehealth consultations. Shah (2015) - This study appeared in our original search and was not selected for full text review as telehealth was used for a consultation directly to a patient which does not meet our inclusion criteria. Shah (2016) - We reviewed the abstract for this publication based on your suggestion, but it does not fit our inclusion criteria because it is a provider to patient consultation rather than provider to provider. Gillespie - This article did not meet our inclusion criteria for telehealth consultation.
Public Commenter 1, Alan Lee	Abbreviations	Good.	Thank you for reviewing the report and commenting.
Public Commenter 1, Alan Lee	Appendixes	Good.	Thank you for reviewing the report and commenting.

Source: https://effectivehealthcare.ahrq.gov/products/telehealth-acute-chronic/research

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Peer Reviewer 1	Quality of the Report	Good.	Thank you for reviewing our report.
Peer Reviewer 2	Quality of the Report	Good.	Thank you for reviewing our report.
Peer Reviewer 3	Quality of the Report	Superior.	Thank you for reviewing our report.
TEP 1	Quality of the Report	Superior.	Thank you for reviewing our report.
TEP 2	Quality of the Report	Good.	Thank you for reviewing our report.
TEP 3	Quality of the Report	Good.	Thank you for reviewing our report.
TEP 4	Quality of the Report	Superior.	Thank you for reviewing our report.
Public Commenter 7, Lynn Bufka on Behalf of the American Psychological Association	Appended Letter	See appended letter	Thank you for your letter. We are pleased that you found it comprehensive and useful. Regarding your questions related to the types of telehealth modalities, we have updated Table 1, which includes counts for different types of telehealth delivery such as via electronic health records, data streaming (e.g., via a web-based dashboard), videoconferencing, and store-and-forward technology. Modalities for each individual study are also included in the evidence tables located in Appendix G. Additionally, we have added material in our discussion and in the introduction related to current developments in telehealth. Finally, thank you for the editorial feedback; we have made numerous edits throughout the report.
Public Commenter 10, Julie Spitzer	Web-based article about the report	Recap of five major findings from the review with a link to the draft report. No additional commentary. Available: https://www.beckershospitalreview.com/telehealth/telehealth-success-varies-by-setting-5-things-to-know.html	N/A - web-based article detailing the findings of the draft report.
Public Commenter 11, Politico	Web-based article about the report	"A new federal review of nearly 150 studies concludes that telemedicine generally is clinically effective, Morning eHealth's Darius Tahir reports -- but it's insufficient evidence to draw conclusions about whether it saves money or results in higher quality care. The findings are a mixed bag for telemedicine advocates, who argue the technology can decrease costs by shifting patients away from expensive care settings such as hospitals and increase quality by connecting patients with specialists outside their geographic area; the Agency for Healthcare Research and Quality report seems noncommittal about those claims. Still, given telemedicine's growth, the report said there should be ample opportunity to obtain quality evidence that could shed new light on these issues. More for Pros here."	N/A - web-based article detailing the findings of the draft report.

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Public Commenter 9, Les Masterson	Web-based article about the report	Recap of major findings from review with a link to the draft report and some commentary about recent increases in telehealth investments. Available: https://www.healthcaredive.com/news/telehealth-success-varies-by-setting-according-to-ahrq/524877/	N/A - web-based article detailing the findings of the draft report.