Exploratory study of Google Nest Hubs in the long-term care setting in Manitoba – Canada

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Abstract

Background: During the COVID-19 pandemic, many LTC facilities limited recreational and social activities to minimize the chances of an outbreak, leaving residents isolated. In response, we provided Google Nest Hub devices to 80 PCHs/supportive housing residences as an on-demand engagement mechanism for the residents and staff.
Objective: To evaluate the experiences in setting up and using Google Nest Hub devices in long-term care settings.
Method: We employed an online survey that explored the challenges and benefits of setting up and using the devices, who was using the devices, and how the devices were used. We analyzed the frequencies of the close-ended responses, and manually coded the open-ended responses before again analyzing the frequencies.
Results: Thirty staff members from facilities that received a device completed the survey. The majority (N = 25) had already set up a device, while a few (N =5) had not. The experiences reported by the participants were overwhelmingly positive. The devices were used most by recreation staff, residents, and nursing staff. The most common uses were music, weather forecasts, and videos. The majority of respondents reported that the use of these devices provided ongoing interactions, and nearly all agreed that the effort of using the devices was worth the value. A few issues were encountered, largely related to facilities' Wi-Fi resources, and challenges surrounding speech as a means of using the devices. Many benefits were reported, and the use of the devices varied.
Conclusion: Our initial analysis revealed a largely positive response to the varied use of these devices that may serve to help combat residents' isolation and boredom in the long-term care setting and contribute to the resident's quality of life.

Keywords: digital voice assistants, long-term care, Google Nest Hub, nursing home

INTRODUCTION

Early in the pandemic, countries across the globe reported around half of all COVID-19-related deaths occurred in LTC settings (Burki, 2020; Iritani et al., 2020; McGilton et al., 2020). Many LTC facilities placed restrictions on visitation and activities to curb this spread (Molloy et al., 2020; Wallace et al., 2020). These restrictions accentuated problems related to social isolation and loneliness (Abbasi, 2020; Noten et al., 2022; van Tilburg et al., 2021), and decreased the general well-being of residents (van der Roest et al., 2020).

Various technological solutions were tried globally to maintain virtual visits and provide engagement through virtual means for residents (Hoel et al., 2022; Vu et al., 2022). These solutions included utilizing technology such as computers, tablets, and phones. Digital Voice Assistants (DVA) may provide residents with another option for engagement and entertainment due to their ability to pro-

vide hands-free video calling and provide various hand-free recreational activities.

Although research investigating the use of DVAs with older adult populations is relatively scarce (Kim, 2021; Sayago et al., 2019), recent literature has introduced their potential benefits in LTC settings (Wiese et al., 2019). Researchers argue that this sort of technology may support well-being-enhancing activities and enable positive and meaningful activities (Wiese et al., 2019). This highlights a potential benefit of DVAs in LTC settings, as they may both support and enable positive and meaningful activities of recreation and social connection while allowing for hands-free use in the time of a pandemic. Research in settings involving homecare and General Practitioners (e.g., family physicians) finds DVAs have a positive impact on the health and social well-being of older adult patients, and both patients and carers had positive attitudes toward the devices (Balasubramanian

Table 1. Survey participant characteristics

Characteristic	n	%
Gender		
Male	4	13.8
Female	25	86.2
Age		
20 - 29 years	6	20.7
30 - 39 years	8	27.6
40 - 49 years	6	20.7
50 - 59 years	7	24.1
60 + years	2	6.9
Years worked in long-term care		
< 1 year	4	13.8
1 - 2 years	1	2.5
3 - 5 years	4	13.8
> 5 years	20	69.0
Primary type of work in facility		
Recreation	22	75.9
Nursing	1	3.5
Administration	3	10.3
Management	1	3.4
Communications	1	3.4
Allied Health	1	3.4

Note: N = 29

et al., 2021). These assistive technologies have also been used to support and assist primary family carers of older adults with dementia, though the use of these devices was often not supported by more formal health and social service workers (Gibson et al., 2019). Although this research was not conducted in LTC settings directly, it provides some evidence for the possible utility of DVAs in LTC settings for residents and highlights a potential to integrate this technology more formally within the healthcare system.

Although there are many potential benefits to adopting DVAs in LTC settings, potential barriers to using these devices exist as well. Most of the literature suggests that older adults are generally slower, more anxious, and less competent with technology than people from younger demographics (Pradhan et al., 2020). Barriers specific to DVA use are the requirement to shift conversational styles (Kim, 2021) and learn new diction related to technology use (Pradhan et al., 2019) to effectively operate DVAs. Despite these barriers, however, older adults with low technology use seem to pick up the use of DVAs readily and use them somewhat consistently thereafter (Pradhan et al., 2020).

Thus, though with notable barriers, DVAs show the potential to be quite beneficial in the care of older adults in LTC settings. However, we are unaware of any research that investigates this directly in LTC settings. As such, the present study looked to explore the use of a specific type of DVA in LTC settings in Manitoba, Canada.

Methods
Provision of the DVAs
As part of a government-sponsored project to improve the situation of older people during the pandemic, we purchased Google Nest Hubs (GNH; i.e., a form of DVA) for LTC facilities, in rural and urban Manitoba, Canada. Further philanthropic donations allowed for more GNHs to be purchased. In total, 80 LTC facilities re-

quested GNHs, and depending on the number of residents, between one and five GNHs were provided to each facility. We chose GNHs as the DVA devices for several reasons. First, they are very intuitive to use, only requiring users to say, "Hey Google," and then whatever command they wish to use. Second, they also have a screen built into the device allowing for visual cues and video playback. Third, the device comes optimized for various Google applications, such as YouTube and YouTube music for entertainment, and Google Meet for video and voice calls. The various functions of these devices include using your voice to surf the internet, gather information, watch videos, listen to music, use video and voice calls, and play various games and activities.

Prior to distribution, we tested and explored the GNHs, developed instructions on how to set them up and included these instructions with the devices during distribution. Additionally, we created a virtual presentation that explained possible uses, addressed privacy concerns, and gave useful tips. Staff from the facilities that received GNHs were invited to attend this presentation. GNHs were delivered to the LTC facilities and employees of the LTC facilities installed the GNH devices. This included registering a Google account with the device and following on-screen instructions. The government-sponsored project mentioned above was not designed as a research project and LTC facilities receiving GHNs were not required to participate in the research project, which took place several months after the distribution of the devices. The research project, involving surveys and interviews, received ethics approval and all participants in those surveys and interviews provided their consent.

Procedure
For this study, we utilized a primarily quantitative online survey that included both closed- and open-ended questions (Appendices A and B). The survey items were designed to understand how the LTC facilitated the setup and used the GNHs, as well as to understand the challenges and benefits they faced in this process. Survey Monkey was used to administer the survey. The recruitment for the survey was done through targeted sampling, by emailing a survey invitation and link to the various institutions that received GNHs. A reminder email was sent out two weeks later. The inclusion criterion was that the participants worked at a facility that received at least one GNH.

Survey
Participants were asked to report their gender, age, the primary type of work within the facility, and how long they have worked in LTC. They were also asked if they were reporting on behalf of a personal care home (i.e., facilities that provide

Table 2. Facility characteristics for the survey participants

Characteristic	*n*	%
Type of facility		
Personal care home	25	86.2
Supportive housing residence	4	13.8
Regional health authority of facility location		
Winnipeg	22	75.9
Interlake-Eastern	2	6.9
Southern	3	10.3
Prairie mountain	2	6.9
Northern	0	0
Number of GNHs the facility received		
2	12	41.4
3	6	20.7
4	6	20.7
5	5	17.2
Number of residents in facility at maximum capacity		
1 - 49	8	27.6
50 - 99	5	17.2
100 - 149	10	34.5
> 149	6	20.7

Note: GNH = Google Nest Hub

care to older adults whose needs can no longer be met at home) or a supportive housing residence (i.e., facilities for those who can no longer manage in their own home but do not require the services of a personal care home), which local Manitoba regional health authority the facility was in, how many residents the home had at full capacity, and how many GNHs the facility received. After the demographic information had been received, the participants saw one of two versions of the survey, depending on whether the LTC facility had or had not set up at least one GNH.

Those who had set up a GNH answered a total of 27 questions (Appendix A) which included questions that explored who set up the GNH and any difficulties associated with this. It also evaluated who is using the GNH, how they are using the GNH, and where they are using the GNH. Furthermore, the benefits and challenges associated with these GNH devices for both staff and residents were investigated. Finally, we gauged the overall opinions of staff on the GNH devices.

Those who had not yet set up a GNH answered a total of 14 questions (Appendix B) that explored why this was the case, and whether they had plans to use the device in the future. We then investigated either (1) what these plans would be, or (2) why they had no plans to use them. Finally, we collected general comments regarding the GNH.

Survey analysis
To analyze this survey, we looked at the frequencies of the closed-ended responses. For the open-ended responses, we utilized manual coding. First, we read all the open-ended responses, making note of the themes of the responses. Once the themes were created, we again reviewed all answers, placing them in their respective themes. Finally, we analyzed the frequency of each themed response.

Interviews
In addition to the surveys, we also interviewed two participants using a semi-structured interview guide. However, due to the limited sample, only a few quotes from the interviews are used to highlight points in the discussion.

RESULTS
Participants
A total of 30 individuals responded to our survey, with 29 providing demographic data. For the characteristics of the survey participants, see *Table 1*. For the characteristics of their facilities, see *Table 2*.

Participants who had set up at least one GNH
Closed-ended analysis
Most participants had set up at least one GNH (N = 26). All subsequent numbers in brackets represent the number of participants out of these 26 who selected the indicated response. Note that for some questions multiple responses could be selected so the total could be greater than 26.

Regarding setup, the majority had recreation staff set up the device (20). Other responses included other (3), administration staff (2), and technical staff (1). The majority reported no technical difficulties when setting up the GNHs (21). Of the five respondents who encountered issues, issues cited included facility Wi-Fi (3), selecting the wrong language and not being able to revert to English (1), and being concerned about connecting a personal device to complete the set-up (1).

The use of the GNHs was varied. The GNHs were utilized by recreation staff (23), residents (12), nursing staff (11), other staff (6), technical staff (2), families of residents (2), and administrative staff (1). Music was the most popular use among both residents and staff (See Table 3 for data on the different ways both staff and residents used the GNHs). The location of the device(s) varied as well. These locations included the recreation room (14), dining room (11), lounge (11), no specific location (the GNH is moved to different locations; 8), nursing station (4), resident's room (3), and other (3). The majority (16) reported no challenges with using voice commands, or residents understanding what the GNH says. However, a minority (10) did report some challenges which

Table 3. Survey data on ways in which residents and staff use the Google Nest Hubs

Activity	Residents		Staff	
	n	%	*n*	%
Listening to YouTube music	21	87.5	20	87.0
Getting the weather forecast	16	66.7	16	69.6
Watching YouTube videos	13	54.2	14	60.9
Orienting to the day	9	37.5	10	43.5
Telling jokes	9	37.5	8	34.8
Seeking information/asking questions	9	37.5	12	52.2
Listening to radio stations	8	33.3	9	39.1
Listening or watching the news	7	29.2	5	34.8
Translating for staff or residents	5	20.8	7	30.4
Showing custom pictures	2	9.3	4	17.4
Other	2	8.3	3	13.0
Video or audio chats	1	4.2	1	4.4
Staff administrative tasks	0	0.0	4	17.4
Broadcasting messages	0	0.0	1	4.4

Note. N = 26

included not remembering to say "Hey Google" before a command (4), the device being too quiet for every resident to hear what it is saying (2), not recognizing the voice of residents with speech impairments (e.g., from a stroke; 1), residents not remembering to use voice commands at all (1), and issues with Wi-Fi (1).

Table 4. Survey open-ended response analysis of uses and surprising aspects of the Google Nest Hub Devices

Question and derived themes	N	%
What are the top three ways in which you are using the Google Nest Hubs?	23	100.0
Music	20	87.0
YouTube videos	7	30.4
Finding facts and information	6	26.1
Miscellaneous entertainment	6	26.1
Weather	5	21.7
Telling jokes	5	21.7
Orienting to the Day	4	17.4
Resident communication and relationships	4	17.4
News	2	8.7
Advocating for Wi-Fi	1	4.3
What is the most surprising aspect of using the Hub?	20	100.0
Ease of use/Convenience	7	35.0
Music options	3	15.0
Effectiveness and/or variety of uses	3	15.0
Residents are more accepting than the nursing staff	2	10.0
Enhancement of resident's lives	2	10.0
Universality	1	5.0
Revealed need for Wi-Fi	1	5.0
Nothing was surprising	1	5.0

Note: N reflects the number of respondents for each question, and the number of total respondents for each question whose responses fit into each theme when listed beside the respective themes. % Reflects the percent of participants whose responses matched with a derived theme.

When asked how they would describe the use of the hub (Appendix A, Question 24), 22 participants provided responses. The majority selected ongoing interactions (15), with fewer selecting a mix for different residents (6), and only one selected gimmicky and short-term. Twenty-two participants also responded to a Likert-type statement that staff and residents interacting with the Hub were worth the effort of setting it up and providing support (Appendix A, Question 25). Most strongly agreed (13), some agreed (6), a few were neutral (2) and only one disagreed. No participant strongly disagreed.

Open-ended analysis
Open-ended questions included asking participants to list the top three ways they were using the GNHs, and the most surprising aspects of the GNH devices (Appendix A, Questions 18 and 23; *Table 4*). We also asked participants to provide the top three benefits for both residents and staff (Appendix A, Questions 19 and 20; *Table 5*). Finally, we investigated the top three challenges in using the GNH devices (Appendix A, Question 22; *Table 6*).

Participants who had not set up a GNH
Closed-ended analysis
Only four participants had not yet set up at least one GNH. All four reported that they planned on using the devices in the future. When asked for the reason(s) why the GNHs had not yet been set up (Appendix B, Question 11), three cited issues with Wi-Fi and two indicated restrictions from the pandemic. Technical issues other than Wi-Fi, privacy issues, an older DVA device being used, and the person responsible for set-up having not done so, were also each cited once.

Open-ended analysis
When asked to describe their plans with the devices (Appendix B, Questions 12 and 13), responses included resident recreation (3), with examples such as music, trivia, and information gathering. One participant included a caveat that these uses would begin once residents were no longer forbidden to congregate in shared spaces due to the COVID-19 pandemic.

DISCUSSION AND CONCLUSION
The present study serves as an initial investigation into the use of DVAs in LTC. Our research revealed an overall posi-

Table 5. Survey open-ended response analysis of the most beneficial aspects of the Google Nest Hub devices for residents and staff

Question and theme	N	%
Question: List the top three most beneficial aspects of the Google Nest Hubs for residents	21	100.0
Personalized, on-demand music	17	81.0
Ability to answer questions	6	28.6
User friendly and convenient	6	28.6
Facilitates independence	5	23.8
Personalized videos	4	19.0
Miscellaneous entertainment	4	19.0
Jokes	3	14.3
Weather updates	3	14.3
News	2	9.5
Orienting to the day	2	9.5
Question: List the top three most beneficial aspects of the Google Nest Hubs for the staff	22	100.0
Personalized, on-demand music	15	68.2
User friendly and convenient	10	47.6
Gathering information	6	28.6
Assisting with job activities	4	19.0
Personalized videos	4	19.0
Miscellaneous entertainment	3	14.3
News	3	14.3
Mobility of device	2	9.5
Weather	2	9.5
Infection control friendly	1	4.8

Note: N reflects the number of respondents for each question, and the number of total respondents for each question whose responses fit into each theme when listed beside the respective themes. % Reflects the percent of participants whose responses matched with a derived theme.

The most common recreational use of the GNHs was their ability to offer on-demand, personalized music. Researchers have speculated that listening to music may benefit LTC residents with cognitive decline (McCreedy et al., 2021), since early musical memories may be stored in areas of the brain affected during cognitive decline (Groussard et al., 2019). The relaxation response elicited by music (Hernandez-Ruiz et al., 2020), along with the potential to evoke autobiographical memories (Belfi et al., 2022) may help address agitation concerns within this population (McCreedy et al., 2021). That providing personalized music for the residents was so often reported as a natural use of the device suggests that these devices may be pivotal in providing this service. A quote from an interview that illustrates this benefit is "this one resident's favorite song… I saw it repeated at least three times in a row." Beyond this potential targeted, specialized use, music also provides the opportunity to, as one respondent described, "bring tenants together," and thus potentially help address the issue of loneliness in LTC (Thomas, 1996).

Another reported benefit of the GNHs is the independence it afforded the residents which may help address the last of the "three plagues": helplessness (Thomas, 1996). Feelings of helplessness have long been attributed to a lack of control in one's environment (Seligman, 1972). The reported ease of use of these devices and the increased independence this may offer the residents may increase the sense of control they have in their daily recreation activities. A quote illustrating this from our interview reads, "something that they're able to do independently and they don't always have to ask that staff for help [with the GNH]." This increased sense of control may serve to decrease feelings of helplessness. However, not all residents succeeded in using these devices independently.

The most common challenges reported surrounded communication with the GNHs' voice-activated features. Specifically, the residents remembering to say "Hey Google" before using the device, the device not understanding the residents' speech, and the volume being too low for the residents to understand. Although these challenges were relatively infrequently mentioned, they highlight a need for the continued development of technology that is accessible to all populations. These findings echo concerns regarding a need to switch conversational style when using DVAs (Kim, 2021) and learning the

tive regard for DVAs. Most individuals had no issues setting up or using the devices, and of the few challenges faced, most were minor. The use of these DVAs was varied, as many different individuals were using the devices for a variety of activities/tasks. These varied uses suggest that the use of DVAs in LTC may help address all "three plagues" of LTC: helplessness, loneliness, and boredom (Thomas, 1996).

When asked about the most beneficial aspects of the GNHs for the residents, entertainment was widely addressed, which may combat the concern surrounding boredom in the LTC setting. As one participant we interviewed illustrated, "Certain residents… would benefit so much from having them… they maybe don't need as much recreation interventions as some other residents who aren't as independent… but they still need that recreation." This highlights a problem of providing recreation for all residents of LTC facilities that correspond with their unique level of independence, and that GNHs may help address this problem. This suggests that previous research demonstrating DVAs can support well-being-enhancing, meaningful activities in community-dwelling older adults (Wiese et al., 2019) may be extended to LTC facilities.

Table 6. Survey open-ended response analysis of the top challenges of using the Google Nest Hub devices

Question and theme	N	%
Question: What have been your top three challenges with using the Google Nest Hubs?	17	100.0
Device understanding residents	4	23.5
Residents are uncomfortable with new technology	4	23.5
Remembering audio cue ("Hey Google")	3	17.6
Wi-Fi challenges	3	17.6
Needs to be plugged in	2	11.8
Privacy concerns	2	11.8
Device volume too low	2	11.8
Staff are uncomfortable with new technology	2	11.8
No proper location for the device	1	5.9
Not enough features	1	5.9
No time for set up	1	5.9
Too much specificity required in making requests	1	5.9

Note: N reflects the number of respondents for each question, and the number of total respondents for each question whose responses fit into each theme when listed beside the respective themes. % Reflects the percent of participants whose responses matched with a derived theme.

new diction required to operate specific devices (Pradhan et al., 2019). Although no technology will be perfect for every resident of an LTC facility, and our research reflects that some struggled with, or were uncomfortable with this DVA technology, the majority of the staff participants still saw it as a benefit, and many residents took to adopting this technology. This supports research that demonstrated older adults, even those with low technology use, are able to adapt to using DVA technology (Pradhan et al., 2020).

Strengths, limitations, and future research
There are strengths and limitations of our study to consider. To our knowledge, this study represents a first look at DVA technology in an LTC setting. Samples of this kind are difficult to acquire, and even more so during the time of the pandemic when staff was extremely overworked (McGilton et al., 2021). Further, since our study was exploratory in nature, our participants were able to provide information on the benefits and challenges of the devices as they perceived them. Apart from directly surveying the residents themselves,

this is the closest perspective affordable in evaluating the use of such devices. These characteristics provided a great deal of ecological validity to our findings. Though this unique sample was a strength, the relatively small size was a limitation. Additionally, because we relied on the self-report opinions of staff, no objective standards of measurement were used. Lastly, there are limits to the generalizability of our findings. We only tested GNH devices, so it is uncertain if these results generalize to other DVAs. Furthermore, all our participants worked in the province of Manitoba, Canada, which may limit generalizability.

Future research should address these limitations by attempting to explore the benefits of these devices with a larger sample size. Furthermore, a sample more representative of the LTC settings across the globe may be recruited to strengthen the generalizability of our results. Apart from sample characteristics, future research may also employ more robust measurements of use, such as analyzing device interaction logs, or naturalistic observation methods. Additionally, outcome data on resident well-being or perceived opinions of residents towards the DVAs may also be gathered to further explore the challenges and benefits of the devices as they apply to residents themselves.

Conclusion
As new technology is developed that is increasingly accessible, the benefit of this technology for our most vulnerable populations ought to be further studied. This exploratory analysis serves as an initial call to action for researchers to evaluate the use of DVAs in LTC settings. It is clear from this analysis that these sorts of devices carry a great potential benefit for residents and the staff who work tirelessly to care for them.

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APPENDIX A: SURVEY FOR THOSE WHO HAD SET UP AT LEAST ONE GOOGLE NEST HUB

1. I consent to participate in this survey.
a. Yes
b. No

2. What is your gender?
a. Male
b. Female
c. Other (specify):
d. Prefer not to say

3. What is your age?
a. < 20
b. 20 to 29
c. 30 to 39
d. 40 to 49
e. 50 to 59
f. > 60

4. How long have you worked in long-term care?
a. < 1 year
b. 1 to 2 years
c. 3 to 5 years
d. > 5 years

5. What is your primary type of work in the facility you are filling the form out for?
a. Recreation
b. Nursing
c. Health Care Aid
d. Administration
e. Other (specify):

6. Are you reporting on behalf of a PCH or supportive housing residence?
a. PCH
b. Supportive housing residence

7. In which RHA is your PCH or supportive housing residence located?
a. Winnipeg Regional Health Authority
b. Interlake-Eastern Regional Health Authority
c. Southern Regional Health Authority
d. Prairie Mountain Regional Health Authority
e. Northern Regional Health Authority

8. How many Hubs did your facility receive? (Open-ended)

9. How many residents does your home have, if at maximum capacity?
a. 1 to 49
b. 50 to 99
c. 100 to 149
d. >149

10. Have you setup at least one Google Nest Hub in your facility?
a. Yes
b. No

11. Who was responsible for setting up the Hub? (check all that apply)
a. Recreation staff
b. Nursing staff
c. Administrative staff
d. Technical staff
e. Other, please specify

12. Who is using the Hub (i.e., giving the verbal commands)? (check all that apply)
a. Residents on their own
b. Recreation staff
c. Nursing staff
d. Administrative staff
e. Technical staff
f. Families
g. Other, please specify

13. Where do you have the Hubs located in your facility? (check all that apply)
a. Dining room
b. Recreation room/multipurpose rooms
c. Nursing station
d. Lounge
e. Individual resident room
f. The Hub(s) move from place to place
g. Other, please specify

14. Have you had any technical difficulties with setting up or using the Hubs? If yes, please describe.
a. No
b. Yes, please describe:

15. Have there been any challenges with using the voice commands or residents understanding what the Google Nest Hub says?
a. No
b. Yes, please describe

16. Please list all the ways in which residents at your facility have used your Hub(s) (Check all that apply).
a. Orienting to the day (time of day, news in the morning, with the Good Morning command, etc.)
b. Showing pictures other than the default pictures
c. Watching YouTube videos
d. Listening to YouTube music
e. Listening to radio stations
f. Translating for staff or residents
g. Video or audio chats with family and friends
h. Staff administrative tasks or information (calendars, etc.)
i. Broadcasting messages for residents and staff (e.g., announcing a meal or activity beginning)
j. Telling jokes
k. Getting the weather forecast
l. Listening or watching the news
m. Seeking information or asking the Google Nest Hub questions about any topic
n. Other, please specify

17. Please list all the ways in which staff at your facility have used your Hub(s) (Check all that apply).
a. Orienting to the day (time of day, news in the morning, with the Good Morning command, etc.)
b. Showing pictures other than the default pictures
c. Watching YouTube videos
d. Listening to YouTube music
e. Listening to radio stations
f. Translating for staff or residents
g. Video or audio chats with family and friends
h. Staff administrative tasks or information (calendars, etc.)
i. Broadcasting messages for residents and staff (e.g., announcing a meal or activity beginning)
j. Telling jokes
k. Getting the weather forecast
l. Listening or watching the news as a standalone feature, not part of orienting to the day
m. Seeking information or asking the Google Nest Hub questions about any topic
n. Other, please specify

18. What are the top 3 ways in which you are using the Google Nest Hubs? Please describe. (Open-ended)

19. List the top 3 most beneficial aspects of the Google Nest Hubs for residents, if applicable. (Open-ended)

20. List the top 3 most beneficial aspects of the Google Nest Hubs for staff, if applicable. (Open-ended)

21. What features did not work for your setting or residents? Please describe, if applicable. (Open-ended)

22. What have been your top 3 challenges or concerns with using the Google Nest Hubs, if applicable? (Open-ended)

23. What is the most surprising aspect of using the Hub? (Open-ended)

24. Would you describe the use of the Hub as sustained and ongoing or gimmicky and only interesting as a short-term novelty?
a. Sustained and ongoing interactions
b. Gimmicky and short-term use only
c. Mix for different residents

25. The value that staff and residents get from interacting with the Hub has been worth the effort needed to set it up and provide support.
a. Strongly disagree
b. Disagree
c. Neutral
d. Agree
e. Strongly agree

26. Do you have any future plans for the devices? (Open-ended)

27. Have any family members purchased Hubs for a resident's room?
a. Yes
b. No

28. Do you have any positive or negative stories that you want to share? Please do not provide identifying information about individuals. (Open-ended)

29. Any other comments you want to share with us about the Google Nest Hubs? (Open-ended)

APPENDIX B – SURVEY FOR THOSE WHO HAD NOT SET UP AT LEAST ONE GOOGLE NEST HUB
1. I consent to participate in this survey.
a. Yes
b. No

2. What is your gender?
a. Male
b. Female
c. Other (specify):
d. Prefer not to say

3. What is your age?
a. < 20
b. 20 to 29
c. 30 to 39
d. 40 to 49
e. 50 to 59

f. > 60

4. How long have you worked in long-term care?
a. < 1 year
b. 1 to 2 years
c. 3 to 5 years
d. > 5 years

5. What is your primary type of work in the facility you are filling the form out for?
a. Recreation
b. Nursing
c. Health Care Aid
d. Administration
e. Other (specify):

6. Are you reporting on behalf of a PCH or supportive housing residence?
a. PCH
b. Supportive housing residence

7. In which RHA is your PCH or supportive housing residence located?
a. Winnipeg Regional Health Authority
b. Interlake-Eastern Regional Health Authority
c. Southern Regional Health Authority
d. Prairie Mountain Regional Health Authority
e. Northern Regional Health Authority
8. How many Hubs did your facility receive? (Open-ended)

9. How many residents does your home have, if at maximum capacity?

a. 1 to 49
b. 50 to 99
c. 100 to 149
d. >149

10. Have you setup at least one Google Nest Hub in your facility?
a. Yes
b. No

11. If you have not setup at least one device, please check the reason(s).
a. No time
b. Wi-Fi is problematic
c. Technical issues with setup other than Wi-Fi
d. The pandemic situation will not allow for their use due to restrictions of where residents can be
e. Privacy issues
f. Other (please describe)

12. Are you planning on using your device in the future when circumstances change?
a. Yes (If yes, question 13)
b. No (If no, question 14)

13. Please describe how you are planning on using the device in the future (Open-ended).

14. Please describe why you are not planning on using the device in the future (Open-ended).