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Managing Medical Knowledge Flow: Physicians' Social Media Actualisation Practices

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Abstract:

Physicians have extensive clinical knowledge and are thus uniquely positioned to offer public health education through social media (SM) platforms. However, it is challenging for physicians to effectively communicate complex medical information to lay people with varying levels of related knowledge. There is limited research on how physicians navigate these challenges. This study uses affordance actualisation theory to investigate how a prominent physician adapts SM features to effectively disseminate medical and scientific information. The study identifies two key SM actualisation practices in this process. First, the process involves balancing knowledge brevity to improve accessibility while maintaining information fidelity to ensure accuracy. Second, the process involves providing valuable clinical insights while adhering to legal constraints in the open SM environment through the optimisation of SM features as a compensatory mechanism. The current findings contribute to a theoretical framework on how physicians manage medical knowledge flow online, which involves not only advancing knowledge but also carefully regulating knowledge to maintain accuracy and professional standards within the open nature of SM.

Keywords: physicians, social media, affordance actualisation, health communication, knowledge flow

1. Introduction

The widespread use of social media (SM) has led to its increased application in healthcare. Physicians have recognised the benefits of SM platforms for knowledge sharing and are thus increasingly utilising these platforms to improve health communication in everyday practice and during health crises, such as the COVID-19 pandemic (D'eom et al., 2023; Liu et al., 2023). These platforms facilitate the dissemination of crucial health information (Chamakiotis et al., 2021; Wu & Deng, 2019), enhance public awareness of specific health issues (Liu et al., 2020;

Sun et al., 2024), and increase health literacy, thereby contributing to improved public health outcomes (Schneider-Kamp & Takhar, 2023). Liu et al. (2020) also demonstrated that physicians who engage with disease-specific communities on SM can positively influence user well-being.

Physicians have extensive clinical experience and are uniquely positioned to offer public health communication via SM (Liu et al., 2020). However, they encounter significant challenges in effectively conveying complex medical information to lay audiences with varying levels of understanding. The dissemination of this complex information can lead to misinterpretation (Zhou et al., 2023) or the spread of misinformation (Wang et al., 2019), thereby decreasing trust in healthcare providers (Schneider-Kamp & Takhar, 2023) and undermining medical authority (Islam et al., 2020; Rueger et al., 2021; Tasnim et al., 2020). Excessive online information seeking may decrease an individual's ability to accurately identify the nature and causes of their health problems (Liu et al., 2020). These contradictory impacts underscore that physician-led SM platforms require more than mere knowledge transmission (Liu et al., 2023); they necessitate the careful management of knowledge dissemination to enhance accessibility while maintaining scientific rigour (Åhlin et al., 2023; Campbell, 2021; Faraj et al., 2016; Rueger et al., 2021).

Herein, we use affordance actualisation theory (AAT) (Burton-Jones & Volkoff, 2017; Strong et al., 2014) as a suitable theoretical lens to explore the dissemination of medical knowledge via SM platforms. AAT posits that a technology's potential uses (affordances) can only be realised and optimised (actualised) through appropriate actions. In this study, we focus on exploring physicians' actions for leveraging SM's capabilities for effectively managing medical knowledge dissemination online. Therefore, we aim to address the following research question (RQ):

How do physicians actualise SM platforms to effectively manage medical knowledge dissemination?

Drawing on a case study of a prominent physician's SM practices, this research identifies two key SM actualisation practices. The first practice involves a mechanism for physicians to carefully trim video clips with the application of YouTube features to translate intricate medical knowledge into accessible information while maintaining scientific rigour. The second practice involves guidelines for sharing clinical insights in alignment with legal standards. Collectively, these mechanisms show that while SM provides numerous opportunities for knowledge

expansion, physicians actualise these opportunities whilst maintaining rigor, completeness and adherence to medical professional standards. This study differs from previous research on physician-led online knowledge sharing (e.g., Schneider-Kamp & Takhar, 2023; Sun et al., 2024) by offering concrete, actionable practices for physicians to navigate the affordances and constraints of SM. Our findings suggest a framework of SM-actualised management of medical knowledge flow. Although flow-focused knowledge sharing is not new, this study is likely the first to introduce it within the context of online medical communication. While previous research has emphasised the role of SM in broadening knowledge dissemination and enabling multidirectional flow within organisations (Faraj et al., 2016; Mozaffar & Panteli, 2021), this study argues that, for medical knowledge flows to be effective, there is a need to balance knowledge brevity with accuracy, and responsiveness to clinical inquiries.

2. Theoretical Background

2.1 Physician-led SM platforms

SM has emerged as an influential conduit for health knowledge dissemination, facilitating both the exchange of existing knowledge and the generation of new insights (Barrett et al., 2016; Faraj et al., 2016). Patients use SM to share medical experiences (Bernardi & Wu, 2022; Foster, 2016), form peer-to-peer support networks (Chamakiotis et al., 2021; Vennik et al., 2014), and increase public awareness of specific health issues (Kothari et al., 2022; Lasker et al., 2005). Physicians have utilised these platforms to exchange critical health information (e.g., Sun et al., 2024), enhance patient communication (e.g., Liu et al., 2020) and expand public health outreach (e.g., Gunasekeran et al., 2022; Liu et al., 2023). Therefore, SM platforms have become valuable spaces for medical professionals to disseminate evidence-based knowledge across multiple disciplines (Rolls et al., 2016) and communicate tacit healthcare expertise (Foster, 2016), thus contributing to improved healthcare performance (Chamakiotis et al., 2021) while also increasing public health literacy (Gunasekeran et al., 2022).

Despite these advantages, the vast and expansive nature of SM audiences presents substantial challenges for physician-led medical communication. First, effectively translating complex medical knowledge into accessible information for lay audiences with varying health literacy levels is an arduous task (Campbell, 2021; Rueger et al., 2021). The varying levels of medical understanding among SM users can lead to the misinterpretation of medical content (Zhou et al., 2023), thus potentially compromising the integrity of information shared and affecting healthcare performance (Grajales III et al., 2014). Zhou et al. (2023) highlight this issue in their

research on online health communities, noting that while emotional support on these platforms can benefit some users, it may be detrimental to others. This complexity limits physicians' ability to engage in in-depth and nuanced discussions tailored to individual needs and interpretations.

Second, while the broad user base of a SM platform can amplify diverse opinions and enhance information sharing, online sources can sometimes be incorrect, as observed during the COVID-19 pandemic (Islam et al., 2020; Tasnim et al., 2020). That is, while interested parties gained substantial information regarding the pandemic, there was a certain degree of misinformation (Rueger et al., 2021). Moreover, despite the fact that networking provides an opportunity to form communities among stakeholders, these communities can also undermine medical authority and foster scepticism towards healthcare providers. For example, Schneider-Kamp and Takhar's study (2023) on young women's attitudes towards contraceptive pill use revealed that networking allows patients to adopt a perception of hazards that result in their challenging doctors' expertise. In situations such as the COVID-19 pandemic, rumours and misinformation related to the aetiology, outcomes, prevention, and cure of the disease rapidly propagate through SM (Islam et al., 2020; Tasnim et al., 2020).

Based on the contradictory influences of SM, researchers have underscored the need for a professional approach to physician-led online medical communication, emphasising that this approach should extend beyond casual conversation and align more closely with traditional professional communication standards (Guo et al., 2017; Zhou et al., 2023). Williams and Balaz's (2008) taxonomy of medical knowledge offers a valuable framework for understanding the nuances of professional medical communication. They distinguish between 'embrained' (cognitive), 'embodied' (experiential), 'encultured' (socialised), and 'embedded' (ingrained within particular workgroups) knowledge (Williams & Balaz, 2008). While we recognise the challenge of differentiating between different types of medical knowledge, this distinction highlights the complexities inherent in medical knowledge dissemination compared with general information sharing.

The complexity of online medical communication and the inherent contradictions of SM present significant challenges for physicians managing SM platforms. Physicians must not only utilise SM for broad knowledge dissemination but also ensure the quality and efficacy of the information shared. Therefore, it is necessary to address both the potential and constraints of SM to effectively guide knowledge transfer from physicians to audiences as well as to guide

knowledge transfer among the audiences themselves. To address this issue, we draw on AAT, which offers a robust theoretical lens for exploring the dynamic process of physician-led knowledge dissemination on SM platforms.

2.2 SM affordance actualisation

Affordance theory, which was proposed by Gibson (1986), posits that objects and environments offer potential actions to individuals. This concept has been extended to technology to explore how technological objects enable users to accomplish tasks within specific contexts (Leonardi, 2023; Leonardi, 2011; Majchrzak & Markus, 2012; Zammuto et al., 2007). SM, which comprises online platforms for content creation, sharing, and interaction, is a prime example of a technological object (Kaplan & Haenlein, 2010; Karahanna et al., 2018; Lin & Kishore, 2021). Research has identified several SM affordances, including 'generative role-taking,' 'meta-voicing,' 'triggered attending,' and 'network-informed associating,' which contribute to knowledge dissemination (Majchrzak et al., 2013). These affordances can be realised through SM features such as 'friending' and 'liking' on Facebook or 'watching video' and 'subscribing' on YouTube to align with user needs (Karahanna et al., 2018). Karanasios (2018) provides a thorough review of SM studies and categorises SM affordances as egocentric (individually focused) or allocentric (socially oriented).

However, affordances are not inherently enabling; SM can both empower and constrain actors in achieving their intended outcomes. Thus, the concept of affordance alone is insufficient to explain why users do or do not capitalise on available affordances. This gap has led to the emergence of the notion of affordance actualisation (Burton-Jones & Volkoff, 2017; Strong et al., 2014). Relatedly, scholars contend that user perception plays a crucial role in whether affordances are actualised. Norman (1999) suggests that only when technology is properly employed can users' perceptions of potential actions grow, leading to the actualisation of affordances. This theory underscores the importance of the user's capabilities in determining whether SM affordances are realised. Furthermore, the alignment of affordances with user goals is crucial for their actualisation (Burton-Jones & Volkoff, 2017). The objectives associated with technology, such as using electronic healthcare records to improve patient care or reduce costs, can vary significantly (Burton-Jones & Volkoff, 2017). While certain affordances of technology may fulfil one objective, they may not be suited to achieving others. This highlights the necessity of aligning affordances with specific goals.

The preceding discussion highlights the distinction between affordances and affordance actualisation (Bernhard et al., 2013). Affordances represent the potential actions a technological object enables for users, whereas affordance actualisation involves the deliberate and goal-oriented use of these affordances to achieve specific goals (Burton-Jones & Volkoff, 2017; Strong et al., 2014). Strong et al. (2014) clearly define affordance actualisation as the actions taken by users to exploit one or more technology affordances, thereby attaining tangible outcomes. AAT underscores the importance of aligning a technology's affordances with user goals to achieve the desired results. Although previous studies have applied the concept of affordances across various contexts, including medical settings, their focus has often centred on the mere utilisation of technological features. In contrast, the present research does not seek to highlight technological potential; rather, it aims to investigate the practices through which physicians actualise the potential of SM to effectively disseminate medical knowledge. This approach explores a more actionable and goal-oriented use of technology in the medical field.

3 Research Methodology

3.1 Research case and methods

To explore our research question, we conducted a qualitative interpretive case study (Walsham, 1995), as this method is well suited for delving into the nuanced meanings and processes presented in natural settings (Klien & Myers, 1999). This method is also recognised for its effectiveness in uncovering the establishment and evolution of online communication patterns (Kjærulff & Langstrup, 2023; Schneider-Kamp & Takhar, 2023). This aligned with our research objective of investigating how physicians actualise SM affordances with the goal of medical knowledge dissemination.

Our research focuses on the case of Dr Daniel Huang, a prominent paediatrician in Taiwan who attained celebrity status through his TV appearances, books and SM activities. He has a medical practice at MacKay Memorial Hospital and a teaching role at a medical college. He has led an online open forum on YouTube called 'Dr Huang's Health Lecture Hall' aimed at educating the public on medical knowledge, which we refer to as 'Huang's forum' henceforth.

Huang's journey into SM began with his experiences in the emergency room, where he encountered difficulties in effectively communicating health education to patients' caregivers in a busy clinical setting. In response to these challenges, he started writing blogs and sharing information about children's health education with a wider audience. He also authored health education books for parents, achieving best-selling author status. His expertise garnered

recognition, leading to invitations to participate in and host health-related TV programmes, thereby enabling him to share his knowledge.

As the popularity of blogging declined, Huang shifted his focus to building a Facebook community, with the aim of fostering interaction with his readers and encouraging comments and feedback. Over the past decade, his Facebook community has experienced substantial growth, amassing over 800,000 followers.

YouTube holds significant prominence as a SM platform, particularly owing to its video-centric features (Anderson, 2015). Therefore, Huang had a favourable view of YouTube as a platform for disseminating medical knowledge. In early 2020, with support from the book publisher Common Wealth Parenting (CWP), a publishing company specialising in parenting and child education books, and the Good TV station, where Huang hosts a medical talk show, he established his YouTube forum. Upon its launch, his public figure did not benefit from the development of his YouTube channel, which garnered modest viewership and subscription: approximately 50,000 people for nearly one year. However, over the subsequent four years, Huang succeeded in substantially increasing the subscriber count to 380,000 and achieved an impressive 26 million views (refer to Figure 1).

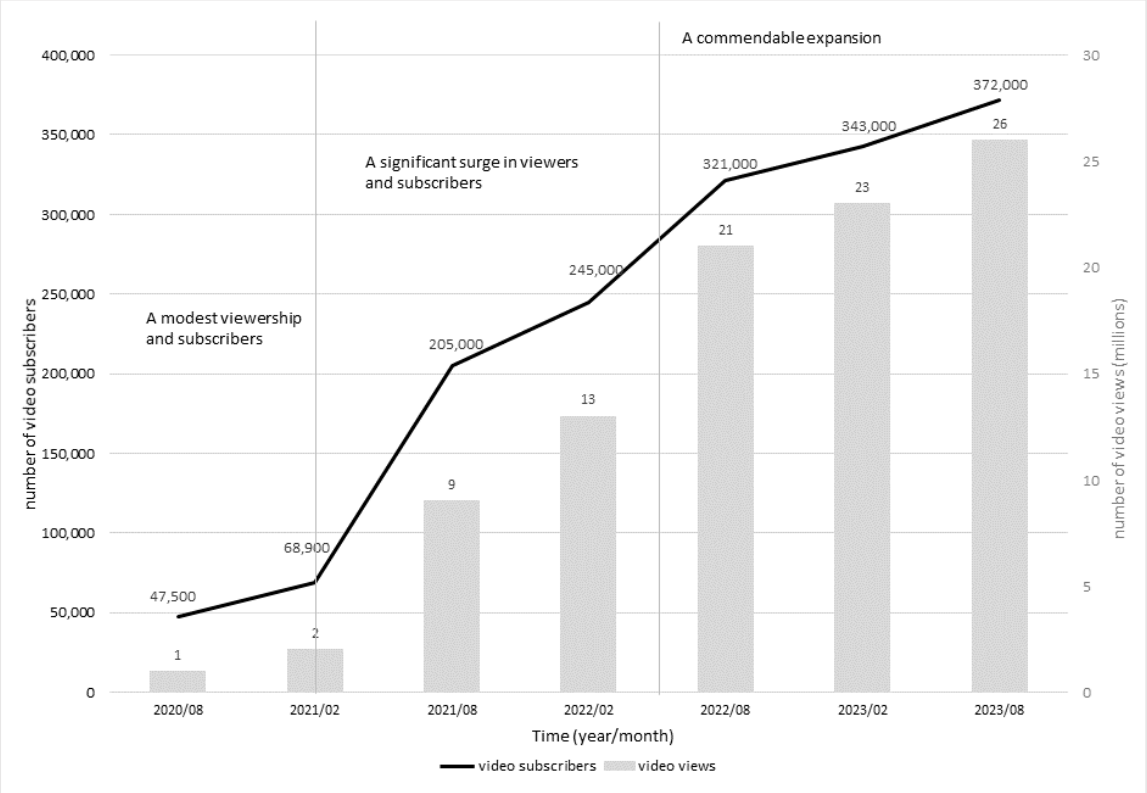

Figure 1. Subscribers and video viewers of Huang's forum

We found that Huang and his teams implemented distinct SM actualisation practices aiming to disseminate medical knowledge. Notably, Huang's forum received the New Media Medical Reporting Award from the Taiwanese Physicians Association for three consecutive years, a recognition that underscores his forum's contributions to the promotion of public health education in Taiwan. Huang's long-term involvement in sharing medical knowledge through SM makes him an ideal subject for our research question, fitting the category of an unusual and revelatory case (Eisenhardt & Graebner, 2007).

3.2 Data collection and analysis

For our research, we employed a comprehensive data collection approach encompassing interviews, observations, and archival data collection, as detailed in Table 1. Semi-structured and focus group interviews were carried out with Huang and key team members. Furthermore, we conducted site visits to the TV station's filming location and the office of the CWP. These visits included observations of their YouTube video production processes to gain deeper insights into the collaboration between Huang and his teams. Additionally, we compiled an archival dataset consisting of 221 online video clips retrieved from August 2020 to August 2023, which included a total of 13,071 viewer comments and interactions.

Table 1. Overview of the collected data

Approach	Source of data collected	Quantity collected
Interviews	■ Semi-structured interviews:	
	- Face-to-face (FTF) interview with Dr Huang	- 100 minutes
	- 2 online interviews with Dr Huang	- 90 minutes
	- FTF interview with 2 team members of Good TV	- 120 minutes
	■ Focus group interview	
	- 2 FTF interviews with 3 team members of CWP	- 170 minutes
Observations	■ Site visit to TV filming location	- 90 minutes
	■ Site visit to YouTube video shooting in CWP	- 80 minutes
	■ Informal conversation with two team members in charge of YouTube video shooting.	- 30 minutes
Archival data	■ 221 Huang's video clips on YouTube	- 13,315 minutes
	■ Viewer's comments	- 13,071 posts

We conducted our data analysis following the systematic approach outlined by Gioia et al. (2013) to ensure rigour in qualitative research . This approach enabled us to develop a *data structure* that incorporates both informant-based (first-order coding) and research-based (second-order coding) insights, allowing us to create a grounded model to answer the RQ (Gioia et al., 2022). We systematically progressed through our dataset, transitioning from raw data to first-order codes, then to second-order themes, and finally to theoretical dimensions. This approach guided our analysis through three primary coding stages (see Appendix I with data examples).

First, we immersed ourselves in the dataset: we watched all videos, read the viewer's posts, analysed interview transcriptions, and reviewed observation notes. This immersive approach provided us with a deep understanding of Huang's SM practices. After obtaining this in-depth understanding, we conducted first-order coding to identify how SM features were used to convey complex medical knowledge to the public. This stage of the research allowed us to understand how SM features facilitate medical knowledge transfer. Examples of codes included 'produce YouTube video series to enhance scientific rigour,' 'Q&A sessions for building physician–patient interactions,' and 'using "super like" for enhancing interactions,' among others.

Second, we applied the AAT to explore how Huang addressed the constraints he faced when using SM for medical education. This phase was guided by an AAT-informed coding procedure to organise first-order categories into second-order themes. By alternating between the theoretical perspective and the data, we categorised second-order themes that demonstrated how SM affordances were purposefully actualised to achieve specific goals and serve the general public, particularly in mitigating the constraints of SM platforms. The findings of this phase are detailed in Sections 4.1-4.2.

Finally, through a systematic and iterative process of cross-referencing the literature with our empirical data, we distilled second-order themes into overarching theoretical dimensions. These dimensions emerged through coding, including 'practice for expanding medical knowledge dissemination' and 'practice for proper clinical response to viewers.' The dimensions were developed with a focus on how Huang actualised SM affordances and mitigated the constraints of SM to manage the flow of knowledge transfer in online medical communication. A framework that integrates the theoretical dimensions is presented in Figure 2.

4. Findings

When Huang's forum was established in early 2020, it encountered a substantial obstacle in cultivating a viewership and subscriber base dedicated to medical discourse. While the platform initially attracted a considerable following due to Huang's celebrity status as a television personality and bestselling author, the majority of early participants demonstrated a primary interest in fan engagement rather than medical discussion. This discrepancy between the forum's intended purpose of disseminating medical knowledge and the observed behaviour of its initial audience highlighted the limitations of SM for knowledge sharing. Despite SM holding great potential for fostering participation and interaction, this platform struggled to achieve its primary goal. Huang expressed frustration with the outcome:

> *While I appreciated my book readers and television audience noticing our social media activities, I would be even happier to see them actively participating in our medical discussions... Despite creating numerous videos, we struggled to gain subscriptions and foster active healthcare discourse.*

To overcome these challenges, Huang and his team implemented a series of SM-based initiatives to increase the platform's attractiveness and engagement. Through their experiences, we identified two practices that were particularly effective in optimising YouTube's functionalities for the purpose of facilitating medical discourse (see Table 2). The first practice involved translating intricate medical information in accessible formats while maintaining scientific accuracy (Section 4.1). The second practice involved reconciling the prohibition on open medical consultations with the need to address viewers' clinical inquiries (Section 4.2). These practices necessitated significant adaptation of SM features to mitigate their inherent constraints, thus enabling Huang's forum to align with its core mission.

Table 2. Physician-led SM actualisation practices

1. Scientific knowledge dissemination	2. Digitally enabled professional responses
A. Knowledge deconstruction Scientific knowledge in the videos is broken down into easily digestible segments to enhance viewers' understanding.	**A. Video responses to address extended questions** Producing Q&A-based videos to respond to questions raised by the audience.

B. Knowledge reintegration Using YouTube's functionalities to resemble broken-down knowledge segments to improve overall knowledge integrity.	**B. Emojis for affirmation responses** Using emojis to respond to questioners who need affirmation of their thoughts.
C. Knowledge diversification Inviting experts from various fields to produce videos, enriching the diversity of knowledge types.	**C. Live responses with a chatbot** An instant messenger-based chatbot designed to provide information-seeking services to viewers.

4.1 Practice for expanding medical knowledge dissemination

As discussed earlier, Huang's efforts to disseminate medical insights via YouTube were hindered by the obstacle of being able to engage viewers in substantive medical discourse. Huang recognised that the inherent complexity of medical information poses a substantial barrier to public comprehension; therefore, he implemented a practice to render complex scientific concepts accessible to the general public. This approach, which we term 'knowledge deconstruction,' involves breaking down intricate information into easily understandable segments.

A. Knowledge deconstruction

To initiate the knowledge deconstruction process, Huang adapted his YouTube videos to be short and concise, typically lasting approximately 10 minutes in length. Deliberate brevity was employed to increase the accessibility of complex medical concepts. As Huang emphasised,

> *I strive to ensure that videos remain under 15 minutes, and ideally around 10 minutes. Lengthy explanations can deter viewers from watching and hinder knowledge delivery.*

In addition to reducing video duration, YouTube features were optimised to enhance content comprehensibility. The 10- to 15-min videos were further refined through editing and segmentation, leveraging YouTube's features to create more digestible content modules, by using (a) an introductory recap of disease symptoms, (b) close-up visualisation of medical conditions for better clarity, (c) summaries of key preventive measures, such as hygiene practices and sanitation protocols, and (d) segmentation using YouTube's chapter features to highlight important insights and facilitate viewers' navigation to relevant sections (see Appendix IId).

This SM-enabled information segmentation allowed Huang to present medical issues, phenomena, and precautionary measures clearly and concisely:

> *When addressing the general public, my primary goal is to ensure their grasp of essential points and understanding of symptoms. It is essential that they clearly understand these, for then, they are less likely to be misled by rumours and can avoid inaccurate assessments or unnecessary panic.*

This approach proved highly effective in conveying intricate medical knowledge to a general SM audience seeking concise, informative content. A working mother commented:

> *As a busy working mum, I find Dr Hung's short videos invaluable for quickly grasping essential information.*

Over time, a marked increase in engagement within Huang's forum became apparent, as evidenced by responses from participants referencing medical topics and terminologies in his videos. Discussions on specific diseases or childcare knowledge became commonplace. For example, comments such as '*The video delves deeply into enterovirus symptoms but is remarkably simple and understandable*' and '*The guidelines for non-staple food preparation are vivid and easy to follow*' were frequently observed.

Moreover, this deconstruction approach, coupled with the utilisation of YouTube chapters, facilitated peer-to-peer learning. The participants began referencing specific segments of Huang's videos to answer others' questions. For example, when one user inquired about the use of 'artificial skin', another responded,

> *At the 1:26 chapter in the video, the doctor says to clean the area thoroughly and then cover it with a wet dressing before applying artificial skin a few days later.*

These findings indicated that deconstructing complex medical information into digestible segments, combined with YouTube's chapters feature, significantly enhanced accessibility and comprehension for viewers. Therefore, Huang effectively managed SM as a platform for delivering professional medical content to the general audience, fostering a vibrant community where information sharing and engagement flourished.

B. Knowledge reintegration

While simplifying video content enhanced viewers' comprehension, Huang acknowledged the potential risks associated with oversimplification. He noted that incomplete explanations could lead to misunderstanding and even the spread of misinformation. As he stated,

> *Without sufficient elaboration, medical information could be easily misconstrued, leading to the spread of misinformation.*

To achieve an optimal balance between simplicity and comprehensiveness, Huang and his team applied a tactic that we term 'knowledge reintegration.' This approach involved creating a series of subject-specific medical videos, each composed of short and concise clips.

For example, the Baby Care series comprised 20 episodes of nutrition knowledge, encompassing topics such as feeding, regurgitation, nutrition, and newborn sleep guidance. Another eight-episode series focused on nurturing highly sensitive children (HSCs), offering valuable insights and parenting recommendations. More recently, they collaborated with a university research centre to distil their seven-year investigation on kids in Taiwan (KID) into an educational video series. Additional series addressing specific paediatric diseases and care are currently being developed. This approach of reintegrating knowledge segments into a series format preserved the integrity of the information while maintaining viewer engagement.

The viewers expressed appreciation for the reintegration approach and provided positive feedback.

> *The physician has really hit the mark on almost every video regarding my parenting struggles! The HSC series is incredibly beneficial, given that I have a highly sensitive child. Understanding the HSC group has provided me with great solace...*
>
> *I had grappled with my child's sleep issues for three years. I wish I had discovered the Baby Sleep series sooner.*

During the COVID-19 pandemic, Huang produced the 'COVID-19 Virus *Muggle Course*' series via this practice. This series covered various aspects of the coronavirus, including its origins, symptoms, infection prevention, and patient care. The series led to a significant increase in viewership, engagement through comments, and subscriptions on Huang's platform.

Viewers responded positively to this series, expressing appreciation for the insightful explanations and likening the experience to attending an infectious disease class.

The explanation provided is insightful~ It feels like I've attended an infectious disease class~ Nodding along in front of the screen!

Some participants actively suggested specific topics for future videos, indicating a desire for further exploration.

Please consider producing more lessons on virus detection as this is important.

In an interview, Huang emphasised the importance of reintegration practices when providing comprehensive content. He stressed that while short videos can enhance knowledge transmission, they can lead to the risk of misinterpretation. Therefore, it is crucial to present the content clearly to avoid quoting out of context, as he stated:

Short videos can enhance knowledge transmission, but they can be easily misinterpreted. Considering the vast number of viewers, it is essential to clearly explain the content so as to avoid quoting out of context.

Given the nature of medical knowledge, which has a high degree of accuracy, the depth and completeness of the content are important factors. Without hindering knowledge transfer among the participants, Huang's reintegration approach managed to achieve an equilibrium between information brevity to enhance knowledge accessibility and information fidelity to ensure the accuracy of medical knowledge.

C. Knowledge diversification

While effectively balancing simplicity and depth of scientific knowledge, Huang recognised that his videos were limited because they only contained information about his topics of interest. Therefore, to enrich the video content, he collaborated with a diverse group of experts to diversify his videos, including nutritionists, speech therapists, psychological counsellors, child education specialists, fellow paediatricians, and his esteemed PhD supervisor, a renowned authority in infectious diseases. This interdisciplinary team contributed to the creation of informative video content, offering a wide range of authentic knowledge and practical demonstrations to address the diverse needs of caregivers.

Moreover, through knowledge diversification, we observed a synergistic exchange of conceptual skills and professional knowledge among the experts, stimulating deeper viewer engagement in medical discourse. For example, Dr Tsai, a physical medicine and rehabilitation specialist, was invited as a guest. While Huang shared his clinical experience with the negative

impacts of sweets on children's weight and dental health, Dr Tsai presented research demonstrating the broader negative effects of sweets on children's language, cognition, and behaviour. This in-depth research-focused discussion elicited significant viewer engagement, with 153 comments. Many viewers shared personal experiences with managing children's sugar intake, whereas others posed research-related questions, such as the following:

> *Thank you for sharing such interesting research. It would be even better if the psychological effects could be measured. For example, do children who eat sweets more frequently each week feel happier compared to those who eat sweets less often? I wonder if strict sugar control, which often accompanies strict parenting, might have adverse psychological impacts.*

This example demonstrates the exchange of 'embrained' and 'embodied' types of knowledge (Williams & Balaz, 2008) within online forums. This provides evidence that knowledge diversification could foster the wider dissemination of medical knowledge among viewers, thereby enriching overall medical discussions.

Additionally, Huang invited television hosts, singers, and popular YouTubers to share their personal experiences. These individuals represented diverse segments of the general public, thus enriching the forum's content.

We found that these experiential narratives demonstrated how the guests introduced relatable knowledge that was emotionally resonant. For example, after a video addressing toddler parenting challenges featuring guest Tao-Zu, a well-known TV host, one viewer commented,

> *Thanks to Dr Huang and Tao-Zu. Tao-Zu's parenting experiences are so realistic and relatable. Your approach to handling conflicts with children is both humorous and inspiring, providing me with great comfort and encouragement.*

While research has highlighted the potential for misinformation within extensive SM comments and shared experiences, Huang's professional expertise in this practice served as a safeguard. His guidance helped channel experiential knowledge into accurate and informative expressions, thereby mitigating the risks associated with unverified information.

This approach provides evidence of 'embedded knowledge' (Williams & Balaz, 2008), i.e., an understanding generated by diverse groups. Moreover, by featuring celebrity guests, Huang not only enriched the video content but also expanded his audience.

4.2 Practice of digitally enabled professional responses

While the YouTube platform offered Huang numerous opportunities to share knowledge, it was accompanied by notable constraints in terms of interacting with viewers, especially when they had medical queries. For example, once a user is asked,

> *My child has ceased to consume breast milk, yet occasional instances of black strands persist. May I inquire about the potential reasons for this?*

These personal queries were not infrequent, most likely because viewers strongly regarded Huang as a paediatrician who was primarily responsible for clinical consultations. However, it was crucial to acknowledge that the medical practices performed in clinical settings had to be adjusted when operating within the SM context.

When Huang was asked how he handled such inquiries, he elucidated,

> *Medical interventions were subject to stringent regulations, and offering personal diagnoses in an open online environment was strictly prohibited. I refrained from responding to private messages or requests for personalised diagnoses…. I would recommend that viewers schedule appointments with their doctors.*

While not responding or suggesting medical appointments were deemed the most appropriate actions to take, Huang was aware that viewers might perceive this as lacking genuine assistance in solving their problems. To manage the balance between adhering to the prohibition of medical consultations in an open context and addressing participants' needs, Huang analysed the questions raised by viewers and categorised these questions into three types: extended questions, affirmation questions, and information-seeking questions. These categories enabled him to employ distinct pragmatic tactics in response to viewers' questions without violating medical regulations.

A. Video responses to address extended questions

Huang and his team found that many viewers raised additional questions that prompted the creation of supplementary explanatory videos. These inquiries were termed 'extended questions.' In response to these queries, the team developed videos featuring question-and-answer (Q&A) sessions. These sessions involved the selection of questions from the audience, which were collectively addressed.

The video series was titled ‘Raise Your Hand and Ask the Doctor.’ The videos typically commenced with Huang reading the questions sourced from the audience. They encompassed queries related to Huang’s previous videos as well as requests for further elaboration on specific situations. These questions were subsequently categorised into two or three distinct but related segments. For example, in the ‘Baby’s Sleep Q&As’ video, one segment focused on issues related to baby sleep (comprising four questions), whereas the other addressed baby night terrors (comprising three questions). This approach of creating videos with Q&A sessions constituted a means to provide general rather than specific responses.

The questions collected from the audience often mirrored real-life scenarios, prompting Huang to provide practical and relatable advice in his responses. Importantly, his answers were not personalised to specific individuals, nor were they delivered immediately upon the questions being posed. Many viewers strongly identified with the content, with comments such as,

> *Yes, my baby’s sleep pattern was exactly as described in the video.*

Upon reviewing the comments left by the participants, numerous responses indicated that Huang possessed a profound understanding of parental emotions. For example,

> *While a paediatrician might simply suggest gently tapping the baby’s back, Huang’s approach authentically resembles that of a father.*

Huang emphasised the importance of ensuring practicality in his responses, thereby transitioning from a communication style typical of a medical doctor to one that was more accessible and parent friendly. During the interviews, he often recounted personal parenting experiences. When asked by the researchers how he perceived his roles as a husband and a father to have an impact on his approach to question responses, he articulated,

> *As a medical doctor, it is important to convey accurate knowledge… as a husband and a father of two sons, I believe it’s equally vital to communicate to parents that they need not relentlessly pursue perfection. In reality, by alleviating their stress, they can play a role in fostering even healthier growth in their children.*

B. Emojis for affirmation questions

During the earlier days when Huang was writing blog articles, he observed the presence of ‘affirmation questions.’ He elaborated:

I noticed that some readers' inquiries weren't really questions; they were seeking confirmation of their interpretations of my articles or validation of their viewpoints.

This insight held great significance for him. He recognised that, on occasion, readers were not seeking expertise but rather affirmation and encouragement from someone with expertise. In addressing such queries, he offered supportive responses such as,

Yes, you're on the right track! You're doing great!

When needed, he would provide further clarification.

He continued to implement these encouraging responses on his present YouTube platform; more often than not, he (and his team) responded to viewers with emojis, such as the 'super like' that he favoured  . This gesture signified that he had acknowledged the questions or comments and offered affirmation and support instead of not replying to them. While direct comments on Huang's use of the super like were not observed, this simple click by Huang and his team fostered greater interactivity within the forum, transforming it from a one-way knowledge delivery platform to a more interactive space.

C. Live responses with a chatbot

The third category pertained to questions where viewers requested information that Huang had previously addressed. In response to such inquiries, he observed that some long-term forum participants often stepped in as helpers, directing new viewers to the relevant information. They would leave messages such as:

Dr Huang discussed this symptom before. You may want to refer to the video [with a link provided]

This pattern of recurring questions led him to realise that over the past decade, while he had authored books, articles, columns, and online posts, he had amassed a significant volume of medical educational materials. This abundance of content made it challenging for new viewers to pinpoint the specific information they were seeking.

In addressing these types of questions, he believed that what users needed was not someone to answer their questions but rather someone to help them find the relevant information. He explained,

> *This wasn't feasible on Facebook or YouTube… We discovered that using LINE [a popular digital messaging platform in Taiwan] messenger's Chatbot could be a viable solution.*

As a result, a LINE chatbot was developed. Users could input the information they were seeking, such as 'fever,' and the chatbot would retrieve articles written by Huang related to fever. While the chatbot's functionality was somewhat basic, with a primary focus on searching for articles authored by Huang, it became evident that he and his team aimed to enhance their ability to respond to viewers' questions. One of Huang's team members recognised that this improvement could not rely on a single platform alone. Instead, they endeavoured to make the various available platforms work together. She remarked,

> *Making good use of the unique features of each platform allows us to do a little more, which may not be achievable with a single platform alone.*

4.3 SM-actualised medical knowledge flow

The above SM practices were not implemented in isolation but rather were interconnected to enhance the dissemination of medical knowledge. We found that they were purposely enacted to ensure an effective *medical knowledge flow* from expanding viewers' scientific cognition to addressing their clinical requirements in a way suitable for the online communication environment (see Figure 2). The practice of scientific knowledge dissemination aims to balance information brevity and fidelity through the SM-enabled processes of information deconstruction, reintegration, and diversification. Huang's videos were meticulously edited to be comprehensible, utilising YouTube features to divide content into digestible segments. These short and concise videos were further reorganised and combined to improve overall comprehension. The inclusion of additional experts in video production further enhanced knowledge diversification.

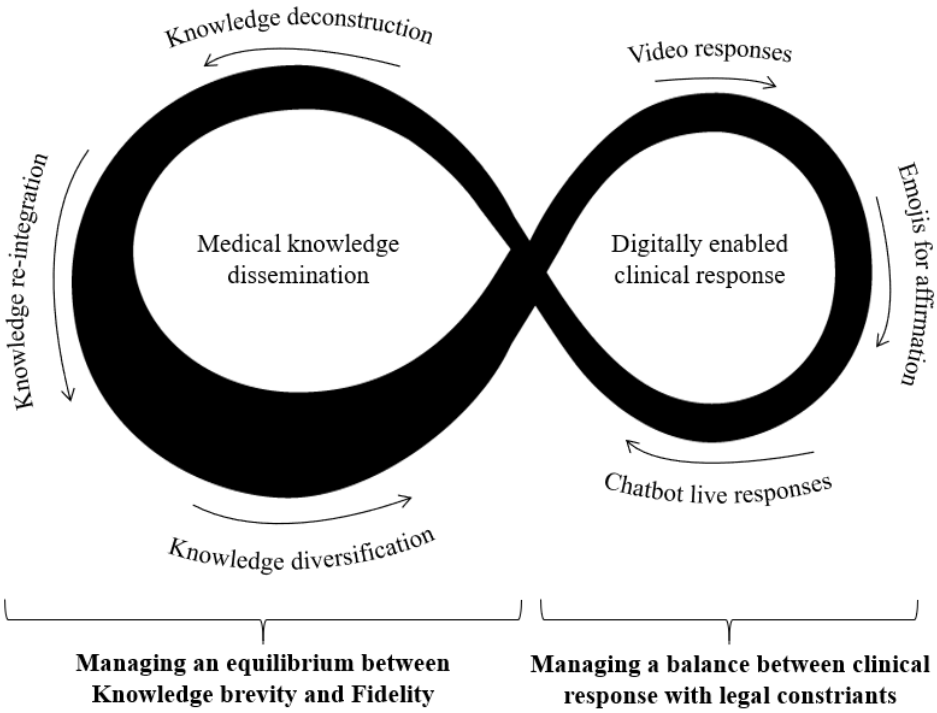

Figure 2. SM-actualised Medical Knowledge Flow

While this practice allowed Huang to effectively convey scientific knowledge to the audience, it did not fully address the needs of the viewers requiring clinic consultation. Despite Huang being a well-known paediatric outpatient physician, online platforms do not permit the provision of clinical consultations or diagnoses. To address participants' inquiries while adhering to regulations, Huang created videos that responded to viewers' health-related queries, using emojis for affirmation and emotional support. Additionally, he collaborated with his team to develop a searchable database accessible through a chatbot interface, thus providing appropriate health education based on viewer inquiries without violating online consultation regulations. This approach served as a compensatory tactic to address the limitations of offering clinical consultations on the platform.

The interconnected practices facilitated an effective flow of medical knowledge discussion, not only by advancing information but also by carefully regulating information to maintain accuracy and uphold ethical boundaries within the open nature of SM. Huang emphasised the importance of this balance:

> *Expanding medical knowledge is crucial, but it must be guided on the right track, given the complexity of the field and the high standards for accuracy.*

In an interview, Huang reflected on his experience in utilising SM to create an effective mechanism for medical knowledge dissemination:

> *The journey of working on social media for medical knowledge dissemination to the public is much more complicated than I anticipated. However, it is also through SM that I can achieve this.*

He further added:

> *The time for health education during clinic consultations is limited. SM platforms allow me to offer those small yet crucial moments of information, emotional support, and companionship... I call what my forum provides 'Medical Litepedia.'*

When researchers labelled his approach 'science popularisation,' Huang clarified:

> *Yeah, it is part of what I've been doing, but not quite perfectly described by that term. Science popularisation implies a focus on readability. For me, while readability is important, as a professional physician, ensuring that caregivers understand medical principles is equally crucial... My goal is to balance comprehension with accuracy.*

The research findings suggest that managing the flow of medical information is a complex task that necessitates not only facilitating the advancement of knowledge but also establishing robust mechanisms to regulate content and uphold accuracy and ethical standards within the platform's open environment.

5. Discussion

The diverse audience of SM users, which includes users with varying degrees of medical knowledge, poses a significant challenge in effectively communicating complex health information. Despite physicians' expertise in public health education, inconsistencies persist in their social media engagement. Prior research has identified key challenges, including users' varying levels of medical literacy (e.g., Wang et al., 2019), potential misinterpretations (Zhou et al., 2023), and diverse user motivations (e.g., Liu et al., 2020), which complicate the creation of accurate and accessible content. This study addressed these challenges by exploring a physician-led SM platform from its inception to stabilisation. The results were then integrated into an AAT-based framework of SM-actualised medical knowledge dissemination.

The research outcomes contribute to the social science and medicine literature by advancing the theoretical understanding of physician-led SM platforms for disseminating professional medical communication, as outlined below.

First, while previous research has highlighted the benefits (e.g., Barrett et al., 2016; Liu et al., 2020) and challenges (e.g., Rueger et al., 2021; Schneider-Kamp & Takhar, 2023) that physicians encounter when using SM platforms to disseminate medical knowledge, this study advances the field by proposing mechanisms to mitigate these challenges. The findings suggest that through video content editing – encompassing the deconstruction, reintegration, and diversification of knowledge – along with the optimisation of SM features, complex medical information can be effectively communicated to a broad audience while maintaining accuracy. Furthermore, SM features can be strategically leveraged to compensate for the limitations of providing clinical consultations. Although specific medical advice is restricted, the platform can facilitate the dissemination of general, pragmatic information, offer encouragement, and guide information searches, thereby fostering interactive health communication.

Second, we propose a theoretical framework for SM–actualised medical knowledge flow. Our study began with an investigation of medical knowledge dissemination, which focused on how complex knowledge was conveyed, translated, and transmitted to the general public via SM. As our research progressed, we recognised that managing medical knowledge dissemination extends beyond the mere concept of knowledge transmission and the identification of different types of medical knowledge (e.g., Williams & Balaz, 2008); it fundamentally involves practices focused on managing knowledge flow within the SM context. Previous studies have demonstrated that online knowledge within an organisational context can generate new value (Faraj et al., 2016), travel long distances, and move in multiple directions, thus broadening participation and impact (Mozaffar & Panteli, 2021). Our study extends the literature on knowledge flows within the context of health communication. This finding shows that effective management of online medical knowledge flow involves not only pushing information over long distances but also using digitally enabled clinical responses whilst maintaining scientific rigor and professional reliability. Thus, SM-actualised medical knowledge flow underscores the need to balance knowledge brevity with accuracy and responsiveness to online clinical inquiries.

Finally, this study advances AAT by addressing the gaps identified in previous research. While earlier studies have highlighted various practices within medical contexts, their focus has often

been on the utilisation of technological features. This study shifts the focus towards actualisation practices, as proposed by earlier research (e.g., Strong et al., 2014; Burton-Jones & Volkoff, 2017), and investigates the proactive role that physicians can play in this process to achieve the desired outcomes. Therefore, this study promotes the effective dissemination and endorsement of professional medical knowledge to the general public. The study also highlights that the actualisation practices of physicians differ markedly from those of general users, emphasising the need to understand these distinct dynamics.

6. Conclusions and Implications

In this study, we explored physicians' utilisation of SM and the associated actualisation practices. While we acknowledge the relevance of the case we present, which offers insights into physician-led SM actualisation practices, we recognise the limitations of this study in terms of generalisability. Future studies should investigate other categories of medical professionals (e.g., pharmacists and nurses) who may face different challenges in their respective domains. Furthermore, future studies should aim to further elucidate the various affordance actualisation practices adopted by these professionals to disseminate medical knowledge via SM platforms. Additionally, as digital health platforms become increasingly prevalent, it is imperative to examine how different generations of medical professionals leverage these platforms and to investigate the multimodal values that may arise from their use.

While physician-enabled affordance actualisation may exhibit different characteristics than other contexts do, we believe that our research findings are relevant to medical knowledge on SM platforms. First, SM platforms have emerged as important tools for medical professionals to disseminate health information, offer guidance, and provide educational content to both their patients and the general population. However, it is crucial to recognise that the effective utilisation of SM's affordances, including knowledge exchange with quality and efficacy, requires deliberate actualisation practices rather than being solely reliant on information transmission from one to many. The physician-enabled actualisation practices we identified herein offer a plausible mechanism for physicians and medical professionals to adopt.

Second, it is essential to underscore that these actualisation practices hinge on achieving a delicate balance between the comprehensiveness and intelligibility of medical knowledge within the context of SM. Additionally, a comprehensive understanding of the fundamental principles guiding the conscientious and ethical utilisation of SM by physicians is indispensable. Adherence to the regulations established by medical associations and

institutions is vital. This adherence ensures that SM affordances are harnessed effectively and in a sustainable manner, thereby preserving both the integrity of the medical profession and the quality of information disseminated to the public.

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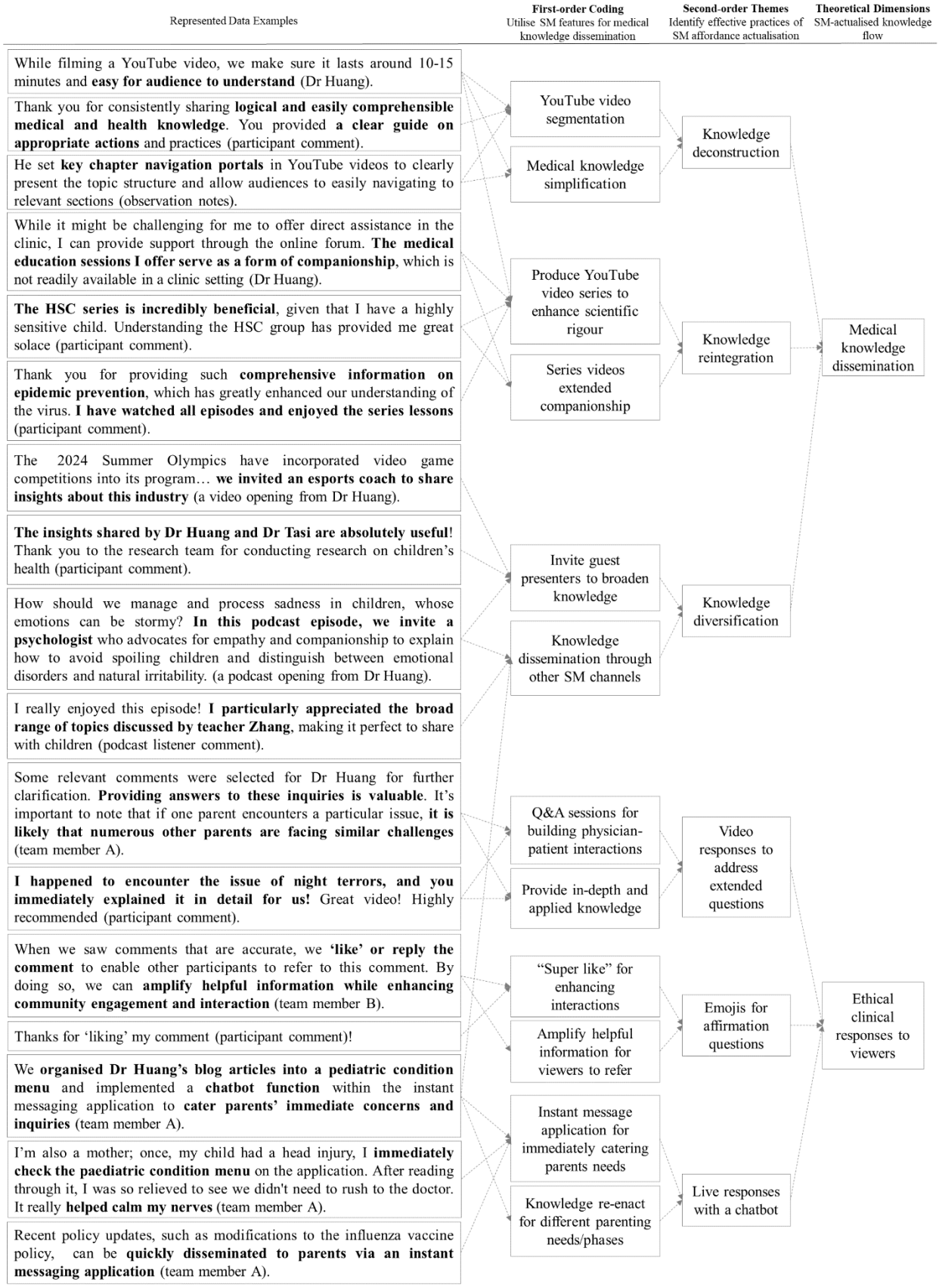
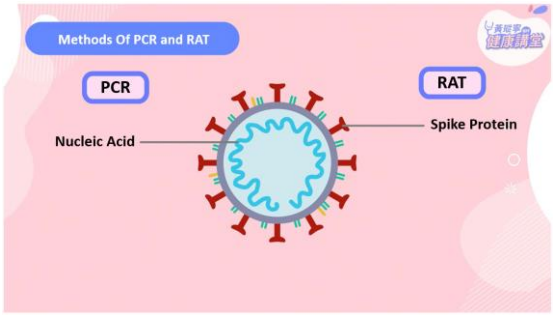
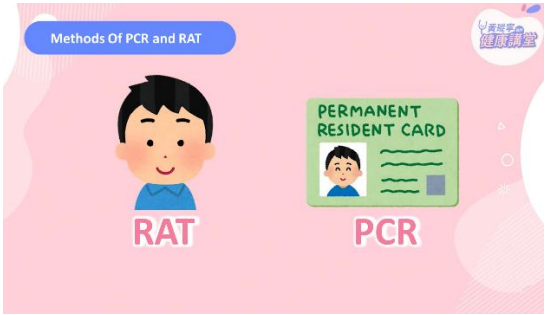
Appendix I. Coding procedure with examples



Appendix II. Examples of Knowledge Deconstruction Practices

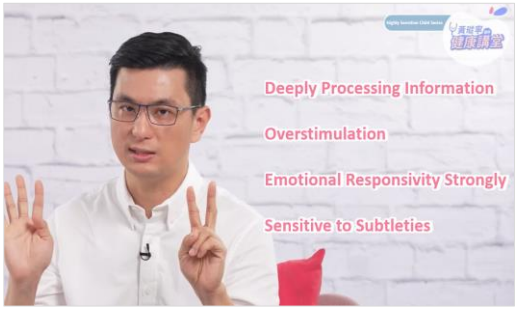
a. Introductory recaps





Note: Polymerase chain reaction (PCR) and Rapid Antigen Test (RAT) are COVID-19 virus detection

b. Close-up visualisation of medical issues



c. Summaries of key preventive measures

d. YouTube functionality: Chapter