

Integrating the COMID tool in nursing and home care to enhance complexity management: How normalization process theory shapes patient care - A pilot study

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Abstract. *Background and aim:* The increasing complexity of home healthcare is driven by an aging population, the prevalence of chronic illnesses, and a growing need for patient-centred, multidimensional care. This study evaluates the feasibility of implementing the Multidimensional complexity in home care nursing (COMID) within the Azienda USL Toscana Centro (AUSLTC) to improve complexity screening. *Methods:* COMID is a multidimensional tool assessing six domains: (1) medical factors, (2) socioeconomic factors, (3) mental circumstances, (4) behavioural factors, (5) instability circumstances, and (6) care network factors. The tool was integrated into AUSLTC's Family and Community Nurse (FCN) workflows following Normalization Process Theory (NPT), which provided a structured framework for adoption through training, stakeholder engagement, workflow integration, and continuous feedback. The study began with nurses practicing on hypothetical cases, followed by a two-month pilot with real patients to assess COMID's feasibility and reliability for patient documentation. *Results:* The pilot included 5 nurses and 106 patients, 47% of whom were classified as having medium or high complexity, with common issues like polymedication (74.5%) and health instability (60.4%), according to COMID's evaluation. FCN feedback indicated that COMID is highly acceptable and feasible, promoting standardized patient assessments and effective interprofessional communication. *Conclusions:* COMID's integration into AUSLTC's home care services improved complexity screening through a structured, comprehensive approach. FCNs reported high levels of acceptability, appropriateness, and feasibility, enabling early complexity identification and supporting targeted, proactive interventions to prevent hospitalizations. COMID shows promise as an effective tool for managing complex home care situations in the Tuscany region. (www.actabiomedica.it)

Key words: COMID tool, complexity management, home healthcare, family and community nurse, multidimensional assessment, chronic disease screening

Introduction

The increasing intricacies of healthcare provision, particularly in home care (1), reflect a shift towards more personalized, holistic, and decentralized models

of patient care (2). This evolution is driven by various factors, including population aging, the increasing prevalence of chronic illnesses, and heightened patient expectations for care that extends beyond clinical interventions to encompass psychosocial,

economic, and environmental needs (3). Traditional models, primarily hospital-centric, are giving way to patient-centred frameworks that prioritize continuity, accessibility, and personalization in healthcare services (4). This trend is evident in the growing role of home care as an alternative to conventional, often episodic, hospital-based care (5), which may be ill-equipped to address the multifaceted needs of patients in their daily environments (6). The complicated nature of at-home assessment and the need for swift decision in choosing treatment are crucial to both avoid hospitalizations and provide tailored care that restores the patient to their optimal health in the shortest time possible. Given the importance of these issues for all healthcare systems, the search for tools that support and streamline the multiprofessional process of patient care is crucial. This article examines the rationale behind the implementation of a 30-item checklist tool for assessing multidimensional complexity in home care nursing (COMID). The study highlights this process as an example of good practice exchange between two healthcare institutions: the originator and the beneficiary of the good practice. This instrument allows health professionals to conduct a rapid analysis of a patient's situation through the assessment of six dimensions: (1) health/medical factors, (2) socioeconomic factors, (3) mental circumstances, (4) behavioral factors, (5) instability circumstances, and (6) care network factors and healthcare system factors. These dimensions, in turn, are made up of five individual items each, totalling thirty. Each item requires a binary response (yes=1, no=0), allowing for a scale of possible scores ranging from zero to thirty. Developed by Busnel and colleagues (8) at the Institution genevoise de Maintien à Domicile (IMAD) in Geneva - an institution that provides care, assistance, and social support to clients by helping them remain autonomous at home - COMID offers a structured, multidimensional approach to assessing complexity in patient care within home settings (7, 8). Complexity is a wide concept, that expresses the challenges in care to address, manage, and understand the patient's interactions within their environment. This requires mobilizing the resources of the patient, caregiving family members, professionals, and healthcare organizations (9). By assisting in stratifying patients based on

complexity, COMID aligns with broader healthcare objectives that emphasize proactive, preventive care, aiming to reduce acute incidents and hospitalizations through early intervention (10). Unlike traditional assessment tools that may focus narrowly on specific clinical factors, COMID's framework encompasses a broad spectrum of patient needs, including social determinants, psychological aspects, and environmental conditions, thus enabling healthcare professionals to make more informed, comprehensive decisions (11). The Azienda USL Toscana Centro (AUSLTC), the beneficiary of the COMID best practice, is one of the Tuscany Region's largest healthcare authorities with a catchment area of 1.603.000 residents. Covering an area of 5,012 square kilometres, with 13 hospitals and 221 local health centres, the AUSLTC sought a strategy to enhance care processes through the introduction of the Family and Community Nurse (FCN) role (12). It can be defined as responsible for nursing processes within family and community settings. Through a continuous and proactive presence, the FCN ensures nursing care in collaboration with other community professionals, facilitating timely and appropriate access to services based on a thorough assessment of individual and family needs. This initiative has enabled a widespread and effective reach of healthcare services across the Region. The FCN model has been implemented primarily through pilot projects and targeted initiatives designed to meet the specific needs of the territory. Given the significant demographic diversity within this Region—characterized by densely populated urban centres as well as more isolated rural areas—the AUSLTC has experimented with various organizational approaches to optimize service integration. The role of the FCN has thus been designed as a vital link, bridging the healthcare needs of the population with the delivery of localized healthcare services. Nowadays, approximately 30,000 patients are benefiting from a structured care pathway, supported by around 455 FNCs. Currently, around 30,000 patients benefit from a structured care pathway, supported by approximately 455 FNCs. These patients often present with significant challenges, such as comorbidities, frailty, and complex social or family dynamics, as identified through initial assessments and clinical observations. To address these multidimensional needs, FNCs

require tools that not only stratify patient populations but also help identify specific areas requiring targeted interventions, leveraging the expertise of healthcare professionals such as physiotherapists, dietitians, and nurses specializing in wound and palliative care. Recognizing the tool's potential to screen for multidimensional complexity, AUSLTC conducted a feasibility study and then integrated COMID into the workflows of its FCNs. This work illustrates how the proposed framework has been successfully implemented in real-world settings to improve practice.

Patients and Methods

Study design

The study utilized a feasibility design to assess the implementation, acceptability, and effectiveness of the COMID tool in a real-world healthcare setting. The implementation process followed the framework provided by Normalization Process Theory (NPT), which outlines four key components necessary for successful adoption of healthcare innovations: coherence, cognitive participation, collective action, and reflexive monitoring (13).

Methodology

Training and preparation

To ensure the proper application of NPT, two nurses from AUSLTC underwent specialized training provided by IMAD. This training combined theoretical knowledge with practical expertise in using the COMID tool and aimed to identify key determinants for effective implementation. These determinants were subsequently used to guide the integration of COMID into Family and Community Nurse (FCN) teams. Comprehensive training sessions were then provided by the trained nurses to five FCNs responsible for patient care in the trial area of AUSLTC. The sessions included theoretical discussions on the role of COMID in identifying multidimensional complexity during patient assessments and practical exercises such as simulations based on hypothetical cases. Simulations focused on intra-operator consistency by having

multiple professionals evaluate the same cases for scoring accuracy.

Pilot study

Following the training, a pilot study was conducted using real patient cases. Patients were recruited based on predefined criteria, such as referral by general practitioners or following discharge from the hospital or emergency room visits. During the initial home visits, FCNs completed the COMID checklist as part of a comprehensive nursing assessment aimed at offering a detailed understanding of the patient's condition and enhancing the evaluation process.

Outcomes

A total of 106 patients participated in the pilot study, evenly divided between men (53) and women (53), with an average age of 81.7 years. All patients resided in the same geographic area. The COMID tool was applied during the first home visit, enabling FCNs to assess multidimensional complexity and provide targeted care plans.

Data collection methods

Coherence

The feasibility and acceptability of COMID were evaluated through feedback sessions and continuous monitoring during the training phase. These sessions emphasized the distinct role of COMID as a complementary assessment tool, supported by the availability of a validated Italian translation (9).

Cognitive participation

Workshops and feedback sessions were conducted with healthcare professionals and managers to ensure stakeholder engagement in the tool's integration. These participatory approaches facilitated a sense of collective ownership among the FCNs and managers, fostering greater acceptance and sustained use of COMID.

Collective action

Minimal adjustments to existing workflows were necessary to integrate COMID into routine practice. Technical support was provided to incorporate

COMID into the electronic health record system, and regular collaborative meetings addressed logistical challenges during the implementation process.

Reflexive monitoring

An iterative feedback mechanism was established to gather healthcare professionals' input on the tool's usability, accuracy, and impact on patient care. This included verbal reports and formal feedback sessions to identify and address any challenges in real-time, as well as to refine subsequent training efforts (14). The structured application of the NPT framework ensured that COMID was seamlessly integrated into FCN practice. By addressing coherence, cognitive participation, collective action, and reflexive monitoring, the study demonstrated the feasibility and effectiveness of implementing COMID in a multidimensional healthcare environment, ultimately enhancing patient care and outcomes.

Results

Following confirmation of the anticipated positive outcomes, AUSLTC resolved to adopt the tool and implement it gradually across its service territory with the aims to: (i) streamline the management of complex patient cases, (ii) assess the stability level of patients' conditions, (iii) facilitate FCNs in promptly identifying the appropriate care pathway for each patient, (iv) enable the prompt activation of priority interventions as identified by the tool and professional judgement, (v) provide a supportive, common, and shared language for communication and discussion within the care team, (vi) initiate an interprofessional process post-analysis of patient complexity levels, (vii) enhance interprofessional decision-making by prioritizing coherent and coordinated areas of care.

Real-Patient phase

A convenience sample of 106 patients (as previously described, composed of half men and half women with an average age of 81.7 years), has been recruited for real-world application of COMID over a period of two months, assessing patient complexity using COMID. The survey area is located north-west of Florence and is predominantly urban, though it also includes some areas with lower population

density. Of the overall sample, 50 patients presented medium complexity, 29 high complexity, and 27 low complexity (Figure 1). The total attainable score ranges from zero to thirty, with a score below 5 indicating a non-complex status, a score between 6 and 9 indicating a risk of complexity, and a score above 10 being classified as complex, as reported in the tool's user guide (15).

After providing an overview of how the patients in the investigated sample are distributed along the continuum of care complexity, an analysis of frequency distribution by total scores follows (Figure 2). The distribution of COMID scores among the patients shows a range from a minimum score of 0 to a maximum score of 21. The most frequently observed scores are 6, 7, and 9, each with 14 patients. The mean COMID score is approximately 8.1, indicating a moderate level of complexity across the sample. The median COMID score is 8, suggesting that half of the patients have scores below or equal to 8 and the other half have scores above this value. This distribution suggests a concentration of patients in the middle range of complexity.

The score obtained serves as an indicator that should prompt a thorough analysis of each item and section, guided by the professional's knowledge of the situation and its evolution over time. The sub-scores and overall score provide a quantification of complexity. Plotting the scores on a radial chart, as suggested below (Figure 3), offers a concise visualization of the set or sum of elements that contribute to the total score.

The dimensions numbered 1 and 5, which investigate clinical stability and instability factors, respectively, hold the greatest weight in the COMID tool. This weighting aligns with the patients' current phase of need, reflecting the importance of assessing their immediate clinical condition and the impact of chronic instability on their care requirements. In further detail, a descriptive analysis is reported in Table 1 to provide a list of the sub-scores that contributed most significantly to the overall scores. These sub-scores also represent key characteristics of the sample, offering insight into the predominant factors influencing patient complexity:

The results derived from the 106 patients revealed a particularly significant finding. Although the item addressing insurance status was removed from

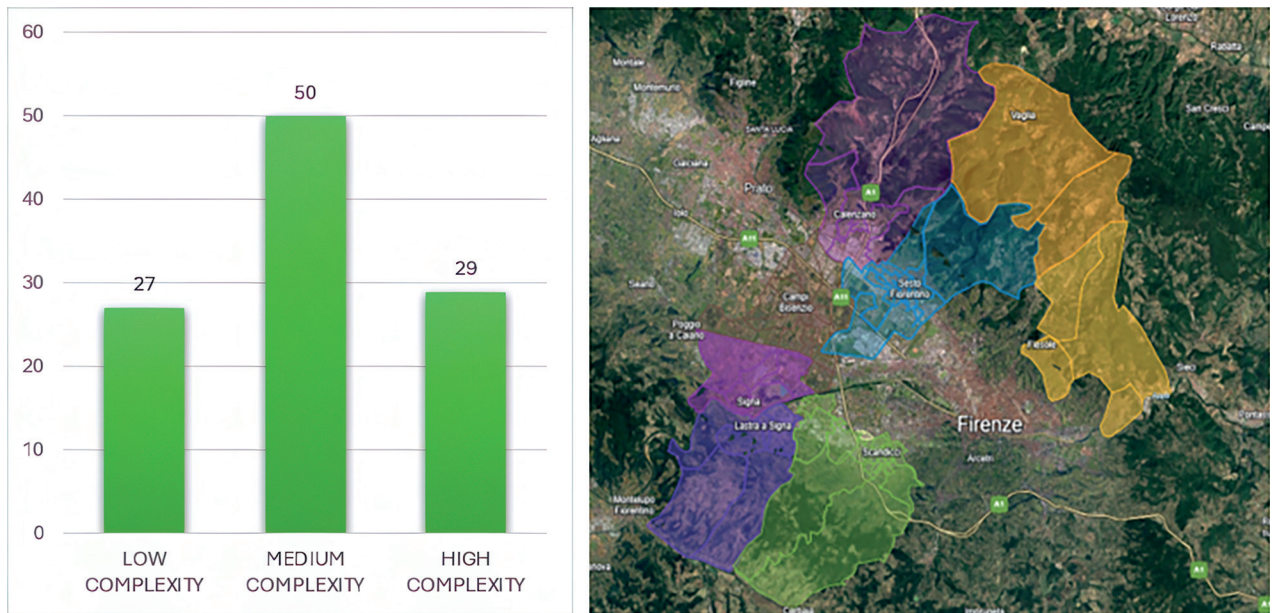


Figure 1. Distribution of Care Complexity Levels and Geographic Mapping of the Florence North-Western Area. The bar chart on the left illustrates the categorization of care complexity levels among the study's sample of 106 patients, divided into low (27 cases), medium (50 cases), and high complexity (29 cases). On the right, a geographic map of the Florence north-western area highlights the spatial distribution of the patients, categorized by their respective complexity levels across different districts.

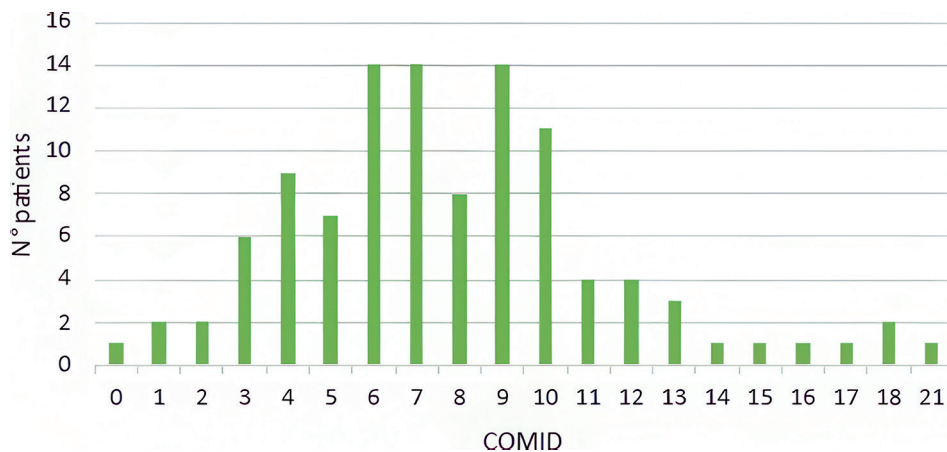
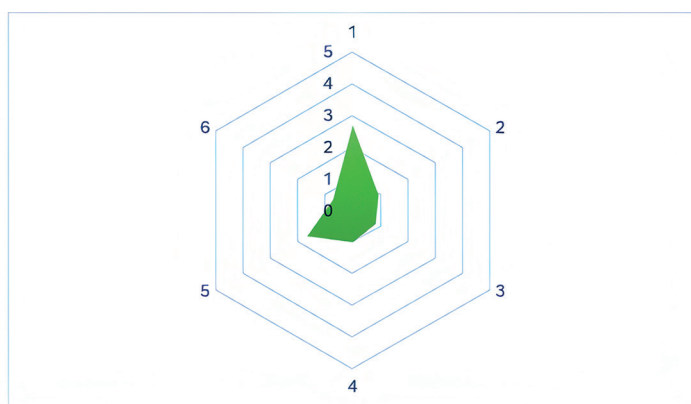


Figure 2. Frequency distribution by total COMID scores for the investigated sample.

the instrument (as this is not relevant in the Italian context, where healthcare is publicly funded with cost-sharing by citizens), the Cronbach's Alpha was found to be 0.721. This value aligns closely with the reliability coefficients reported in Vallet's (16) original study on the Geneva population and Levati's (7) study on the Italian version of COMID. A Cronbach's Alpha value of 0.721 is considered acceptable, indicating that

the COMID retains good internal consistency even after the removal of the insurance-related item. This demonstrates that the questionnaire remains valid and reliable for its intended purpose. Furthermore, the similarity of this result to those reported in previous studies—such as Vallet's work on the Geneva population and Levati's analysis of the Italian version of COMID—confirms that the adaptation did not



| Dimension | Dimension description | Average value |
|-----------|---|---------------|
| 1 | Medical/health factors | 2,96 |
| 2 | Social and economic factors that worsen health status | 0,94 |
| 3 | Mental factors that worsen health status | 0,83 |
| 4 | Patient's behavioural factors | 0,98 |
| 5 | Factors of instability | 1,64 |
| 6 | Factors related to health providers and care system | 0,69 |

Figure 3. Radial Chart of Dimension Scores and Their Descriptions. The radial chart visualizes the average scores (ranging from 0 to 5) of six dimensions influencing health complexity, as detailed in the accompanying table. The dimensions include: 1) medical/health factors (2.96), 2) social and economic factors that worsen health status (0.94), 3) mental factors that worsen health status (0.83), 4) patient's behavioural factors (0.98), 5) factors of instability (1.64), and 6) factors related to health providers and the care system (0.69). The chart highlights the dominance of medical/health factors compared to other dimensions.

Table 1. Sub-scores prevalence

| Sub-score | Dimension of belonging | Prevalence in the sample (%) |
|---|--|------------------------------|
| Several chronic diseases (more than 2) and/or unexplained symptoms | 1. Medical health factors | 86% |
| Polymedication | 1. Medical health factors | 74,5% |
| Unpredictability of health status (unusual symptoms, decompensation of a chronic disease, wounds, pain, etc.) | 5. Factors of instability | 60,4% |
| Social isolation | 1. Social and economic factors that worsen health status | 60,4% |
| Chronic pain | 1. Medical/Health factors | 58,5% |
| Worries about symptoms, health conditions, and/or medical information - patient's behavioural factors | 4. Patient's behavioural factors | 56,6% |

compromise the instrument's reliability. Overall, the value of 0.721 underscores the robustness of COMID in effectively measuring its target constructs, even within the Italian context.

Professional Feedback: Acceptability, Relevance and Feasibility of the COMID reported on the sample of the five FCNs responsible for nursing care within the trial area

Five FCNs of the territorial cell we asked to test the

Table 2. Short questionnaire on COMID for the FCNs' pilot study

| | | Nurse 1 | Nurse 2 | Nurse 3 | Nurse 4 | Nurse 5 |
|----------------------|---|---------|---------|---------|---------|---------|
| Acceptability | I consider COMID an acceptable tool | 5 | 3 | 4 | 4 | 5 |
| | COMID seems attractive, it draws me in, I like it | 5 | 4 | 3 | 4 | 4 |
| | I like COMID | 5 | 3 | 4 | 4 | 4 |
| | I am happy to use COMID | 5 | 3 | 3 | 4 | 4 |
| Relevance | COMID seems well-suited | 5 | 2 | 3 | 4 | 4 |
| | COMID seems appropriate | 5 | 3 | 4 | 4 | 4 |
| | COMID seems applicable | 4 | 3 | 3 | 4 | 5 |
| | COMID seems to fit well | 4 | 4 | 3 | 4 | 4 |
| Feasibility | COMID seems implementable | 5 | 4 | 4 | 4 | 5 |
| | COMID seems to be a possible tool | 5 | 4 | 4 | 4 | 5 |
| | COMID seems feasible | 5 | 4 | 3 | 4 | 5 |
| | COMID seems easy to use | 5 | 3 | 4 | 4 | 5 |

COMID tool on real cases, filled in a very short questionnaire on the acceptability, relevance and feasibility of COMID. The questionnaire used is an Italian adaptation of the 'Acceptability Intervention Measure', as reported in Table 2. Intervention Appropriateness Measure' and "Feasibility of Intervention Measure" (14), a tool developed to collect information on the acceptability, relevance and reliability of the implementation of an instrument.

We investigated each of the following three dimensions with four questions, which show next to them the mean of the answers calculated from the score chosen by the respondents on a 5-value scale:

1-Not at all agree, 2-Disagree, 3-Neither agree nor disagree, 4-Agree, 5- Totally agree.

Furthermore, COMID was deemed highly feasible, with assessments completed efficiently within routine visits, thereby minimizing additional administrative burdens (14).

Discussion

The aim of this article was to evaluate the feasibility, reliability, and effectiveness of the COMID within the AUSLTC by FCN. The framework used for COMID's implementation is the Normalization Process Theory (NPT). The decision to extend the use of COMID across the entire area of responsibility aligns with the previously outlined objectives,

which we will briefly restate for clarity:(i) streamline the management of complex patient cases, (ii) assess the stability level of patients' conditions, (iii) facilitate FCNs in promptly identifying the appropriate care pathway for each patient, (iv) enable the prompt activation of priority interventions as identified by the tool and professional judgement, (v) provide a supportive, common, and shared language for communication and discussion within the care team, (vi) initiate an interprofessional process post-analysis of patient complexity levels, (vii) enhance interprofessional decision-making by prioritizing coherent and coordinated areas of care. During the pilot study time, 5 FCNs assessed 106 patients. The patients' characteristics demonstrates a high prevalence of complex health and social challenges: multiple chronic conditions, poly medication, health instability, chronic pain and social isolation suggest nursing and medical commitment. Thus, a tool like COMID was essential to provide a clear and immediate overview of the situation. The pilot study underscores COMID's transformative potential for complexity management in home care. By enabling healthcare providers to stratify patients based on multidimensional complexity, COMID fosters a shift from reactive to proactive care. This approach is essential in the context of chronic disease management, where early intervention can prevent the progression of health conditions that would otherwise necessitate hospital-based care (3). The successful pilot of COMID within AUSLTC's FCN teams

points to significant implications for the broader home care sector. As healthcare systems worldwide grapple with the challenge of managing increasingly complex patient populations, tools like COMID offer a scalable solution for complexity-driven care stratification. COMID aligns with the shift toward value-based care models, which prioritize outcomes over volume and emphasize the importance of tailoring care to individual patient needs (17). By assessing patient complexity across clinical, psychological, socio-economic, and environmental dimensions, COMID enables healthcare providers to develop targeted interventions that not only improve patient outcomes but also optimize resource utilization. By identifying high-complexity patients early and addressing their unique needs through multidisciplinary interventions, we hope to reduce the likelihood of acute health crises that necessitate costly hospitalizations. This stratification contributes to a more efficient allocation of healthcare resources, as high-complexity patients can be provided with targeted support, while lower-complexity patients receive standard care (18). One of COMID's most significant strengths is its capacity to standardize patient assessments, creating a common language for complexity that enables more effective communication across multidisciplinary teams (14). Furthermore, integrating COMID into AUSLTC's electronic health record system facilitated seamless documentation, allowing healthcare professionals to complete complexity assessments without incurring additional administrative burdens. The integration of COMID into digital health records underscores the importance of technical infrastructure in supporting the efficient adoption of complexity assessment tools (17).

Limitations

While the pilot study demonstrated the feasibility and effectiveness of the COMID tool, several limitations must be acknowledged: (i) small sample size due to the nature of pilot study, (ii) limited duration of the study, (iii) limited evaluation of outcomes: the study focused primarily on the feasibility and reliability of the tool rather than a comprehensive evaluation of its impact on clinical outcomes, cost savings, or patient satisfaction. Further studies are needed to assess these dimensions.

Addressing these limitations will require larger, multi-site studies over extended periods, with a focus on long-term patient outcomes, cost-effectiveness, and the scalability of COMID in diverse healthcare settings.

Conclusion

In line with Italian national healthcare goals under DM 77 (19), which emphasize enhancing territorial healthcare services, COMID supports the transition from hospital-based care to community-based, preventive care. The tool's alignment with these goals positions it as a valuable asset for Tuscany's healthcare systems aiming to improve accessibility, reduce hospital congestion, and enhance the sustainability of care delivery (7). The partnership with IMAD and the Swiss researchers and scholars involved in the development of COMID tools enables a cohesive exchange of best practices and aids in the consistent implementation of the model across diverse territories within Tuscany, and it is a very productive way of fostering collaborative, community-based care frameworks. Initial results are encouraging for a larger-scale implementation in the whole AUSLTC's home care community services. Scaling COMID across different levels of care could enable a more consistent approach to complexity management across the healthcare continuum, ensuring that patients receive complexity-appropriate care regardless of where they access services. With the growing integration of digital health technologies, future versions of COMID could be adapted for telemedicine platforms. Remote assessments would allow healthcare providers to monitor patient complexity continuously, enabling proactive adjustments to care plans in response to changes in patient conditions. This adaptation could be particularly valuable in rural or underserved areas, where access to in-person care may be limited. By facilitating remote complexity assessments, COMID could contribute to reducing disparities in healthcare access and promoting equity in care delivery. By facilitating a shift from reactive to proactive care, COMID aligns with the goals of modern healthcare systems, which emphasize value-based, patient-centred care as essential to managing chronic conditions and supporting the aging population.

Ethic Approval: All authors performed this research in accordance with the Declaration of Helsinki, and the protocol has been approved by the Ethics Committee, Comitato Etico di Area Vasta Centro (CEAV), authorization number 27017_oss, on July 13, 2024, to be valid until December 2024.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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