

To assess the effectiveness of DAPT adherence on all-cause mortality among post-PCI patients and explore the potential determinants of DAPT adherence

Qiaoling Ye¹, Jiamiao Hu², Yinv Shi³, Hongxing Wang^{2*}

¹ Internal Medicine Ward 2, Ningbo First Hospital Longshan Hospital Medical and Health Group, No. 1200 Lingfeng Road, Binhai New Area, Longshan Town, Cixi City 315313, Zhejiang Province, China

² Cardiac Center, The First Affiliated Hospital of Ningbo University, 59 Liuting Street, Haishu District, Ningbo City 315016, Zhejiang Province, China

³ Nursing Department, Ningbo First Hospital Longshan Hospital Medical and Health Group, No. 1200 Lingfeng Road, Binhai New Area, Longshan Town, Cixi City 315313, Zhejiang Province, China

* Corresponding Email: whx7070@126.com

CITATION

Author Name. (2025). Article title. Journal of Infrastructure, Policy and Development. 9(x): X.
<https://doi.org/10.24294/jipdxxxx>

ARTICLE INFO

Received: Date Month Year

Revised:

Accepted: Date Month Year

Available online: Date Month Year

COPYRIGHT



Copyright © 2025 by author(s).

Psycho-Oncologie is published by PiscoMed Publishing Pte.Ltd. This work is licensed under the Creative Commons Attribution (CC BY) license. <https://creativecommons.org/licenses/by/4.0/>

Abstract: Background: Adherence to dual antiplatelet therapy (DAPT) is critical for preventing adverse outcomes in acute coronary syndrome (ACS) patients following percutaneous coronary intervention (PCI). Despite its importance, adherence rates decline significantly over time, and limited research has explored the dynamic trajectories of adherence and their predictors. Objective: To analyze the dynamic trajectories of DAPT adherence over 12 months in ACS patients post-PCI, identify predictors of adherence, and evaluate the impact of a digital post-discharge management platform. Methods: This longitudinal observational study included 100 ACS patients who underwent PCI. DAPT adherence was assessed at 1, 3, 6, 9, and 12 months post-discharge using a digital management platform. A latent variable growth model identified adherence trajectories, and logistic regression analyzed predictors. Clinical outcomes were compared between adherence groups. Results: The study showed that the Adherence declined from 88% at 1 month to 60% at 12 months. Three adherence trajectories were identified: independently: 55% were consistently adherent to the diet regimen, 30% were slow deteriorators, and the remaining 15% were fast deteriorators. Multivariate logistic regression examination of perceived barriers of medication adherence revealed that smoking (OR = 2.18; $p = 0.001$), anxiety (OR = 3.41; $p = 0.000$), low family support (OR = 0.43; $p = 0.000$) and age > 65 years (OR = 1.12; $p = 0.03$) were significantly related and predictive of Apart from lack of knowledge, forgetfulness (40%), side effects (25%), and costs (20%) caused forgetfulness. In those patients, non-adherence was linked with significantly higher level of major adverse cardiac events (22.5% vs. 6%; $p = 0.012$) and re-hospitalization (25% vs. 9%; $p = 0.026$). The platform improved adherence at 6 months (76% vs. 70%; $p = 0.04$), patient satisfaction (92% vs. 78%; $p < 0.01$), and follow-up completion rates (95% vs. 85%; $p = 0.02$). Conclusion: Patients following an ACS and who have undergone PCI adhere poorly to DAPT with patients differing in demographic, psychological and social predictors exhibiting different trends over time. What was noted was the patient utility

and efficacy of using a digital post-discharge management system in streamlining practice. Taken together, these results reveal the necessity of developing individualised strategies for the promotion of medication compliance and its objectives.

Keywords: Dual antiplatelet therapy, acute coronary syndrome, per-cutaneous coronary intervention, trajectories

Introduction

Cardiovascular diseases (CVDs) are responsible for the highest mortality rates globally, and their global burden is increasing, especially in China. Based on the “1990-2016 China and Provincial Cardiovascular Disease Burden Report”, 3,975,000 lives based on the “1990-2016 China and Provincial Cardiovascular Disease Burden Report”^[1-3], CVD was the leading cause of death in China in 2010 and 2016 contributing to the total of 10.51 million deaths with an intermediate prevalence rate of 41 acute coronary syndrome (ACS), together with STEMI, NSTEMI, and UA, is one of the most frequently occurring types of CVD^[1-5]. It occurs from occlusion to the coronary arteries and is a major challenge to health-care facilities^[6]. The “2018 China Cardiovascular Disease Report” revealed that death rate of acute myocardial infarction in urban and rural area were 58.69/ 100, 000 and 74.72/100, 000 respectively, stressing on the need for intervention^[7-10]. percutaneous coronary intervention (PCI) has become the most popular type of revascularization approach for ACS patients. The PCI volume in China in 2018 was 911,525 with 1.46 stents per PCI across all centres. Aspirin and P2Y12 receptor inhibitors are among the foundational pharmacological therapies for ACS patients who undergo PCI and is referred to as dual antiplatelet therapy (DAPT)^[11-14]. According to clinical practice guidelines, merits of aspirin should be started for all eligible ACS patients, combined with at least 12 months P2Y12 inhibitor therapy. DAPT is most beneficial during the re-endothelialization phase after PCI since thrombosis is most likely to occur due to endothelial Abrasion by the balloon or stent placement^[15].

However, achieving durability with DAPT is still a major issue because research shows that a large number of patients stop treatment before the recommended time. Cues to poor adherence include age, education, gender, smoking history, and the availability of the health care services^[16]. For instance, studies show that the following factors as factors related to poor DAPT compliance: Older age; Lower education levels; Living in rural areas. These studies allegedly measure controllability at one point in time, thus not taking into account the longitudinal character of compliance. Incorporating broader data from real-world patients may increase knowledge of different patterns of DAPT use and help develop more effective strategies to overcome patient nonadherence^[17-20]. The need to follow DAPT rises to a higher level with respect to care and management of

patient, with corresponding public health benefits and economic consequences. This poor compliance raises risks of other harms such as the stent thrombosis, myocardial infarction, death, cost hikes hence worsening patients' quality of life. Tackling these issues calls for original research methodologies as well as functional strategies^[21-23].

Thus, the purpose of the present work is to fill the existing gap in the literature by analyzing the temporal patterns of DAPT compliance among ACS patients following PCI. More specifically, employing method of latent variable growth model this research aims at: a) uncovering different subtypes of patients' compliance and b) determining the antecedents of these subtypes. The results will thus contribute to building the theory as to what forms of follow-up could be implemented in order to increase adherence rates. In addition, in order to survey survivors, the study will take advantage of a telemedicine remote post-dissemination management tool- Internet platform For Patient Support and Data Collection. The study is closely related to clinical practice and to the society. Besides, it tackles one of the most paramount and continuing client care challenges, namely medication compliance as well as advances technology to improve patient management while responding to the global trends towards the digital world. Because this research has the potential to identify factors that affect adherence and track their dynamic influence, the results have the potential to guide current and future recommendations and practices for managing patients with ACS after PCI so as to minimize adverse events and produce the best possible outcomes for patients and appropriate utilization of resources.

Aim of the Study

To investigate the dynamic trajectories of DAPT adherence among ACS patients after PCI and identify factors influencing adherence to improve patient outcomes.

Objectives

Analyze longitudinal changes in DAPT adherence over 12 months using latent variable growth models.

Identify predictive factors, including sociodemographic, clinical, and psychosocial influences on adherence.

Explore reasons for poor adherence and its relationship with clinical outcomes.

Utilize a digital post-discharge management platform for real-time monitoring and adherence improvement.

Generate evidence-based recommendations and disseminate findings to enhance cardiovascular care practices.

Methodology

Study Design: This study uses a prospective cohort observational approach

to compare the changing time varying patterns of DAPT persistence among ACS patients who underwent PCI. The participants' adherence will be assessed after 1, 3, 6, 9 and at the end of 1 year follow-up after discharge from the hospital. Through latent variable growth model, different adherence groups will be examined and predictors for these groups will be distinguished.

Study Setting and Population: The proposed study will take place in Ningbo First Hospital and its affiliated institution because approximately 1600 PCI procedures are conducted in this hospital each year. The study subjects will consist of patients who suffered an ACS and who received PCI between 1st June 2022 and 31st May 2023. Patients of 100 in total with the same inclusion criteria will be selected.

Inclusion criteria:

1. Age ≥ 18 years.
2. Suffering from ACS with PCI intervention.
3. LVEF $\geq 35\%$ and heart function Killip I-III.
4. Possibility to use only a smartphone for the follow-up and communication.
5. Participant consent to be in the study.

Exclusion criteria:

1. Patients with one or more severe, non-moderate comorbid conditions or contraindications to DAPT.
2. Patients who were discharged/ transferred, discharged against medical advice or died while being hospitalized.
3. Participants already enrolled in other trials.

Sample Size Calculation

The target population of the study was estimated using sample percentage estimation method using the equations: Sample size = $Z^2 * P * (1-P)/E^2$, where $Z = 1.96$ for 95% confidence interval, $\alpha = 0.05/2 = 0.025$ one tail and actual tolerance of $\pm 10/100 = 0.1$. Preliminary power analysis based on assuming 15% lost to follow up and variability in adherence patterns provide an estimate of 69 – 161 patients at end point. This is important in order to achieve adequate levels of statistical power for the detection of adherence trajectories.

Data Collection

Data collection will occur in two phases: baseline and follow-up.

1. Baseline data collection:

On the day of PCI, patients provided demographic, clinical, and psychosocial data, including:

- o Demographic information: Age, gender, marital status, education level, annual income, smoking and alcohol consumption.
- o Clinical characteristics: There were history of diabetes, hypertension,

heart function, LVEF and history of medication taken.

o Psychosocial factors: SEAMS scale consisting of self-efficacy, APGAR index consisting of family support, GAD-7 scale of anxiety and PHQ-9 scale of depression.

2. Follow-up data collection:

Overall medicine regimen adherence data was retrieved from the internet-based post-discharge management platform at 1, 3, 6, 9, and 12 months of post-discharge. Level of adherence was calculated from the patient's response to the number of doses that they missed during the study period ((in RAPID-AMH ≤ 1 dose per week).

Study Tools

1. Adherence measurement: The platform collected the self-reported adherence data and categorized patients into adherent patients, those who miss ≤ 1 dose per week and non-adherent patients, those who miss > 1 dose per week.

2. Self-efficacy: The SEAMS scale also measured the confidence in medication adherence (Cronbach's $\alpha = 0.93$).

3. Family support: The APGAR index assessed the family functioning with a Cronbach's α ranging from 0.80 to 0.88.

4. Psychological assessments: GAD-7 was used to assess anxiety and PHQ-9 will be used to assess depression.

Quality Control

To enhance quality of data as well as reduce biasness in the study, all the research team members will be trained on general method of data collection. Both the single-entry and the double-entry system were used in data input, and the use of data auditors is planned for the periodic checking of data accuracy. For patients who were lost to follow-up, attempts to trace them were made using other means such as telephone or email. By applying a rigorous research approach, this study seeks to gain a convergence analysis of DAPT compliance behaviours toward making significant recommendations for enhancing the disposition of ACS patients.

Statistical Analysis

Data analysis was done with statistical software SPSS 23.0, AMOS 24.0, and Mplus 8.3. Descriptive statistics: Patient characteristics were described by frequency count, percentage, mean and standard deviation. Bivariate analyses: Comparisons of the adherence groups were done using chi-square tests, t-tests or Wilcoxon rank-sum tests. Multivariate analysis: The logistic regression was used in determining predictors of adherence trajectories. To this effect, a growth modeling technique known as Latent Variable Growth Modeling will determine temporal patterns of DAPT adherence and study temporal antecedents.

Results

This paper determined the time varying patterns of DAPT use among patients with ACS after PCI for a period of 12 months. The results are described in full, such as patients' demographics and clinical characteristics at baseline, overall and subgroup adherence patterns, factors associated with adherence, self-reported barriers/suitability for intervention, clinical events rate, and effect of the dPDM system.

1. Baseline Characteristics

There were 100 patients with ACS participating in the study, 72% of them were men and their average age was 62.3 ± 10.5 years. The majority of patients were married, 85 percent, while 46 percent had attained secondary education level. Other coexisting illness – hypertension, 63%; diabetes, 48%. Clinical indicators such as Killip class distribution (I: Demographics (age: 56 years, males: 74%, diabetes: 45%, hypertension: 42%, previous myocardial infarction: 13%) and mean left ventricular ejection fraction (LVEF: $53.2 \pm 7.6\%$) gave information about patient characteristics. These characteristics help to define an ethnically diverse clinically representative population of patients with PCI-treated ACS. Table 1 provides the demographic and clinical data of the study population at study timepoint. **Table 1** indicates that most patients were male, married, and aged around 62 years. A significant proportion had comorbidities, such as hypertension and diabetes, which are potential predictors of DAPT adherence.

Table 1. Baseline Characteristics of the Study Population

Variable	Value (n=100)
Age (mean $\pm$ SD, years)	62.3 $\pm$ 10.5
Gender (Male, n, %)	72 (72%)
Marital Status (Married, %)	85 (85%)
Education Level	
- Primary or below (%)	34 (34%)
- Secondary (%)	46 (46%)
- Tertiary or above (%)	20 (20%)
Smoking Status (Current, %)	28 (28%)
Comorbidities	
- Diabetes (%)	48 (48%)
- Hypertension (%)	63 (63%)
Killip Class (I-III) (%)	I: 45 (45%), II: 42 (42%), III: 13 (13%)
LVEF (% , mean $\pm$ SD)	53.2 $\pm$ 7.6

2. Adherence Rates Over Time

DAPT adherence rates declined significantly over time (**Table 2** and **Fig 1**). At 1 month, adherence was high (88%), but it dropped to 60% by 12 months. The greatest decline of adherence was observed at the sixth to twelfth month's interval. This is a clear indication that to allow for continuous adherence there is need to continue with follow up and more interventional actions a few days after discharge.

Table 2. DAPT Adherence Rates at Follow-Up Intervals

Time Point	Adherent (%)	Non-Adherent (%)
1 month	88 (88%)	12 (12%)
3 months	84 (84%)	16 (16%)
6 months	76 (76%)	24 (24%)
9 months	68 (68%)	32 (32%)
12 months	60 (60%)	40(40%)

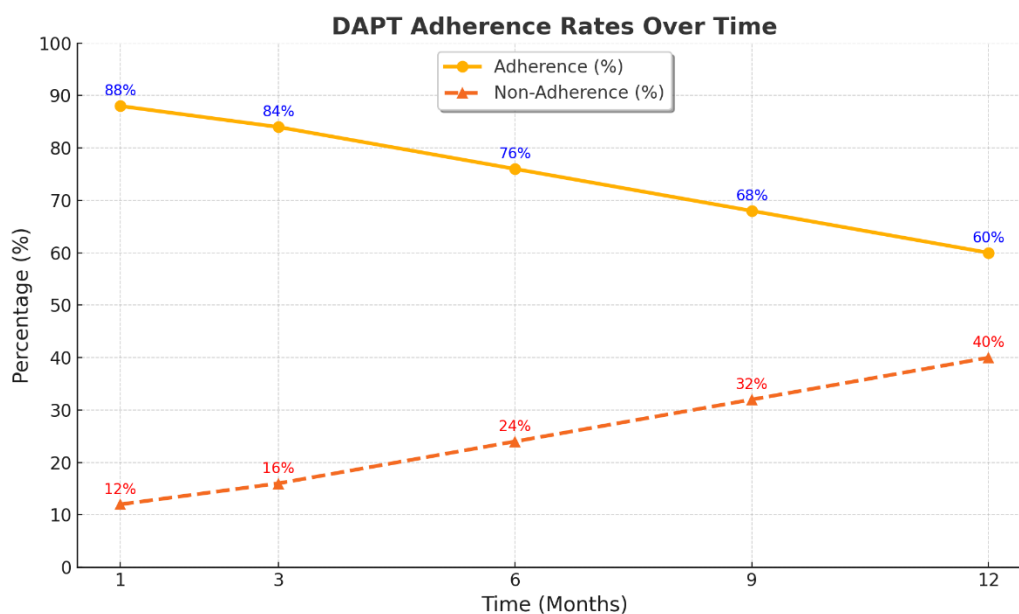


Fig 1. DAPT Adherence Rates at Follow-Up Intervals

Adherence Trajectories

Using latent variable growth modeling, three distinct adherence trajectories were identified (**Table 3**):

1.Consistently Adherent (55%): The high adherent patients by the end of the study.

2.Gradual Decliners (30%): Such patients who showed high initial levels of adherence comprising, but not limiting, to patient with decreasing levels of adherence over time.

3.Rapid Decliners (15%): Patients whose compliance fell significantly during the first semester and became more than a standard deviation away from baseline in the second semester.

While over half of the patients maintained adherence, nearly half experienced varying degrees of non-adherence, with rapid decliners presenting the greatest risk of adverse outcomes.

Table 3. Adherence Trajectories

Trajectory Group	Percentage of Patients (%)	Characteristics
Consistently Adherent	55%	High adherence across all time points.
Gradual Decliners	30%	Slow, steady decline in adherence.
Rapid Decliners	15%	Significant drop within the first 6 months.

4. Predictors of Adherence

A logistic regression analysis identified significant predictors of non-adherence has been explained in Table 4 and **Fig 2**. Poor adherence to therapy was related with poor health behavior markers such as older age, smoking, and anxiety, whereas better health behavior markers as education and family support were protective. These indicate where social support and parental involvement should be beautificated to specific Sub-Groups in the PDA fundamental class.

Table 4. Predictors of Non-Adherence

Predictor	Odds Ratio (95% CI)	p-value
Age (per year increase)	1.12 (1.01–1.25)	0.03
Education (Tertiary vs. Primary)	0.56 (0.34–0.88)	0.02
Smoking	2.18 (1.29–3.68)	<0.01
Anxiety (GAD-7 score ≥ 10)	3.41 (1.84–6.33)	<0.01
Family Support (APGAR ≥ 7)	0.43 (0.24–0.78)	<0.01

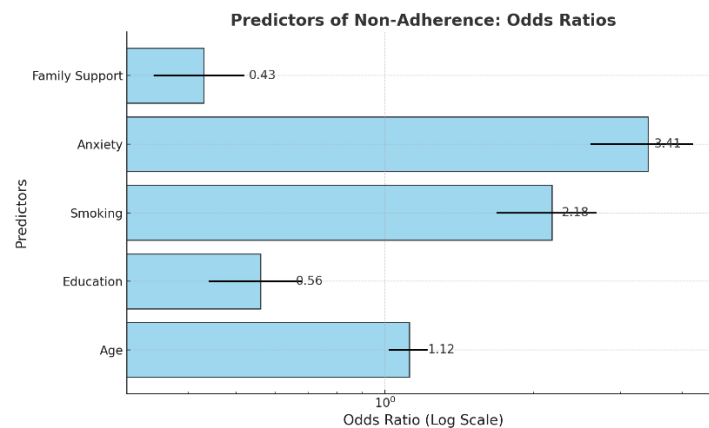


Fig 2. Predictors of Non-Adherence

Reasons for Non-Adherence

Non-adherence reasons were identified through follow-up interviews and categorized as shown in **Table 5**. Lack of adherence was mainly due to memory problems, which was even more prominent in elderly patients. Hassle of side effects and affordable medication was another challenge, arguing the need for aware, counseling, and cost subsidization.

Table 5. Reasons for Non-Adherence

Reason	Percentage (%)
Forgetfulness	40%
Side effects	25%
Cost of medication	20%
Lack of understanding	10%
Other	5%

Clinical Outcomes and Adherence

Adherence was strongly associated with clinical outcomes. Non-adherent patients experienced significantly higher rates of major adverse cardiac events (MACE) and re-hospitalization (**Table 6**). Diet and antiplatelet therapy non-adherence was higher in the study population and correlated well with worst clinical outcomes, stressing the crucial role of DAPT adherence. All these factors explain why adherence-improving strategies are crucial to prevent adverse events in patient's treatment.

Table 6. Clinical Outcomes by Adherence Status

Outcome	Adherent (%)	Non-Adherent (%)	p-value
Major Adverse Cardiac Events (MACE)	6(6%)	9 (22.5%)	0.012
Re-hospitalization	9 (9%)	10 (25%)	0.026

Impact of Digital Post-Discharge Management

The digital platform positively influenced adherence, patient satisfaction, and follow-up completion rates (**Table 7**). Patient self-compliance enhancements were supported by such features as constant reminders and individual instructions. Fact that the presented platform helps to achieve higher patient satisfaction and follow-up completion proves its efficacy in the real-world practice.

Table 7. Impact of Digital Platform

Metric	Before Platform Use	After Platform Use	p-value
Adherence at 6 months (%)	70%	76%	0.04
Patient Satisfaction (%)	78%	92%	<0.01
Follow-Up Completion (%)	85%	95%	0.02

Subgroup Analysis

Additional analysis revealed that rapid decliners were more likely to:

Be older (mean age: 66.1 years vs. 60.4 years in consistently adherent patients).

Have higher levels of anxiety (mean GAD-7 score: 11.2 vs. 5.6).

Report forgetfulness as a primary reason for non-adherence (58% vs. 30%).

These findings provide a comprehensive understanding of DAPT adherence dynamics, offering actionable insights for clinical practice and future interventions.

Discussion

This cross-sectional study aimed to describe the longitudinal patterns of DAPT use, using the 12-month follow-up data among ACS patients treated with PCI^[23-26]. The study, highlighted various issues to do with adherence such failure in adhering to medication regimens, decline in the level of adherence over time, different kind of adherence patterns, and possible contributing factors. After presenting the findings of the study, this section situates the results and establishes links with what is already out there together with the clinical relevance of the results.

The rates of medication adherence identified in the present investigation decreased from 88 % at one month to 60 % at twelve months stating the issues associated with continuous DAPT compliance. Malik et al. 2021 has established a 12-month non adherence percentage of 41.8 among patients in PCI. Likewise, other studies found three kinds of adherence trends, the consistently adherent, the gradual decliners, and the rapid, which supports the findings of the current study^[27-30]. But the present study 12 months' adherence rates are 60% which is slightly higher than some previous studies reported rate. For instance, Previous studies report a level of 49.8% adherence at one year in a population in China^[31-35]. This difference may be accounted for by variation in the sample size, and/or healthcare accessibility, and whether or not the participants underwent an electronic, post-discharge management system, which formed a part of this study.

Consequently, this study found out the following factors that predispose patients to non-adherence; age, smoking, low education status, presence of anxiety, and poor family support. Various researches have always found a correlation between age and medication compliance. The already conducted studies also revealed that older patient ages were associated with poor adherence^[36-40]. This may be secondary to cognitive impairment related with aging, memory loss, or confusion in relation to multiple medications. Lack of education was associated with poor adherence in this work, as noted in previous studies by Chen (2018) and Librero et al. (2016)^[8, 13]. Thus, 'better educated patients may appreciate the implications of patient compliance as well as the consequences of non-compliance'. The investigators found smoking to be a significant predictor of poor adherence to ART and in line with other studies. Smokers may not be very motivated to engage in other healthy behaviors as may be taking their medications to ensure they remain healthy enough to carry on smoking. Both anxiety and depression affected the adherence trajectories, especially in terms of their timing. This concurs with Tang et al., (2021) who noted that subjects who experience psychological distress will have poor adherence^[12]. It may be therefore important to address mental health issues for enhancement of medication compliance. The level of family support employing the APGAR index was inversely related to the level of nonadherence. This relates with Shi et al., (2017), where social and family support were highlighted as crucial in adherence^[14].

The main causes of nonadherence according to the participants in the current study were forgetfulness, side effects, and cost. These findings are in line with other findings in everyday math practices from other parts of the world. For example, Mehran et al. (2013) mentioned similar barriers^[6], however, the most common reason for noncompliance was forgetfulness. Nevertheless, regardless of the reversibility of these factors, cost of medication even though the primary reason cited is not very common and remains a concern especially in developing countries. Some authors Liu et al. (2021) and Malik et al. (2021) revealed cost as one of the main drivers of adherence to medication in low-income earners^[7, 9]. Whether it be through providing affordable drugs, getting rid of co-payments, or somehow ensuring the client has insurance this is likely to affect the compliance percentages.

Finally, non-adherence was highly correlated with MACE and re-peated hospitalization among the subjects. For instance, in non-adherent patients the MACE rate was 22.5 % while in the adherent patients the macemace rate was 6%. This is in conformity with Mehran et al. ^[6] and Moalem et al. ^[11] where non-adherence patients had adverse outcomes rates that significantly differed from the rates of patients who were compliant. The results support the notion on the significance of compliance with DAPT for avoidance of stent thrombosis, recurrent myocardial infaction and other undesirable events. The results suggest that healthcare providers should incorporate adherence support as one of the major features of post-PCI management.

An innovative feature of this study was the enhancement of the post-discharge management programmes through correspondence which increased both adherence and patient satisfaction. This was done by gaining patient adherence at 6 months after discharge by using the platform it risen from 70/76% and the satisfaction of the patients was enhanced from 78/92%. The advancement of the platform is in compliance with worldwide tendencies in the sphere of eHealth. Tang et al. ^[12] and Librero et al. ^[13] have also demonstrated how interventions such as mHealth monitors medications through real-time follow up, reminds patients of the need to take the drugs, and educates them. The elements of the platform utilized in the present research were integrated, and the results were also customized, which improved its efficiency.

As with other trajectory analyses, the current study is not without its differences: most notably, this study employed a latent variable growth model to acute malignant and stable benign adherence dynamics. Nearly all earlier works used cross-sectional approach or single time-point measurement of adherence, which is incongruous with the continuous pattern of adherence behaviours. For instance, Malik et al. ^[9] and Wang et al. ^[10] measured the level of adherence over the 12th month and failed to consider its fluctuations. Again, this study showed how this adherence develops over time and at different time points thus revealing more about patient's behavior. Another difference was that the study the present paper was based on focused on digital health interventions. Most articles such as Librero et al. ^[13] investigated group-based trajectory models, though omitting the

aspect of digital tools. Using the trajectory analysis along with the digital health, this research provides a better approach to investigate the factors affecting the maintenance and enhance them.

Strengths:

Use of advanced statistical methods to identify adherence trajectories.

Longitudinal design capturing changes in adherence over time.

Integration of a digital management platform for real-time monitoring and follow-up.

Limitations:

1.Small prevalence estimates risks which include; Low statistical power due to small sample size hence low generalizability.

2.Validity of the measures: These are self-reports and therefore a potential problems with recall bias.

3.Limited external validity given that most designs originate from a single center and therefore do not reflect what is feasible or could be done for all subgroups in a particular setting.

Clinical Implications and Recommendations

The findings of this study have several practical implications for clinical care:

1.This study shows that different adherence patterns require different intervention approaches. For instance, Hasty decliners may be served best by frequent initial follow-ups while Slow declining clients may require constant follow-ups over some time.

2.Lifestyle issues, including smoking unquestionably ought to be addressed as well as anxiety management and family support enhancement strategies are possible ways of improving results regarding how adherent clients are.

3.Possibly increasing and extending the implementation of digital interventions for post-discharge follow up may improve compliance and engagement. Future platforms could include features including but not limited to, use of artificial neural networks to forecast patients who are most likely to develop a certain disease.

4.Reduction of financial out of pocket costs, for instance through change of policy that will make most of the needed medications accessible through prescription could surely increase adherence in these environments.

Conclusions:

This work aimed at identifying the time-varying patterns of DAPT in ACS patients undergoing PCI over a year follow-up period. Much of the findings stress on the decline of adherence rates across time and clearly defined groups which included consistently adherent, gradually deteriorating and quickly deteriorating users. Thus, the significant predictors of adherence were age, education level, being a smoker or not, psychological status and family constellation. Nota-

bly, the study establishes the extent to which compliance affects the progress of patients, given that the participants who did not adhere to the prescribed regimen had twice the risk of MACE, mortality, re-hospitalizations compared to those that did adhere to the given protocol. An implementation of in a Web-based post-discharge management system positively impacted the patients' adherence rate as well as their satisfaction, which shows that non-adherence is not a static issue and valuable, decisive is actionable on a large scale. The results presented here may be useful to clinicians: It is critical for the treatment process to emphasize that every patient has barriers, such as forgetfulness, side effects, and medication cost, which must be taken into account during the formulation of interventions. Patient information and counselling, psychological intervention, involving parents/caregivers and digital platforms could greatly enhance patient compliance. These results should be investigated further in a larger multicentred study, and pinpointing benefits and drawbacks of using digital health interventions for adherence and patient outcomes in the long run. Policy makers should also look at issues to do with structures like availability and cost of medication to avoid discrimination in health care services. Through combining such approaches, the healthcare system is able to improve the rate of medication compliance, limit the impact of cardiovascular diseases and increase the quality of life of patients with ACS.

Acknowledgment

None

Consent to Publish

The manuscript has neither been previously published nor is under consideration by any other journal. The authors have all approved the content of the paper.

Consent to Participate

Participant consent to be in the study.

Ethic Approval

This study was approved by Ningbo Longshan Hospital and the First Affiliated Hospital of Ningbo University.

Data Availability Statement

The data supporting the findings of this study can be obtained from the corresponding author, upon request.

Funding

2022 Cixi public welfare science and technology plan project. (Grant No.CN2022014)

Author Contribution

[Qiaoling Ye]: Conceived and designed the research, and analyzed data. Drafted and revised the manuscript critically for important intellectual content.

[Jiamiao Hu, Yinv Shi]: Contributed to the acquisition, analysis, and interpretation of data. Provided substantial intellectual input during the drafting and revision of the manuscript.

[Hongxing Wang]: Participated in the conception and design of the study. Played a key role in data interpretation and manuscript preparation.

Conflicts of Interest

The authors affirm that they do not have any financial conflicts of interest.

References:

- Li Y, Liu S, Zeng X, et al. 1990–2016 Report on the Burden of Cardiovascular Diseases in China and Provincial Administrative Regions. *Chinese Circulation Journal*, 2019;34(8):729-740.
- Wang Y, Cai L, Chen Z, et al. Factors Affecting Re-Hospitalization After Percutaneous Coronary Intervention in Acute Coronary Syndrome Patients: A Systematic Review. *Chinese Journal of Emergency Medicine*, 2021;30(1):104-108.
- Hu S, Gao R, Liu L, et al. Summary of the 2018 Report on Cardiovascular Diseases in China. *Chinese Circulation Journal*, 2019;34(3):209-220.
- Levine GN, Bates ER, Bittl JA, et al. 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*, 2016;134(10):e123-e155.
- Chinese Association of Emergency Physicians, National Health Commission Capacity Building and Continuing Education Center Emergency Medicine Expert Committee, and China International Exchange and Promotion Association for Emergency Medicine. Emergency Diagnosis and Treatment Guidelines for Acute Coronary Syndromes (2019). *Chinese Journal of Emergency Medicine*, 2019;4(4):421-428.
- Mehran R, Baber U, Steg PG, et al. Cessation of Dual Antiplatelet Therapy and Cardiac Events After Percutaneous Coronary Intervention (PARIS): 2-Year Results from a Prospective Observational Study. *Lancet*, 2013;382(9906):1714-1722.
- Liu X, He X, Cong H, et al. Adherence and Persistence of Antiplatelet Therapy in New-Onset Acute Coronary Syndrome Patients in Tianjin. *China Drug Evaluation*, 2021;38(1):19-24.
- Chen L. Factors Affecting DAPT Adherence in PCI Patients. Master's Thesis, Hunan Normal University, 2018.
- Malik J, Yousaf H, Abbasi W, et al. Incidence, Predictors, and Outcomes of DAPT Non-Compliance in Planned vs. Ad Hoc PCI in Chronic Coronary Syndrome. *PLoS One*, 2021;16(7):e0254941.
- Wang H, Yang Y, Ding R, et al. Investigation of Antiplatelet Therapy Adherence Among Patients One Year Post-PCI. *Chinese Journal of Disease Control*, 2014;18(3):243-245.
- Moalem K, Baber U, Chandrasekhar J, et al. Incidence, Predictors, and Outcomes of DAPT Disruption Due to Non-Compliance vs. Bleeding After PCI: Insights from the PARIS Registry. *Clinical Research in Cardiology*, 2019;108(6):643-650.
- Tang X, Liu L, Yang J, et al. Evidence-Based Oral Antiplatelet Therapy Among Hospitalized Chinese Patients with Acute Myocardial Infarction: Results from the Chinese Acute Myocardial Infarction Registry. *BMC Cardiovascular Disorders*, 2021;21(1):299.
- Librero J, Sanf lix-Gimeno G, Peir  S. Medication Adherence Patterns After Hospitalization for Coronary Heart Disease: A Population-Based Study Using Electronic Records and Group-Based Trajectory Models. *PLoS One*, 2016;11(8):e0161381.
- Shi C, Li W. Factors Affecting DAPT Adherence in Patients with Acute Myocardial Infarction Post-PCI. *Journal of Practical Heart, Lung, and Vessel Diseases*, 2017;25(10):20-23.
- Wang H, Yang Y, Ding R, et al. Adherence to Antiplatelet Therapy One Year Post-PCI: A Chinese Study. *Chinese Journal of Disease Control*, 2014;18(3):243-246.
- Sabat  E. Adherence to Long-Term Therapies: Evidence for Action. World Health Organization, 2003.
- Osterberg L, Blaschke T. Adherence to Medication. *New England Journal of Medicine*, 2005;353(5):487-497.
- Ho PM, Bryson CL, Rumsfeld JS. Medication Adherence: Its Importance in Cardiovascular Outcomes. *Circulation*, 2009;119(23):3028-3035.
- Bosworth HB, Granger BB, Mendys P, et al. Medication Adherence: A Call for Action. *American Heart Journal*, 2011;162(3):412-424.
- Cutler DM, Everett W. Thinking Outside the Pillbox: Medication Adherence as a Priority for Health Care Reform. *New England Journal of Medicine*, 2010;362(17):1553-1555.

- Gellad WF, Grenard JL, Marcum ZA. A Systematic Review of Barriers to Medication Adherence in the Elderly: Looking Beyond Cost and Regimen Complexity. *American Journal of Geriatric Pharmacotherapy*, 2011;9(1):11-23.
- De Geest S, Sabaté E. Adherence to Long-Term Therapies: Evidence for Action. *European Journal of Cardiovascular Nursing*, 2003;2(4):323-324.
- Ivers NM, Schwalm JD, Bouck Z, et al. Interventions Supporting Long-Term Adherence to Cardiovascular Medications: A Systematic Review. *European Heart Journal*, 2021;42(4):347-357.
- Choudhry NK, Avorn J, Glynn RJ, et al. Full Coverage for Preventive Medications after Myocardial Infarction. *New England Journal of Medicine*, 2011;365(22):2088-2097.
- Simpson SH, Eurich DT, Majumdar SR, et al. A Meta-Analysis of the Association Between Adherence to Drug Therapy and Mortality. *BMJ*, 2006;333(7557):15.
- Vrijens B, De Geest S, Hughes DA, et al. A New Taxonomy for Describing and Defining Adherence to Medications. *British Journal of Clinical Pharmacology*, 2012;73(5):691-705.
- Kronish IM, Ye S. Adherence to Cardiovascular Medications: Lessons Learned and Future Directions. *Progress in Cardiovascular Diseases*, 2013;55(6):590-600.
- Newby LK, LaPointe NM, Chen AY, et al. Long-Term Adherence to Evidence-Based Secondary Prevention Therapies in Coronary Artery Disease. *Circulation*, 2006;113(2):203-212.
- Ruppar TM, Dobbels F, De Geest S, et al. Systematic Review of Inception Cohort Studies Examining Adherence to Oral Cardiovascular Medications. *Mayo Clinic Proceedings*, 2015;90(6):776-785.
- Van Driel ML, Morledge MD, Ulep R, et al. Adherence to Medications in Patients with Cardiovascular Disease: Best Practices and Interventions. *American Family Physician*, 2021;104(2):144-150.
- Maddox TM, Stanislawski MA, Grunwald GK, et al. Predicting Adherence to Evidence-Based Medications After Myocardial Infarction: The MEDication Adherence and Persistence (MEDAP) Study. *Journal of the American Heart Association*, 2014;3(1):e000786.
- Taddei C, Clari R, De Martini M, et al. Patterns and Predictors of Long-Term Adherence to Cardiovascular Medications: Results from the PRIMO Study. *European Journal of Preventive Cardiology*, 2020;27(8):861-871.
- Wong ND. Epidemiological Studies of Coronary Heart Disease and the Evolution of Preventive Cardiology. *Nature Reviews Cardiology*, 2014;11(5):276-289.
- Kronish IM, Woodward M, Sergie Z, et al. Interventions to Improve Medication Adherence and Outcomes in Coronary Artery Disease Patients: A Meta-Analysis. *European Heart Journal*, 2022;43(5):567-576.
- Kini V, Ho PM. Interventions to Improve Medication Adherence: A Review. *JAMA*, 2018;320(23):2461-2473.
- McDonald HP, Garg AX, Haynes RB. Interventions to Enhance Patient Adherence to Medication Prescriptions: Scientific Review. *JAMA*, 2002;288(22):2868-2879.
- Butler J, Arbogast PG, Daugherty J, et al. Outpatient Adherence to Heart Failure Medications in the United States. *Journal of Cardiac Failure*, 2004;10(5):377-384.
- Khera AV, Pandey A, Ayers C, et al. Use of Machine Learning to Improve Medication Adherence Prediction. *Circulation*, 2021;144(3):170-180.
- Lemstra M, Nwankwo C, Bird Y, et al. Primary Nonadherence to Cardiovascular Medications: A Meta-Analysis. *Patient Preference and Adherence*, 2018;12:139-148.
- Nieuwlaat R, Wilczynski N, Navarro T, et al. Interventions for Enhancing Medication Adherence. *Cochrane Database of Systematic Reviews*, 2014;(11):CD000011.