Original Article

Effect of collaborative care intervention on productivity losses among people with comorbid common mental disorders and cardiovascular disease in rural Karnataka

Farah Naaz Fathima[1], Sumithra Selvam[2], Elsa Heylen[3], Krishnamachari Srinivasan[4], Maria Ekstrand[5]

[1]Department of Community Health, St. John's Medical College, Sarjapur Road, Bengaluru, Karnataka, India, [2]Division of Epidemiology, Biostatistics and Population Health, St. John's Research Institute, Bengaluru, Karnataka, India, [3]University of California San Francisco, USA, [4]Department of Psychiatry, St. John's Medical College, Bengaluru, Karnataka, India, [5]Department of Medicine University of California San Francisco, USA

Abstract

Introduction: Common mental disorders (CMD) and cardiovascular diseases (CVD), common health problems among patients seeking primary healthcare, contribute to high economic productivity losses. Collaborative care programs for CMDs and CVDs have shown improvement in clinical outcomes for both conditions; however, data on productivity outcomes are scarce. **Objective:** Effect of integrated collaborative care on productivity among people with comorbid CMD and CVD in rural Karnataka primary health clinics. **Methods:** Participants were recruited within a randomized trial in rural South India, where patients received either collaborative or enhanced standard care. In this substudy, 303 participants were followed for 3 months and assessed with the iMTA Productivity Cost Questionnaire (iPCQ). **Results:** We found a reduction in the proportion of individuals reporting productivity loss at 3 months (66%) compared to baseline (76%; $P = 0.002$). Productivity losses decreased from INR 30.3 per person per day at baseline to 17.7 at 3 months. Reductions were similar in the two treatment conditions. Conclusion: Medical intervention may foster reduced productivity losses among patients with CMD and CVD. Collaborative care did not translate into higher reductions in productivity losses than "enhanced standard care."

Keywords: Collaborative care, common mental disease, productivity loss, rural

Introduction

The burden due to common mental disorders (CMD) and cardiovascular diseases (CVD) is high worldwide and in India. Mental disorders rank second in highest number of years lived with disability and a third of patients seeking primary care in India have a mental disorder.[1–3] CVDs are leading cause of mortality and contribute to reduced quality of life.[4,5] CMDs and CVDs frequently coexist with a bidirectional relationship. Almost a quarter of patients with CVD have a diagnosable psychiatric syndrome. Individuals with CMDs are less likely to adhere to healthy lifestyle and treatment recommendations.[6,7] Primary care physicians are often the first point of contact for patients with CVDs and CMDs. Identification and appropriate management of these conditions by primary care physicians will improve clinical outcomes and reduce productivity losses.

Health-related productivity losses are high in CMDs and CVDs.[8] Health appraisal data from the United States of America (USA)

Address for correspondence: Dr. Farah Naaz Fathima, Department of Community Health St. John's Medical College, Sarjapur Road, Bengaluru—560034, Karnataka, India.
E-mail: doc.farah@gmail.com

Received: 23-11-2022 **Revised:** 13-04-2023
Accepted: 26-04-2023 **Published:** 30-09-2023

Access this article online

Quick Response Code:

Website: http://journals.lww.com/JFMPC

DOI: 10.4103/jfmpc.jfmpc_2296_22

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How to cite this article: Fathima FN, Selvam S, Heylen E, Srinivasan K, Ekstrand M. Effect of collaborative care intervention on productivity losses among people with comorbid common mental disorders and cardiovascular disease in rural Karnataka. J Family Med Prim Care 2023;12:1917-22.

revealed that depression and CVDs had an annual productivity loss of 878 USD and 220–330 USD, respectively.[9]

Depression is the largest contributor to lost work productivity due to its high prevalence in general population, early onset, chronicity, deleterious effects on educational and professional attainment and lack of access to effective treatments.[10]

Many gaps exist in data on economic evaluation of interventions for mental illness. There is limited understanding beyond the short term economic consequences of mental illness and its treatments. Most benefits of good mental health care are outside the health sector in schools and occupational settings. Mental illness is strongly linked to social and economic marginalization. Existing literature especially from developing countries does not focus on inequalities related to socioeconomic, religious, cultural, ethnic and other groups.[11,12]

Integrated collaborative care intervention programs for CMDs and CVDs have shown overall improvement in outcomes for both conditions.[10,12–14] Two studies by Lerner *et al.*[15] look into productivity losses associated with mental illness in specific occupational settings in the USA.[16] In the first study, 431 employed adults with depression were randomized to receive work focussed intervention or usual care. The intervention consisted of telephone-based counselling on care co-ordination, cognitive-behavioural therapy and work coaching. Their results indicated that at-work productivity loss improved, number of absence days decreased and depression severity symptom scores declined following intervention.[16] The second study explored effectiveness of a brief telephonic intervention and reported improvement in time management and performance of physical tasks, mental-interpersonal tasks and at-work productivity loss score.[15] Similar studies are lacking among community dwelling individuals especially those from rural areas and resource constraint settings.

Our study explored the effect of collaborative care on productivity losses among people with comorbid CMD and CVD rural Karnataka. In this study, we present the results of the three-month follow-up of individuals with comorbid CMD and CVD. This substudy was funded by a training grant received by the first author.[17]

Methods

The participants for this analysis were recruited from a parent study (HOPE) set in rural South India.[18] HOPE study (CTRI/2018/04/013001) is a multi-level randomized controlled trial among adults aged ≥30 years with a diagnosis of a CMD (depression or anxiety disorder) and at-least one medical condition that included (hypertension, diabetes, hyperlipidaemia, or ischemic heart disease and includes 2593 participants from 49 Primary Health Centers (PHC) in Ramanagara District, Karnataka state). The institutional ethics committee approval approved both the parent study and the subanalysis. Written informed consent was obtained from the participants at both times.[18]

The HOPE study was a cluster RCT that assessed the impact of collaborative care compared to usual care, randomizing at PHC level. Intervention arm PHC staffs were trained in the diagnosis and treatment of CMDs and the collaborative care model. The multi-level intervention comprised of community-based "Healthy Living groups" coordinated by project staff and Accredited Social Health Activists (ASHAs), using cognitive–behavioural strategies to promote healthy behaviours and by teaching patients skills that can be integrated into their lifestyles. In addition, the PHC physicians in the intervention arm received support of our psychiatry consultants during weekly calls for patient management.[18]

Participants in the intervention PHCs were invited to participate in a 12-monthly, "healthy living" group sessions (8-10 same sex participants), designed to target both mental health issues and CV risk factors held in an easily accessible venue in the community. In the first three months, weekly sessions were co-facilitated by a master's level counsellor and ASHA, who subsequently provided 9 monthly sessions focused on behaviour maintenance. The behaviour change strategies used were based on principles of Social Cognitive Theory and topics included both those relevant to mental health (understanding mental illness, role of stress, coping skills, social support and relaxation) and CV health (understanding hypertension, diabetes, cholesterol and ischemic heart disease, importance of balanced diet, physical activity, regimen adherence and reducing smoking and problem drinking). Both cognitive and behavioural skills training were performed, including goal setting, behavioural contracts, problem solving, reducing irrational thoughts, obtaining social support from group buddies and family members, and integration of healthy behaviours into daily life.[18]

Participants in the enhanced standard treatment arm received a package of usual care per the standardized protocols developed by the state that was augmented by additional training. All the PHC staff (medical officers, staff nurses and pharmacists) in the enhanced care group received training on diagnosis, management and referral of patients with CMDs.

In both arms, patients diagnosed with moderate-to-severe depression were provided access to effective anti-depressant medication as prescribed by a psychiatrist at the nearest district hospital. Patients with high risk for suicide were referred to psychiatrists at the district hospital. All abnormal clinical results (e.g. hypertension, DM, etc.) received appropriate referral.[18]

Out of the 2500 participants recruited in HOPE study, 303 participants recruited consecutively were included for this sub-study and were followed up for a period of three months. During these three months, participants who were randomised to the collaborative care group under HOPE Study received

intervention in the form of healthy living group sessions. In this paper, we present at the effects of only the first three months of collaborative care with the aim of looking at short-term impact of the partial intervention on productivity loss.

Measures: The outcome measure used in the sub-study was productivity losses measured using the iMTA Productivity Cost Questionnaire (iPCQ), which is a generic questionnaire designed to determine illness-related productivity losses.[19,20] Most questions of the iPCQ are based on validated questions derived from previously available instruments.[21,22] This questionnaire is a feasible and reliable instrument for collecting data on productivity losses and is easy to comprehend including persons with low literacy levels.[20] Productivity losses in the last 4 weeks were measured at baseline and at the end of a 3-month follow-up period.

Productivity losses were measured in domains of any productivity loss, productivity losses at paid work (due to absenteeism at paid work and due to presenteeism at paid work) and productivity losses at unpaid work. All the responses were for work over the past 4 weeks.

a. Absenteeism (paid work) was computed by multiplying the number of workdays missed by number of work hours per day.
b. Presenteeism (paid work) was computed by capturing the number of workdays with reduced participant performance. The participant's estimate of the quantum of work that he/she could perform on days with reduced performance was compared with a completely functional workday. This was expressed as an efficiency score ranging from 0 to 10 with 0 representing present at work, but not able to perform at all and 10 representing full performance on a normal workday despite ill health. The following formula was used for calculating the hours of lost productivity due to "presenteeism": number of impaired workdays × (1 – [efficiency score/10]) × number of hours per workday.
c. Productivity losses due to unpaid word were calculating by multiplying number of days of unpaid work missed by number of hours of additional help needed per day to make up the work.

Valuation of all productivity losses was performed by multiplying the number of days of productivity lost by the standard value of productivity. This was computed from the minimum wage for Karnataka state published by the Department of Labour of Government of Karnataka.[23] Minimum wage for agricultural work was used as a surrogate for all calculations. The cost of unpaid productivity loss due to household work was also calculated similarly since a standard hourly rate was not available.

Permissions were obtained from iMTA for use of the tool. We translated (forward and backward) the tool into local language (Kannada), which was used in face-to-face interviews.

The baseline results of productivity losses among these 303 individuals included in this substudy have been reported elsewhere.[24] In this study, we present the changes in productivity losses over the previous 4 weeks among the 303 participants following 2 to 3 months of receiving healthy living group intervention.

Statistical analysis

Data were checked for errors and entered in Microsoft excel and analysed using standard statistical software. The socio-demographic profile of study participants was described using descriptive statistics like mean, standard deviation and proportions. The proportion of study participants reporting productivity losses in each category at baseline and at 3 months was calculated. McNemar's Chi-square test was used for difference in proportion of participants reporting productivity loss at baseline and at 3 months. Given the non-normality of the distributions, Wilcoxon signed rank test was used for difference in distribution of costs due to productivity loss at baseline and 3 months. Mann–Whitney U test was used to study the difference between the median costs due to productivity losses in enhanced standard care and collaborative care groups at 3 months. Multiple regression was performed with productivity loss at 3 months as the dependent variable, intervention group as the predictor and baseline productivity loss as covariate. A *P* value of 0.05 was considered as significant for all analyses.

Results

The sample had a total of 303 participants, of which 201 were in collaborative care PHCs and 102 were in enhanced standard care PHCs.

In our study, the mean age of participants was 59.9 ± 9.1 years with a majority of females (76.9%) and elderly participants (69.1)). The detailed socio-demographic and morbidity profile of the study sample is described elsewhere with relevant details in Table 1.[24] The results of the 3-month follow-up of the study sample (303 individuals) are presented here.

Table 2 depicts the proportion of study sample with productivity losses at baseline and at three months for whole group and by study arm. There was a significant reduction (p = 0.002) in the proportion of individuals reporting any productivity loss at 3 months (65.7%) compared to baseline (76.2%). Similar reductions in proportion of individuals reporting

Table 1: Demographic description of the sample at baseline

	Collaborative care (*n*=201)	Enhanced standard care (*n*=102)
Age in years	60.4±10.2	59.8±10.6
Gender–female*	163 (81.1%)	70 (68.6%)
Paid job	68 (33.8%)	34 (33.3%)
Education		
Illiterate	138 (68.7%)	66 (64.7%)
Some schooling	52 (25.9%)	33 (32.3%)
College graduates	9 (4.5%)	2 (2.0%)

Table 2: Proportion of study sample with productivity losses at baseline and at 3 months for whole group and by study arm

Productivity loss	Whole group (*n*=303)		Collaborative care (*n*=201)		Enhanced standard care (*n*=102)	
	Baseline	At 3 months	Baseline	At 3 months	Baseline	At 3 months
Paid work	97 (32.0%)	56 (18.5%)[a]	64 (31.8%)	35 (17.4%)[a]	333 (32.4%)	21 (20.6%)[a]
Presenteeism	92 (30.4%)	53 (17.5%)[a]	60 (29.9%)	34 (16.9%)[a]	32 (31.4%)	19 (18.6%)[a]
Absenteeism	55 (18.2%)	21 (6.9%)[a]	35 (17.4%)	12 (6.0%)[a]	20 (19.6%)	9 (8.8%)[a]
Unpaid work	188 (62.0%)	176 (58.1%)	120 (59.7%)	112 (55.7%)	68 (66.7%)	64 (62.7%)
Any	231 (76.2%)	199 (65.7%)[a]	150 (74.6%)	128 (63.7%)[a]	81 (79.4%)	71 (69.6%)

Reported as number (%), [a]*P*<0.01 indicates statistically significant change in the proportion from baseline, using McNemar Chi-square test

productivity losses were found for paid work (p = 0.0001), absenteeism (p = 0.002) and presenteeism (p = 0.0001). The percentage reduction in the proportion of participants reporting productivity losses from baseline to follow-up was highest in the categories of presenteeism (38.6%) and absenteeism (33.3%). We found no difference in the proportion of individuals reporting productivity loss between the two intervention groups at 3 months in any of the categories.

Total productivity losses for the prior 4 weeks decreased from INR 256,697 at baseline to INR 149,728 at three months following intervention [Table 3]. This amounts to a reduction from INR 30.3 to 17.7 per person per day. Reductions were seen across all categories. Reduction in productivity loss in paid work contributed to a large proportion (97.6%) of the decline in productivity loss.

Table 4 depicts the comparison of productivity losses over the past 4 weeks (in INR) at baseline and at 3 months for whole group and by study arm. We found no difference in cost of productivity losses overall and in the categories between the two study arms at 3 months. These findings persisted after adjusting for productivity loss at baseline.

However, our study found a significant reduction in the cost of productivity loss between baseline and 3 months. This reduction on productivity cost was seen in the categories of any productivity loss, paid work, presenteeism and absenteeism at 3 months compared to baseline [Table 3].

Table 3: Total cost of productivity loss (over the past 4 weeks) at baseline and at 3 months among 303 participants, in INR

Productivity loss	Baseline	3 months	Difference
Paid work	184,448	79,984	104,464
Presenteeism	94,844	49,644	45,200
Absenteeism	89,604	30,340	59,264
Unpaid work	72,249	69,743	2,506
Any	256,697	149,728	106,969

Discussion

The results of our study show a decrease in proportion of participants reporting productivity losses at 3 months compared to baseline. In addition, we found a decrease in the absolute cost of productivity losses after a 3-month period. Participants assigned to the collaborative care group did not show any additional reduction in productivity loss compared to those who received enhanced standard care.

There could be several reasons for a lack of significant additional effects of collaborative care on productivity loss among participants. Firstly, it could be attributed to short duration of follow-up. In our substudy, we analysed productivity losses at the end of 3 months out of the total 12 months for follow-up in the parent HOPE study. Healthy living group sessions were scheduled weekly and participants in collaborative care arm were able to attend around 4-5 sessions out of the total session over a 3-month period. Longer periods of intervention and follow-up would be needed to translate into changes in productivity. Secondly, since the recall period for productivity losses was 4 weeks, it is possible that reporting of productivity losses by participants who had received only 2 months of intervention may have resulted in underestimation of reduction in productivity losses. Thirdly, our study reports reduction in productivity loss in both groups. This could be because all randomized patients in HOPE study received some additional care either in the form of healthy living groups or enhanced standard care including medication and referral. All patients with moderate-to-severe depression were referred to a psychiatrist. This way, both groups received some non-standard intervention. Use of antidepressant medication in treatment depression has proven benefits, and it would have been unethical not to refer patients to district psychiatrist for further treatment. Therefore, ethical considerations prevented us from having a true control group without any intervention. An interventional study by Woo *et al.*[25] in Seoul among working population with depressive disorders demonstrated that treatment of depression for a period as short as 8 weeks resulted in significant reduction in productivity losses and a significant improvement in self-rated job performance (31.8%).

The cost of productivity loss in our study (in INR) in the past 4 weeks among 303 participants reduced from INR 30.3 per person per day at baseline to 17.7 per person per day at the end of 3 months. This translates to an annual cost saving of INR 165 per person per year (2.6 USD). Woo *et al.*[25] reported a much higher cost savings of 7508 USD per employee per year in their study. When converted by purchasing power parity compared to INR using the International Comparison Program by the World

Table 4: Comparison of productivity losses over the past 4 weeks (in INR) at baseline and at 3 months for whole group and by study arm[§]

Productivity loss	Whole group		Collaborative care			Enhanced standard care		
	Baseline *n*=303	At 3 months *n*=303	Baseline *n*=201	At 3 months *n*=201	Change from baseline	Baseline *n*=102	At 3 months *n*=102	Change from baseline
Paid work	1902±2045 1322 (552, 2549)	1428±1136 1048[b] (570, 1901)	2095±2206 1489 (579, 2897)	1491±1275 855[b] (547, 2530)	1269±2712 1058 (-195, 3063)	1525±1659 1151 (412, 1884)	1322±876 1216 (760, 1615)	216±1346 117 (-73, 957)
Presenteeism	1030±1544 558 (304, 1216)	936±628 820 (486, 1216)	1192±180 608 (347, 1368)	933±648 771 (478, 1137)	376±1265 186 (-328, 983)	728±794 440 (255, 957)	962±605 912 (486, 1254)	-64.6±617-212 (-353, 121)
Absenteeism	1629±1575 1140 (608, 2280)	1444±1105 1140[b] (551, 2128)	1788±1546 1330 (684, 2394)	1736±1170 1710 (769, 2242)	1620±3084 760 (228, 2052)	1350±1626 912 (579, 1425)	1055±934 912 (456, 1102)	826±845 741 (66, 1672)
Unpaid work	384±238 380 (190, 532)	396±190 532 (285, 532)	390±195 532 (266, 532)	408±188 532 (285, 532)	14±194 0 (-100, 88)	373±301 354 (152, 532)	375±194 532 (147, 532)	-46±214 0 (-177, 0)
Any	1111±1594 532 (361, 1167)	752±788 532[b] (425, 627)	1206±1732 532 (416, 1280)	765±848 532[b] (520, 551)	501±1941 0 (-46, 513)	935±1290 532 (354, 1077)	729±670 532 (425, 988)	103±1038 0 (-177, 243)

Reported as mean±SD, Median within parenthesis 25th, 75th percentile; [b]Wilcoxon signed rank test to test the change in productivity cost at 3 months from baseline; [§]No significant difference between the study groups (Collaborative care Vs Enhanced Standard Care) at 3 months using Mann–Whitney *U* test

Bank, 7508 USD would amount to 357.5 USD per employee per year.[26] The reasons for the low amount of per capita cost saving in our study could be threefold. Firstly, the study by Woo *et al*.[25] was conducted in an occupational settings, whereas our study was among general populations in a rural area where only one third of the participants had a paid job. Secondly, the minimum wage for Karnataka state as per the Department of Labour, Government of Karnataka, at the time of our study was 304 INR (4.68 USD) per day.[23] This is considerably lower than the USA federal minimum wage of 7.25 USD per hour that amounts to 58 USD for an 8-hour working day.[27] Thirdly, the study participants in the study by Woo *et al*.[25] had a diagnosis of major depressive disorder, whereas in our study we included participants with any CMD and CVDs.

Nevertheless, the small cost saving of 2.6 USD for person per day is significant in the Indian context where 21.2% of the population lives below the Global Poverty Line of 1.9 USD per person per day.[28,29]

A significant reduction in proportion of study participants reporting productivity loss in our study was due to reduction in presenteeism (38.16%) and absenteeism (33.33%) at paid work. Very little reduction in productivity loss was seen in the unpaid work category (3.96%). This could be because persons doing unpaid work in families are likely to be at a lower priority to receive treatment compared to earning members.

Our study has certain limitations. This is a substudy of a larger research project designed to examine the effectiveness of the collaborative care model among patients diagnosed with CMD and CVDs. Our substudy may not have been adequately powered to pick up differences in productivity losses between the collaborative care arm and enhanced standard care arm. In addition, as all participants had both CMD and CVD, we were unable to separately quantify the productivity losses due to each condition. In addition, a large proportion of our participants consisted of individuals who were aged above 60 years (62.7%) and were not engaged in paid work (42.6% retired, 22.7% homemakers). Hence, measuring productivity losses due to paid work (presenteeism and absenteeism) in this population would not be applicable to a large proportion of participants.

Despite the above limitations, our study is the first longitudinal study from India that looked into productivity losses in people with CMDs and CVDs. Our study thus sheds some light on productivity losses among people with CMD and CVDs a clinic- and community-based intervention. Clinic-based interventions can be incorporated by primary care physicians in their settings to reduce productivity losses among patients with comorbid CVDs and CMDs.

More research in this area is needed focusing on documenting the changes in productivity losses following intervention, especially in low- and middle-income countries. Such data studies identify priority areas with evidence-based interventions to reduce productivity losses. This has policy implications in terms of resource allocation, identifying training needs and program implementation.

We conclude that primary healthcare providers play a role in the reduction of productivity losses among patients with CMDs and CVDs. Nonphysician heath workers like ASHAs can be trained to deliver simple messages promoting healthy lifestyle in the community.

Financial support and sponsorship

This study was funded by GloCal Health Fellowship – An initiative of Forgarty International Centre [NIH] and University of California, Global Health Institute (2016-17).

Conflicts of interest

There are no conflicts of interest.

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