

# Physical Therapists' Guideline Adherence on Early Mobilization and Intensity of Practice at Dutch Acute Stroke Units

## A Country-Wide Survey

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**Background and Purpose**—Clinical practice guidelines for patients with stroke recommend early stroke rehabilitation at acute hospital stroke units. The present study aimed to (1) explore the organization of early stroke rehabilitation; (2) investigate current practice with respect to early mobilization and augmented exercise therapy time; and (3) identify the perceived barriers to and facilitators for guideline adherence as reported by physical therapists (PTs) working on acute hospital stroke units.

**Methods**—All 96 Dutch acute hospital stroke units were requested to assign one PT for participation in the survey.

**Results**—Of the 96 contacted PTs, 91 returned the questionnaire. Seventy-one percent of acute hospital stroke units reported that out-of-bed mobilization of patients was performed within 24 hours. PTs provided a mean of 22 minutes of physical therapy per weekday and weekend therapy was not standard practice. PTs reported having sufficient knowledge of and experience with the clinical practice guidelines for patients with stroke and reported that the clinical practice guidelines for patients with stroke left enough room for them to draw their own conclusions and to take patient preferences into account. PTs perceived insufficient time to comply with the clinical practice guidelines for patients with stroke and a need for financial compensation to realize human resources.

**Conclusions**—Our national survey among PTs suggests that the organization of early stroke rehabilitation varies considerably and that early mobilization and intensity of practice in early stroke rehabilitation are not optimal. Addressing this problem requires agreement between hospital management boards and insurance companies about minimum services and resources required and the introduction of novel methods of increasing duration of exercise therapy with minimal use of resources. (*Stroke*. 2012;43:2395-2401.)

**Key Words:** intensity ■ physical therapy ■ stroke ■ stroke units ■ decision making ■ disease management ■ early ambulation

Acute hospital stroke units (AHSUs)<sup>1,2</sup> are suggested to be beneficial in reducing mortality and disability in patients with stroke.<sup>2,3</sup> It is believed that the aggressive detection and treatment of secondary complications, including inactivity-related complications, contribute to these benefits of organized care at AHSUs.<sup>4</sup>

Immobility after stroke is an important factor assumed to be associated with an increased risk of secondary complications. For example, Bamford and colleagues<sup>5</sup> estimated that inactivity-related complications account for 51% of deaths in the first 30 days after a first stroke. Studies suggest that early mobilization on AHSU, defined as “out of bed within 24 hours after stroke onset,”<sup>6</sup> benefits patients in terms of reducing high

blood pressure, preventing lung infections and deep venous thrombosis, and improving functional outcome.<sup>7-10</sup> In addition, cumulative meta-analyses<sup>11-15</sup> suggested that a minimum dose of 16 hours (ie, 1000 minutes) of exercise therapy is required to induce 5% change in basic activities in daily living skills and for long-term outcome after stroke. Trials on early rehabilitation management are ongoing, although clinical practice guidelines for patients with stroke (CPGPS) strongly recommend early stroke rehabilitation.<sup>15-20</sup>

In The Netherlands, an AHSU, together with the emergency department and general neurology ward of the hospital, is embedded in local integrated stroke services.<sup>21</sup> The Dutch hospitals accept all patients with stroke, irrespective of age,

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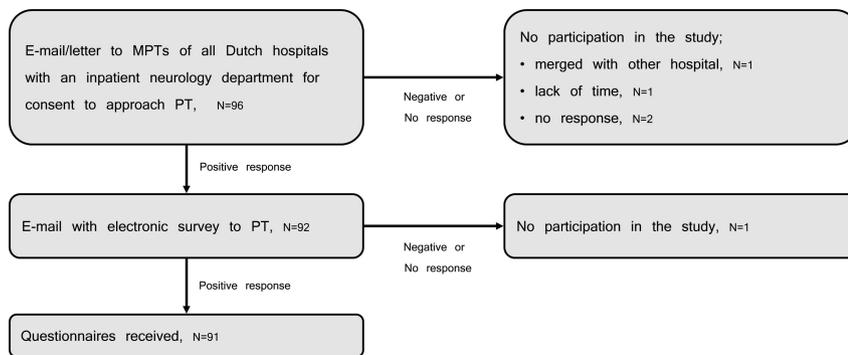
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**Figure.** Flowchart of the selection of physical therapist. MPT indicates manager physical therapy; PT, physical therapy.

premorbid situation, and type of insurance, for diagnostics and multidisciplinary treatment in the acute phase after stroke.<sup>22</sup> An important element in the multidisciplinary treatment is the start of early, intensive rehabilitation services at the AHSU. Dutch CPGPS specifically recommend implementation of early mobilization: out of bed within 24 hours and augmented exercise therapy time; a minimum dose of 2 times 20 minutes of exercise therapy per weekday to prevent inactivity-related complications and to improve long-term outcomes.<sup>23,24</sup>

Previous studies have shown that early rehabilitation after stroke differs markedly among AHSUs<sup>25,26</sup> in different parts of the world. Possible barriers for implementation could be knowledge or insurance systems. Despite the variation, it is assumed that more exercise therapy in the early poststroke phase is better. Nevertheless, the actual time that patients spend on standing and walking activities is rather low, representing approximately 13% of a weekday.<sup>7</sup>

Knowledge is lacking about the extent to which the CPGPS is implemented by physical therapists (PTs) working at Dutch AHSUs. The present study examined the current practice of PTs and their guideline adherence at AHSUs with a 3-fold objective: (1) exploring the organization of early stroke rehabilitation; (2) investigating current practice with respect to “early mobilization” and “augmented exercise therapy time”; and (3) identifying the perceived barriers to and facilitators for guideline adherence.

## Methods

### Study Design and Settings

We conducted a descriptive survey using a web-based questionnaire. All Dutch hospitals with an inpatient neurology department were asked for participation of one PT who provided treatment to patients in the acute poststroke phase. Informed consent was obtained from PTs and their managers. Our study was exempt from approval by the medical ethical committee.

### Selection of PTs

From all Dutch hospitals with an inpatient neurology department ( $n=96$ ), managers of the PTs were asked whether one PT from their team could participate in the study. E-mail addresses of the PTs were obtained from the managers of the PTs. Data were collected between January and March 2011.

### Questionnaire Design and Content

Development of the questionnaire involved 4 stages. First, we searched for existing questionnaires and relevant models of the diffusion of innovations to construct questions on barriers and facilitators. Second, setting-specific questions on the organization of care were formulated based on interviews with 4 PTs working at different AHSUs. Third, a draft questionnaire was designed and

submitted to the project group for several review rounds. Fourth, the questionnaire was constructed in a web-based version and checked for content and suitability by 4 expert PTs.

The final version of the questionnaire consisted of 4 parts. The first part contained 32 questions on characteristics of the PTs and their organization. The second part contained 16 questions related to self-reported use of guidelines and more specifically on the start of mobilization and the time dedicated to exercise therapy. The third part contained 18 questions to identify barriers to the use of the Dutch CPGPS,<sup>23</sup> based on a validated questionnaire from Peters et al<sup>27</sup> in addition to 2 questions: one on the clarity of the guideline recommendations and a second on the PTs’ knowledge and skills. The fourth part contained 8 questions specifically focusing on barriers to and facilitators for the start of mobilization and the time dedicated to exercise therapy at AHSUs based on Rogers’ model of the diffusion of innovations.<sup>28</sup>

### Survey Administration

The PTs received an e-mail with a letter offering information and a hyperlink to the web-based questionnaire. Nonresponders received 4 reminders.

### Data Collection and Processing

The questionnaire was programmed in FormDesk (ISS, Den Haag). Data were entered into an Excel database (Microsoft, Redmond, WA), which was used to check and recode the data, and data analysis was performed with SPSS Version 16.0 (SPSS, Chicago, IL). Data were handled confidentially and PTs and hospitals were anonymized with a unique identification code assigned to each participating PT. Data were stored in a password-protected database on a protected server.

### Data Analysis

Descriptive statistics were used to present the characteristics of the PTs and of the organization of early stroke rehabilitation, the start of mobilization, and the time dedicated to exercise therapy per working day as well as the perceived barriers to and facilitators for adherence to CPGPS.

The perceived barriers and facilitators were assessed by counting and ranking frequencies. Barriers were quantified by adding up the “disagree” and “fully disagree” scores. Facilitators were identified by adding up the “agree” and “fully agree” scores.

## Results

### Response

The Figure shows a response rate of 95% ( $N=91$ ). Five of the 96 hospitals from different parts of The Netherlands did not participate in the present study. None of these hospitals that refused to participate were academic.

### Characteristics of PTs and Setting

Of the 91 participating PTs, 61 were female (67%), the mean age was 40.8 years, with a mean of 17.3 years of employment

**Table 1. Organization of Early Stroke Rehabilitation With Characteristics of Recruited Hospitals (N=91) and Multidisciplinary Teams, Organization of Consultation, and Lines of Accountability**

Characteristics of the hospitals	
Part of stroke services	
No. (%)	88 (96.7)
Thrombolytic therapy given	
No. (%)	86 (94.5)
Type of stroke care*	
No. (%)	
General medical ward	3 (3.3)
Acute intensive stroke unit	19 (20.9)
Acute semi-intensive stroke unit	64 (70.3)
Acute nonintensive stroke unit	3 (3.3)
Missing	2 (2.2)
No. of beds on AHSU (n=88)	
Median (IQR)	4 (4-6)
Length of stay on AHSU, d (n=88)	
Median (IQR)	2 (2-3.75)
No. of beds on neurology ward	
Mean (SD)	21.2 (9.1)
Length of stay on neurology ward, d (n=88)	
Mean (SD)	9.3 (3.2)
Characteristics of multidisciplinary team	
Presence of professionals within the multidisciplinary team	
No. (%)	
Neurologist, nurse, PT, and speech therapist	91 (100)
Occupational therapist	88 (96.7)
Physician	87 (95.6)
Transfer nurse	75 (82.4)
Social worker	61 (67.0)
Neuropsychologist	28 (39.6)
Geriatric specialist	27 (29.7)
Nurse practitioner/physician assistant	24 (26.4)
Multidisciplinary neurology meeting	
No. (%)	
Present	89 (96.7)
Median	
Frequency per wk	1
Multidisciplinary rehabilitation meeting	
No. (%)	
Present	23 (25.3)
Median	
Frequency per wk	1
PTs asked for attendance	
Manner to ask PT for attendance	
No. (%)	
Specific consult form per patient	75 (82.4)
Generic consult form for all patients	5 (5.5)
No form, PTs screen all patients	4 (4.4)
Other	7 (7.7)

(Continued)

**Table 1. Continued**

Specialist/professional responsible to write the form to ask PT for attendance (n=87)	
No. (%)	
Neurologist	60 (69.2)
Medical specialist trainee	35 (40.7)
Nurse	9 (9.9)
Physician	7 (7.7)
Other	12 (14.3)
Time between stroke onset and receiving the form for PT attendance	
No. (%)	
Within 1 d	71 (78.0)
Within 2 d	16 (17.6)
Within 3 d	2 (2.2)
Unclear time interval	2 (2.2)
Lines of accountability	
Who determines if mobilization is indicated	
No. (%)	
Neurologist	64 (70.3)
PT	39 (42.9)
Nurse	34 (37.4)
Trainee medical specialist	29 (31.9)
Other	23 (25.9)
Responsible for rehabilitation services	
No. (%)	
Neurologist	35 (40.7)
Each professional has their own responsibility for a specific part	35 (40.7)
Physician	15 (16.5)
Responsible for discharge destination	
No. (%)	
Neurologist	80 (87.9)
Physician	11 (12.1)

N=91 unless otherwise stated.

AHSU indicates acute hospital stroke unit; IQR, interquartile range; PT, physical therapist.

\*The definition of types of stroke care according to Stroke Unit Trialists' Collaboration<sup>2</sup>: general medical ward: care in an acute medical or neurology ward without routine multidisciplinary input. Acute intensive stroke unit: accept patients acutely but discharge early (usually within 7 d) with continuous monitoring, high nurse staffing levels, and the potential for life support. Acute semi-intensive stroke unit: accept patients acutely but discharge early (usually within 7 d) with continuous monitoring, high nurse staffing but no life support facilities. Acute nonintensive stroke unit: accept patients acutely but discharge early (usually within 7 d) but furthermore have none of these.

as PT and a mean of 12.8 years of employment in acute stroke care. Eight PTs (9%) were working at a stroke unit within a university hospital. Entry-level professional education was a Bachelor's degree in physical therapy (N=89) and exercise therapy (N=2). Five PTs obtained a Master's degree. Additional attended stroke courses were mainly on NeuroDevelopment Treatment or Bobath (N=51 [56%]), evidence-based neurorehabilitation courses (N=55 [60%]), and/or workshops offered at conferences (N=21 [23%]). Twelve PTs (13.2%) had not attended any stroke courses.

**Table 2. Current Practice, Hospital Policy and Recommendations From the Dutch CPGPS About the Time Spent on Exercise Therapy on Weekdays and Weekend Days and Start of Mobilization**

	Recommendation in CPGPS		Hospital Policy	Current Practice
Time dedicated to exercise therapy				
Mondays to Fridays				
Treatment frequency per 5 weekdays (mean, SD)	5×		4.5 (0.6) <sup>a</sup>	5.0 (0.5)
Treatment frequency per d (no., %) <sup>†</sup>	2×	Once a day	17 (18.7)	37 (41.4)
		Once a day, twice if possible	50 (54.9)	44 (48.4)
		Twice a day	9 (9.9)	9 (9.9)
Minimum time (min) dedicated to exercise therapy per d (mean, SD)	40		24 (6) <sup>b</sup>	22 (6)
Time dedicated to exercise therapy on Saturdays and Sundays				
Treatment frequency per weekends (%) <sup>†</sup>	2	No therapy on weekend days	9 (9.9)	14 (15.4)
		1 d	2 (2.2)	2 (2.2)
		2 d	7 (7.7)	6 (6.6)
		Only indication	60 (65.9)	69 (75.8)
Minimum therapy time (minutes) per d (mean, SD)	40		*	15 (6) <sup>c</sup>
Start of mobilization				
Time from stroke onset to mobilization (no., %)	<24 h	<24 h		65 (71.4)
		<48 h		23 (25.3)
		<72 h	*	1 (1.1)
		>72 h		0 (0.0)
		Unclear		2 (2.2)

N=91 for all variables except for superscript a (N=77), b (N=23), and c (N=72).

CPGPS indicates Clinical Practice Guideline for Patients with Stroke.

\*Not included in questionnaire.

<sup>†</sup>Remaining percentage/no. is lacking policy concerning this statement.

Table 1 summarizes the main characteristics of the participating hospitals and the multidisciplinary team. The AHSUs had a median of 4 beds with a median length of stay of 2 days. After discharge from the AHSU, patients moved to the neurology department, which had a mean of 21 beds and an average length of stay of 9 days. All multidisciplinary teams for patients with stroke consisted of a neurologist, a nurse, a physical therapist, and a speech therapist. In addition, most stroke teams include a physician (96%), an occupational therapist (97%), and a transfer nurse (82%). The transfer nurse manages the transition of patients with stroke from the hospital stroke unit to the other setting such as a rehabilitation center, nursing home, or patients' own home setting including support. Some stroke teams also contained a social worker (61%), a neuropsychologist (28%), and a geriatrician (27%). Multidisciplinary team meetings were almost always chaired by a neurologist (97%).

### Organization of Early Stroke Rehabilitation

Table 1 shows that in most AHSUs, PTs are asked for attendance with a common consult form that can be used by different disciplines of the multidisciplinary team. This common consult form, containing standardized items, is mostly

received within 1 to 2 days after hospital admission. In some hospitals (4.4%), PTs screen all patients with stroke and work without a form. Permission for mobilization is mostly given by the neurologist (70.3%) but other team members can also approve mobilization. PTs reported that in most hospitals each team member is responsible for their own part of the rehabilitation service. If the overall responsibility for the rehabilitation services is assigned to one team member of the AHSU, this is the neurologist. The neurologist is also responsible for deciding on the discharge destination (Table 1).

### Current Practice

Table 2 presents the current practice, hospital policy, and guideline recommendations on the time dedicated to exercise therapy and on the start of mobilization. Twelve AHSUs (13%) reported to have no policy and no protocol with respect to the recommended frequency of exercise therapy, whereas 67 AHSUs reported to have no policy and no protocol with respect to the amount of time dedicated to exercise therapy per day (73%). The minimum amount of physical therapy prescribed by hospital policy was estimated at a mean of 24 minutes a day. The reports on current practice show that

**Table 3. Barriers to and Facilitators for the Use of CPGPS**

Factors and Questions	Percent Fully Disagree	Percent Disagree	Percent Neither Agree nor Disagree	Percent Agree	Percent Fully Agree
<b>1. Professional characteristics</b>					
Read CPGPS thoroughly*	1.1	12.1	9.9	48.4	28.6
Enough knowledge about CPGPS to decide to apply it*	0	6.6	17.6	53.8	22
No problems with changing old routines*	0	6.6	15.4	61.5	16.5
CPGPS fits in with working methods in routine practice*	1.1	14.3	15.4	57.1	12.1
Patients cooperate with applying CPGPS*	0	0	16.5	63.7	19.8
<b>2. Cooperation by colleagues</b>					
Nursing staff or fellow physiotherapists cooperate in applying CPGPS*	2.2	12.1	15.4	56.0	14.3
Neurologists and/or physician cooperate in applying CPGPS*	1.1	8.8	25.3	51.6	13.2
Managers cooperate in applying CPGPS*	2.2	7.7	12.1	63.7	14.3
<b>3. Time investment and reimbursement</b>					
Adherence to CPGPS is not time-consuming*	5.5	31.9	18.7	40.7	3.3
Adherence to CPGPS requires no financial compensation*	8.8	44.0	20.9	23.1	3.3
<b>4. Guideline flexibility</b>					
CPGPS leaves enough room for me to draw my own conclusions	0	2.2	7.7	84.6	5.5
The CPGSP leaves enough room to take the patient's preferences into account	0	3.3	11.0	80.2	5.5
<b>5. Guideline applicability</b>					
CPGPS is a good starting point for independent study	0	12.1	17.6	60.4	9.9
Layout of CPGPS makes it suitable for practical use	3.3	18.7	40.7	37.4	0
Recommendations in CPGPS are clearly formulated	0	8.8	16.5	73.6	1.1
<b>6. Beliefs about CPGPS</b>					
Recommendations are mainly correct*	1.1	15.4	28.6	49.5	5.5
No general reluctance to adhere to CPGPS*	0	9.9	11.0	61.5	17.6
Sufficient knowledge and experience	0	3.3	5.5	80.2	11

CPGPS indicates Clinical Practice Guideline for Patients with Stroke.

\*The original statements of the barriers and facilitators questionnaire were reformulated into positive statements for the data analysis.

physical therapy is provided on all weekdays with a mean minimum duration of 22 minutes a day. In weekends, therapy is provided mainly based on a large variety of specific indications, for example, pulmonary care, control of contractures, first mobilization, and/or a parameter for expected deterioration over the weekend. Patients are mobilized within 48 hours after stroke onset in 88 of the hospitals (97%).

**Perceived Barriers and Facilitators for Adherence to the CPGPS**

Table 3 shows the reported barriers to and facilitators for the use of the CPGPS. The most frequently mentioned facilitator was “This CPGPS leaves enough room for me to draw my own conclusions,” whereas the most frequently mentioned barrier was “Working according to the CPGPS is too time-consuming” (Table 3). Items related to mobilization and exercise therapy revealed that (1) mobilization within 24 hours poststroke was regarded as feasible in 65 (71%) of the

AHSUs; (2) mobilization within 72 hours after stroke onset was regarded as feasible in 90 (99%) of the AHSUs; (3) having multiple therapy sessions on weekdays was regarded as feasible in 33 (36%) of the AHSUs; and (4) therapy on weekend days was regarded as feasible in 25 (27%) of the AHSUs. The 2 main barriers for early mobilization and exercise therapy were the patient’s health status (N=54 [83%]) and policy and funding of the organization (N=67 [95%]).

**Discussion**

Our national survey revealed considerable variation in the organization of early rehabilitation at AHSUs. A large gap is revealed between current practice and the evidence-based recommendations in the Dutch CPGPS. The mean amount of exercise therapy currently provided by PTs in Dutch AHSUs is approximately half of the recommended time of 40 minutes per day. These findings are in line with previous studies in

Australia and Europe<sup>25,26</sup> where higher levels of activity and mobilization were observed in western European centers compared with eastern European centers, whereas the time patients spent in activities with the potential to prevent complications and improve recovery of mobility is low (13% of a weekday).<sup>7</sup>

### Organization of Early Stroke Rehabilitation

The considerable variation in the organization of early stroke rehabilitation care could be explained by the lack of available evidence (Grade 1A) about (1) the disciplines required and the size of the stroke team; (2) the coordination of the team; (3) the number and frequency of team meetings; (4) specific guidelines about amount and schedule of therapy; and (5) alternative strategies such to augment exercise training after stroke. Subsequently, it is unclear what resources are needed to facilitate optimal early stroke rehabilitation. It seems that current decisions about the organization and management of early stroke rehabilitation are mainly driven by the local clinical expertise of healthcare providers and available resources. Improving PT services at AHSUs requires consensus on minimum quality criteria for the amount of therapy, the training of stroke team members, including PTs,<sup>29</sup> as well as an accreditation system to guarantee a certain minimum level of rehabilitation service at stroke units.

### Early Mobilization

Most PTs (71.4%) claim that they adhere to the guideline regarding the start of out-of-bed mobilization within 24 hours after stroke onset, even for patients who are sedated or uncooperative. Although this finding is promising, medical record audits of compliance with early mobilization process of care indicators from Australia and Europe have found compliance rates of between 11% and 49%.<sup>30,31</sup> We do not know whether the support for the practice of early first mobilization evident in this study would translate to high levels of compliance in the real practice setting. Interestingly, the present survey suggests that everyone agrees with the practice, whereas we found clinicians to be very mixed in their view of the early mobilization with many concerned about harm.<sup>32</sup> In the present survey, PTs reported “knowledge” and “experience” as a facilitator in guideline adherence. This finding is in line with the large number of years that the participating PTs had worked in acute stroke care.

### Augmented Exercise Therapy Time

The future challenge is how to increase the amount of exercise therapy without the need for additional use of resources such as staff. Potential alternatives include interventions such as (circuit) class training,<sup>33</sup> additional family-mediated exercise intervention,<sup>34</sup> practices supervised by nurses and the use of assistant PTs, robotics, and virtual reality training<sup>35</sup> and continuation of services including therapy at weekends.<sup>36</sup> These alternatives have been shown to be feasible, although cost-effectiveness and the differential effects of stroke severity and age remain to be proven. Implementation of these interventions in an AHSU should be further explored to facilitate their use in routine clinical setting, because many interventions never reach the clinic.<sup>1,36</sup>

Despite the presented alternatives to face-to-face physical therapy, in our opinion, these are insufficient to bridge the gap between current practice and the recommended intensity of exercise therapy. The participating PTs confirmed this by reporting that the current specialized staff would be unable to double the amount of therapy time and provide weekend services. PT managers, hospital boards, and insurance companies need to bridge this gap by deciding on the resources that should be allocated to facilitate successful implementation of the CPGPS and make acute stroke care more effective.

### Limitations

The study had a number of limitations. First, findings were self-reported and not based on observed behavior. With that, answers may be biased toward the Dutch GPGPS recommendations, whereas amount of therapy time is imprecise because those were estimated by PTs. Second, questions were answered from the PTs' professional perspectives, and the perspectives and experiences of other professionals in the stroke team may be different. Future research could focus on multidisciplinary guideline adherence and the attendant barriers and facilitators. Third, the questions on timing of mobilization were formulated as time between first mobilization and onset of stroke. Timing for PTs is easier to report from moment of admission. This leaves room for error in the survey environment. Fourth, we realize that the recommendations about the exact amount of exercise therapy and the moment of mobilization are somewhat arbitrary. The dose-response relationship between exercise therapy on AHSUs and functional outcome is poorly understood<sup>1</sup> and it is unclear if there is a minimum threshold for benefit.<sup>20</sup> In line with other guidelines,<sup>37</sup> the Dutch CPGPS recommend a dose of 40 to 60 minutes per workday<sup>16–20</sup> as an estimate for the optimal dose for stroke victims with a disability in basic activities in daily living (ie, Barthel Index <20 points).

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### Disclosures

G.K. manages also the current second revision of the Dutch guidelines of Stroke Rehabilitation that will be published in 2013.

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