Information Overload in Rehabilitation:

How to Keep Up Without Getting Down

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Have you ever casually gone to the mailbox thinking maybe there would be a letter from a friend, or notification that you have just won the Publisher's Clearing House sweepstakes, or at least some shampoo samples? But when you open the box you get this sinking feeling as you see a huge stack of mail, including several journals. You are not alone. This visceral response may mean that you are a victim of information overload. In a 1997 Reuters survey, 60% of the respondents reported that the amount of information they need to handle left them feeling stressed and tense.[1,2] And it is easy to see why.

FACTS

Consider this:

- "A weekday edition of the New York Times contains more information than the average person was likely to come across in a lifetime in 17th century England."[3]

- A 1997 survey of Fortune 1000 companies revealed that the average manager sends and receives 178 documents a day. It has been estimated that handling information costs companies $6,000 per employee annually.[1,4]

- In the United States there are more than 260,000 billboards, 11,000 newspapers, 11,000 periodicals, 27,000 places to rent videos, 500 million radios, and 100 million computers. Ninety-eight percent of American homes have a television set, and more than half have more than one. There are 40,000 new book titles published every year

(300,000 worldwide). And every day in America, 41 million photographs are taken and 60 million pieces of junk mail are handled.[5]

- Each year, the volume of information increases. Closer to home, in the biological sciences, even as early as 1978 it was reported that the annual biomedical literature produced was such that if a person read two articles a day 365 days a year, it would take 27 centuries to read it all. At the same rate it would take 7 centuries to read a year's worth of chemical literature, more than 14 years for cardiovascular literature, and more than 70 years for oncology literature.[6]

And if the sheer volume is not enough, these are not the only sources of overload. We also have phones, cell phones, pagers, answering machines, faxes, snail mail, voice mail, e-mail, overnight mail, teleconferences, meetings, Listservs, and newsletters, not to mention store displays, T-shirts, and informal chats with colleagues in elevators. And then there are the increasing number of numbers we need to keep track of, like PINs for the automatic teller and passwords for calling cards, Internet service providers, home computers, and work computers; zip codes and new area codes, driver's license numbers, health plan numbers, social security numbers, and medical record numbers.

Clearly, information overload has reached epidemic proportions. What is this information "disease" all about? What are the symptoms? Who is most susceptible to this condition? How bad is the situation in rehabilitation fields? Are there any cures?

WHAT IS INFORMATION OVERLOAD?

What is most surprising about information overload is that, although it seems like a new phenomenon, it has been studied by researchers in various disciplines since the 1940s.[7–9] There are actually two very

different kinds of information overload. The first is called "task overload." It is what happens when we look for information and are deluged with answers. A good example of this is when we do a search on the Web and get thousands of hits.

The second type of information overload is what I want to discuss today. It's called "upkeep overload."[10,11] This is what you may be experiencing this weekend after attending numerous educational sessions. And you are bound to experience it when you return home and see the stack of journals that are waiting for your attention.

Upkeep overload is being overwhelmed with the amount of information you need to process to stay up to date in your field. This is sometimes referred to as maintaining "professional currency" or your "intellectual capital." Manual laborers are valued for their physical skills, but we are considered knowledge workers, because our main contribution is what we know. When should Mrs. Jones begin active exercise? What information does Mr. Smith need to understand his injury? How much eschar should be debrided, how much resistance added? What work restrictions...? What splint material and positions to use...? The list goes on and on.

Upkeep overload involves the day-to-day activities that rehabilitation professionals feel are necessary to maintain their chief assets—their intellectual capital. Our professional training socializes us to believe that maintaining professional currency is important. Our certification and licensure requirements ensure the public that being up-to-date is a priority for our professions. Each of you is committed to keeping up in your field, or you wouldn't be here today. But it's not easy is it?

The most interesting point I discovered about upkeep overload is that we, as rehabilitation specialists, actually have a much more difficult time keeping up in our fields than do high-level executives in business, industry, or the government. The people "at the top" have other people who brief them about each aspect of their business. And the people at the bottom, the workers on the assembly line, don't have to worry about keeping up either, because their bosses will tell them everything they need to know to do their jobs.[10] It is we in the middle who must keep up to date largely on our own time and our own initiative. Knowing that we "have it hard" doesn't make it any easier, but I found it somewhat consoling to know that there is a reason for my madness.

Causes of Information Overload

At first glance, it may seem that the cause of information overload is that there is just too much information and too many automated ways to access it.[12] Actually, it is more complex than that. We become anxious because we sense that there is a "widening gap between what we understand and what we think we should understand."[3] It's not just the presence of information that causes the problem; it is our attempts to make sense of it all that is the problem.

It is said that "information anxiety...is the black hole between data and knowledge."[3] We have a "rapid accumulation and diffusion of information beyond human capacity to process it."

To put information into perspective, human beings need to take time to ponder, wonder, and dream.[13] We have information, but we don't have enough time to integrate it with what we already know. Not only do we feel overwhelmed by the amount of information to be understood, but sometimes, try as we might, we just don't understand the information. Sometimes we're anxious because we don't even know whether certain information exists—or if it does, where to find it. Sometimes we know information exists, but we don't have access to it—it costs too much, we forgot our password, or we can't remember what we named a document.[4] So the quantity of information is not the only cause of information overload. The problem of quantity is just the tip of the iceberg.

Symptoms

Psychological/Behavioral

Faced with too much information, we become confused and irritable.[14] We may even have a loss of time perception[15,16] and impaired judgment to the point of accepting false information.[16] We may be indecisive or have analysis paralysis.[1,17] All these help us procrastinate and can lead us to make foolish decisions, omissions, and errors.[9] One author went so far as to say that information overload "may have some relationship to schizophrenic behavior, indicated by the use of withdrawal or escape as coping mechanisms."[9]

Physical Symptoms

Besides what is going on in our minds, our bodies revolt as well, with symptoms of sleep deprivation, indigestion, heart problems, hypertension,[1] eyestrain,[18] neck, shoulder and arm pain,[18] and headaches.[19,20]

Sometimes we cope by multi-tasking or by working longer hours, but unless we control the overload itself in some way, the price we pay is shattered relationships and loss of our health.[19] Sources generally agree that when input reaches a critical level, output eventually decreases. Data smog,[21] brain drain,[1] data asphyxiation,[16] information anxiety,[3] information glut,[3,5,17] information chaos,[5] information fatigue syndrome,[1] paralysis of analysis,[1] toxic worry,[17,22]— whatever the appellation, the problem is clear, and it is clearly unhealthy.

TABLE 1. Hours per Week Spent on Specific Activities for Maintaining Currency by Seven OT Faculty Members at the University of Wisconsin Milwaukee

	Journals	Texts	Videos	Tapes	Networking	LISTSERV	Junk Mail	All Activities
Total	14.00	14.50	2.10	5.00	41.00	16.25	9.00	101.85
Mean	2.00	2.07	0.30	0.71	5.86	2.32	1.29	14.55
SD	1.15	4.01	0.52	2.12	4.02	2.10	0.84	6.86
Median	2.00	1.00	1.00	2.50	5.00	2.00	2.00	12.85
Mode	1.00	1.00	1.00	—	10.00	5.00	1.00	—
Range	1–4	0–10	0–1	0–4	2–10	0–5	0–3	5–25

EVALUATION OF INFORMATION OVERLOAD IN REHABILITATION

Scope of Literature in Occupational Therapy

Luckily, while we were busy evaluating our patients, information scientists were busy evaluating us. The study, published in 1997,[23] looked at the scope of literature in physical therapy (PT) by analyzing the sources of citations of all articles that appeared in two core PT journals over a three-year period. They found 22,945 citations in 1,020 articles. A similar study of the occupational therapy (OT) literature was published in 1999.[24] Three OT journals were studied over a two-year period. The literature encompassed 8,068 citations in 777 different journals.

Conservatively speaking, using the OT data, if 16 articles were published in each journal each year, an occupational therapist wanting to maintain very broad professional currency would need to read 43 articles every day, 365 days a year.

Professional Mail

Feeling a victim of information overload myself, I tracked and analyzed my mail for the month of February 2000. Excluding personal letters and non-professional catalogs, I received 214 pieces of mail at home, including 53 notices about continuing education courses, 47 ads, 45 bills or financial information, 33 catalogs, 18 journals, and 18 newsletters. (I find it particularly interesting that I would be sent ads from a petite store. Something is definitely wrong with their market analysis!) When sorted in these categories, the physical size of the stacks ranged from 2" to almost 5"—with professional catalogs being the thickest stack and newsletters the thinnest.

The breakdown of the continuing education conferences was as follows: 22 related to health care but not hand care; 11 to hand care; 11 to computers; 4 to management; and 3 to miscellaneous topics.

Of the professional catalogs, 10 were computer related, 10 were office catalogs, 10 were for rehabilitation products, and 3 were related to information

science. Apparently I subscribe to 8 rehabilitation journals, 6 medical informatics journals, and 4 library and information science journals. When I was involved on the ASHT Board of Directors, there was rarely a day without some correspondence from ASHT. I asked a current board member to track the number of mailings from ASHT in a month, and the number was 117. So we have a very hard working and information-producing board.

While your tally may look different from mine, I suspect that most of you have the same visceral response that I do when confronted with your mail. Keep in mind, though, that one person's junk mail is another person's treasured information.

Faculty Pilot Study

In preparation for this talk I did a pilot study on information overload among seven OT faculty members at the University of Wisconsin Milwaukee, the number of hours each faculty member spent per week in activities related to maintaining professional currency ranged between 5 and 25 hours per person (Table 1). All seven faculty members spent a total of 101.85 hours a week in these activities.

As shown on Table 2, the number of journals scanned ranged from 2.5 to 6, with a mean of 4 (SD 1.3) The mean number of journals read partially was 3. Very few journals were reported as being read in full. Four of the 28 journals (14%) that were scanned were read in full.

TABLE 2. Journal Reading Habits of Seven OT Faculty Members at the University of Wisconsin Milwaukee

	Journals Scanned	Journals Partly Read	Journals Fully Read
Total	28.50	18.00	4.00
Mean	4.07	2.57	0.57
SD	1.30	1.90	0.79
Median	4	3	0
Mode	5	3	0
Range	2.5–6	0–6	0–2

TABLE 3. Stress Ratings

Rating	No. of Respondents*
I have things under control	2
I feel pretty well controlled, but have a nagging feeling that I may be missing things	1
I know I am missing things, but I am comfortable that my approach keeps me from having major gaps in information related to my area.	–
I scan or read the major journals in OT, and feel comfortable with supplementing this with literature searches when needed.	1
I feel overwhelmed most of the time. It is a major source of stress in my life.	1
I have given up trying to keep up and only seek information when interactions with colleagues indicate that I have a major information gap.	1

*Number of respondents with this rating.

As with all other variables studied, there was much variation between subjects regarding the amount of stress experienced related to maintaining currency. The ratings varied from "no stress" to severe, i.e., "I've given up trying to keep up" (Table 3). One subject did not respond to the stress item. When comparing the stress data with other information collected, the only trend that was noted regarding stress is the that the two subjects who felt the most in control were the only subjects who did not report multi-tasking either at home or at work while involved in activities to maintain currency.

Although no literature was found regarding information overload in rehabilitation, Hunt and Newman did address information overload in 691 physicians.[25] They pointed out that not only is there an aging population and a rapidly increasing knowledge base with which to keep current, but there is also increased pressure to see more patients in less time, because of reimbursement issues. The majority of physicians stated that they had less time available for reading than they did five years earlier, and the more academic their practice was, the more pronounced the change for them, compared with their more clinical counterparts. The number of journals physicians reviewed each month ranged from 2.25 to 3.63, depending on their specialty. Although the article does not state whether these numbers represent means, if they are, then they are comparable with the mean number of journals scanned in the Wisconsin study, which was 4.07.

INFORMATION SCIENCE CONCEPTS

So what are the solutions? I have some good news! Luckily, because we are all information producers as well as information consumers, we have it in our power to relieve information overload for both ourselves and for others. Before we can do that, though, we need to understand a few information science concepts.

In a perfect world, we would each have a staff of advisors who would regularly brief us on all aspects of our practices. Imagine a world in which, like a top executive, you receive only information you need and only when you want it—"just in time" information, if you will. Imagine that you are with a patient, and you wonder whether there are any new treatments for reflex sympathetic dystrophy. Your personal assistant hands you a recent review. You read it, adjust your treatment plan accordingly, and for your efforts you are granted fractional CEU credits.[26,27]

Filtering

Filtering is the process whereby information is reduced in size on the basis of some criteria. Since there is simply too much information for anyone to absorb, filtering is going on around us all the time. More is not always better. Teachers filter for students, parents for children, and political parties for citizens. Filtering separates the wheat (what is wanted) from the chaff (what is not wanted). There can be both positive and negative aspects to filtering. A common and controversial example of filtering is the filtering of pornographic material on the Internet so that children are restricted from viewing it.

Alert Services/Selective Dissemination Services

Alert services, also known as selective dissemination services, are types of filtering. An individual (or group of individuals with similar interests) sets up a profile that specifies the topics on which they wish to stay up-to-date as well as the desired amount of information (table of contents, citation, abstract, full article); the format (e-mail, print, disk), and the frequency of the service (daily, weekly, monthly, bimonthly, quarterly, yearly). A librarian or a computer program then filters information and provides the person with information that fits the profile.[28]

Increased Processing Increases Cost

Information, just like physical products, increases in value the more it is processed. I'll give you an example of a physical product from the dairy state of

Wisconsin. A cow is fed and milked. The milk is pasteurized, transported, made into cheese, cut, packaged, weighed, labeled, transported to a store, and finally shelved. Each process changes one product into another more costly one. An example of information processing would be UE Net. Raw data were gathered and compiled, and reports were generated. The most expensive reports (and the most valuable) were customized benchmarking reports that highlighted information that was important to each site for decision-making purpose. Again, *the more processing that is done, the more costly any product will be.*

I believe this is one reason we are struggling to communicate with payers. Our pre-managed care progress notes served our purposes well, but now we are being asked to reformat, or repackage, this information to make explicit what we know, so that others outside our profession can understand us. This extra step takes time and therefore costs money. Like physical work, information work requires capital and labor to carry it out.[29]

Information Ages

Information ages, i.e., it gets older. It becomes outdated. The rate at which information ages varies with the field and context. The significance of this varies also. The weather report for last week won't tell you whether to take an umbrella today. (Unless you live in Seattle, in which case you should always carry an umbrella!) The *Physician's Desk Reference* (PDR) is updated every year, but anatomy texts evolve relatively slowly.

Invisible College

The invisible college is the learning opportunity that results from informal communication between colleagues.[30-33] For example, in a chance meeting in an elevator, one colleague tells another about a study he has just heard presented at a professional meeting.

SOLUTIONS

While technology played a part in causing information overload and some believe it will also provide the answers, remember that technology is only a tool. The process, the solution, begins with you.

Make a Plan

Whether you are a clinician, a manager, a professional volunteer, a contractor, or an employee with a professional organization like the ASHT, the Foundation (AHTF), or the certification commission (HTCC), the most important step you can take is to acknowledge the potential for information overload and develop a plan to avoid becoming a victim. Just

as we are told that patients with chronic pain must learn to have an internal locus of control about how they can manage their pain, so we must learn to manage information. Just as you would evaluate a patient's problems, evaluate your own information problems. Set a goal and plan how to get there. How much time do you want to devote to keeping up? When will you do it? Put it on your calendar. What topics will be your focus? Where or from whom can you get help when you need information?

Evaluate Your Use of Technology Tools

The average executive uses eight communication devices.[34] Do they really need all of them? Do you? Just because a device is available, it doesn't mean you have to use it. If you are too "technocentric," consider eliminating some of the toys or tools that cause you stress. On the other hand, if you are "technophobic," consider how you can exploit the tools to make your life less stressful.

Use Memory Aids

Use memory aids like tickler files, day planners, and automated computer reminders. Save your brain for processing information.

Define Your Interests

One of the most effective steps we can take to control information overload is to control the amount of information we are exposed to. If we define the information we need for our work or want because of our interests, we can make deliberate decisions to limit the information we are exposed to. As a result of studying my mail, I really examined my information needs and decided to eliminate two journal subscriptions. I decided to keep those catalogs coming, because I value knowing what new products are available.

Clinicians. By specializing in hand therapy, you have already taken a step in limiting your exposure to information. At the very least, specialization should allow you to more easily decide where to focus your attention. Find a niche in hand therapy, and make sure you are exposed to everything about the area. Be sure to separate what you *are* really interested in from what you think you *should be* interested in. Define your boundaries and shed the guilt. Then give yourself permission to not know everything else in the same amount of detail.

Managers. Therapists in management have the difficult task of trying to keep up on clinical topics as well as management issues. This difficulty is compounded by the fact that traditionally in medicine, people are promoted to management positions on the basis of their clinical knowledge and expertise, rather than their management skills. Conscientious

managers must then learn a new field—management—while keeping up with the clinical area, or risk the loss of the confidence of the clinical staff.

Steps can be taken to meet this challenge. Make a deliberate decision about what topics you need to add to those you already keep up on, but give yourself permission to let go of some of the clinical details that made you a good clinician. As a manager, you will serve your department better by gaining a broad view of what is going on outside the clinic in areas like reimbursement, business, and politics, so that you can see the big picture. Management of even a small department is a specialty in itself. Unless you can clone yourself or can afford to make management mistakes, you need to change what information you attend to. The higher you go in management, the broader your view needs to be.

Researchers and Academicians. Decide whether you want to have deep or wide knowledge of the field. With the current pace of accumulation of information, it is impossible to do both.

ASHT, AHTF, and HTCC. With funding at a premium, professional organizations must define their niches carefully and minimize overlap with related groups. Anything short of this is inefficient.

Focus on What Is Most Relevant

When is a study, a finding, or a report important to you? Only you can decide, but remember that the time you waste on irrelevant reading could mean you miss something relevant. File information when it catches your attention, and then read the whole file of related information at one time. You will integrate the information better if you read it either when you have time or when you have a need for it. Don't read e-mail messages as they come in. Just as you let an answering machine or voice-mail group calls for you to access when it is convenient, access e-mail messages only when you are ready to attend to them, not when others are ready to send them. Remove yourself from mailing lists that are not helpful to you.

Cultivate Information Exchange Relationships

Cicero said, "There are three sorts of people—those who know, those who don't know, and those who know where to look."

Clinicians. No matter how much you narrow a topic, you still cannot be an expert on every aspect of a field. You simply cannot read and synthesize everything, so give yourself permission to ask others whom you trust. But don't leave this to chance—make a formal commitment to a small group of individuals to share information. Turn your network of professional friends into a working group to help each other keep up to date. In other words, make your invisible college visible.

We all need to know the basics in our field, but does it make sense for everyone to try to keep up on minute aspects on their own? Imagine a clinic where one therapist is responsible for tracking and sharing changes involving ultrasound, another ergonomics, another tendon protocols, and another reimbursement issues? Then on a regular basis they brief the other staff about their findings. The literature is simply too extensive to efficiently do it all alone. Unlike executives of large companies or the President of the United States, we may not have the luxury of having people paid to keep us up to date, but we can form a sort of "knowledge co-op." Cultivate these information exchange relationships for all your interests, not just professional interests. Life is too short to feel you have to know everything.

Managers. After your staff is set up to brief you on clinical topics, you can focus on finding relationships that will benefit the department by keeping you current on management issues. Find a "management knowledge niche." Can you really afford not to know about laws that affect your business or when your competitors are offering new services? If you can't get excited about learning about management issues, give yourself permission to step down or delegate significantly.

Researchers and academicians. Those in academia may have the greatest difficulty implementing this concept. Although opportunities to share information abound, they are usually project-based rather than focusing on keeping up to date. What I am suggesting is that you hold department-wide briefing sessions on a regular basis so that everyone can gain a broad sense of what is going on. As your comfort with this process increases, include researchers from other departments. Recruit people who have knowledge niches different from those already in your department. While a critical mass is needed in some areas of research, interesting collaborations can result from cross-pollination among people with different interests and in different fields.

ASHT, AHTF, and HTCC. Managing an organization requires specialized knowledge. Form an organizational knowledge co-op among yourselves and with peers in similar organizations. By publishing the *Journal of Hand Therapy* and references in the Clinical Specialties Literature Scanning section of the *ASHT Times,* you have already taken the first steps toward promoting information exchange among members. Consider taking this a step further by adding a one-sentence abstract to each reference in the *ASHT Times.* Most Web browsers allow users to do a word search within a page, so by posting the citations without even providing a search engine, you will provide a great service. Some members might also like to have these delivered via e-mail. Some might even want full articles. This might even evolve into that fractional CEU program … .

Promote a Culture That Supports Effective Use of Information

Managers. Deliberately minimize your contribution to overload of both your staff and your superiors. Write short memos. Provide a place (preferably on a Web site) where people can readily find information they need rather than pushing information on staff. People often feel they need to read routed material immediately to avoid becoming a bottleneck, even if it is not very important or relevant to them. Avoid printing, if possible, to avoid handling, filing, and killing trees![35] Hold productive meetings.

Match employee information skills with job duties. If someone enjoys reading and scanning literature, make it part of their job, with the responsibility to brief others at set intervals. Some staff might enjoy being more clinically active but don't want to get behind on the literature. If they trust their co-workers to brief them, everyone could be happy. If all staff are equally interested and talented, have them alternate between reading and being briefed. If maintaining professional currency is valued, provide work time to do so. Two hours a week could help a whole department significantly. Make information sharing, rather than competitiveness, the rewarded norm. One company rewards employees who share knowledge that benefits the company by making them eligible to split a $5,000 reward.[36]

Researchers and academicians. Write review articles. Literature reviews are a necessary part of all teaching and research. Exploit your own efforts by writing review articles that will clarify issues for clinicians and academics with different interests. If you hold a teaching position, you probably do this informally for your students. Take the extra step and share it with a wider audience.

Evaluate and use reference management software to find, download, track, and format useful publications and citations. The learning curve is well worth the efficiencies gained. Share sources via the Web with research colleagues and fellow faculty members.[37]

ASHT, AHTF, and HTCC. Work together to:

- Identify information gaps and information that you have that are under-utilized or under-distributed. Could the Journal be accessed via the Web?*

- Evaluate methods of written communication to minimize overloading.

- Be proactive by providing summarization services. Commission your best authors to write review articles or books. Consider training them in evidence-based medicine techniques. Approve only articles or publications that contain thorough but concise literature reviews. Publish a special issue of major review articles.

- Fund projects that investigate or provide customized alert services.

- Provide continuing education courses that address ways of staying current.

Use Library and Information Science Services

As Nicholas Negroponte, director of the MIT Media Lab, said "When I hear the mantra 'anything, anywhere, anytime,' I try not to choke. My goal is to have nothing, nowhere, never, unless it is timely, important, relevant, or engaging."[38]

Clinicians and managers. You can take a step in that direction by setting up a personal profile with a local library or online service so they can alert you to new publications on a regular basis. Give them feedback until you regularly (on your schedule) get the amount and kind of information you want. If the service causes you more stress, narrow your niche. The APTA[39] offers an alert service for members called Literature Updates. Another good example is the Medical Group Management Association,[40] which offers a personalized Internet health care newspaper called NewsRounds. Join AOTA or APTA Listservs on clinical topics or administration and private practice. Or, if you already do use these services and they are not helpful, drop them.

Researchers and academicians. You are fortunate to have library and information services readily available. Academic libraries often have health science librarians who can give presentations to undergraduates about selecting appropriate databases and search strategies for rehabilitation topics. Individual consultations for specific projects for graduate students and faculty are also frequently available. Academic librarians may even be able to offer assistance in writing grants.

ASHT, AHTF, and HTCC. Set up alert services to track industries or organizations that may have an impact on organizational management or hand therapy. Provide summaries to the appropriate members, officers, staff, and board members. Use professional search services when developing new programs or products.

CONCLUSION

Although challenges still remain in finding and obtaining rehabilitation information, by and large our bigger challenge is managing information overload. I think most of you will agree with me that the pace of information coming at rehab professionals shows no signs of slowing. The extent to which you personally feel overwhelmed by this will probably

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*The current issue is available at the *Journal of Hand Therapy* Web site, http://www.jhandtherapy.org.

affect your willingness to try new ways of staying up-to-date. We have a lot of our professional ego tied up in what we know and what other people think we know. To say "I don't know" may seem like a sign of weakness or lack of professionalism, but I would argue the opposite. It is a sign of maturity and professionalism to admit that you cannot read, much less absorb, 43 articles a day, 365 days a year. And I believe it is a sign of professional maturity to both agree to be a trusted resource for other therapists and rely on others as resources for you.

The shortest distance between two places is a straight line. Even after you define what you want to know, there are many distractions that can keep you from getting there. Be selective about what you know and how you learn it. Have a plan! Decide to not to be a "victim."

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